



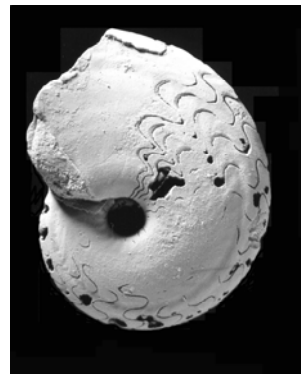
INTERNATIONAL UNION OF
GEOLOGICAL SCIENCES
COMMISSION ON STRATIGRAPHY

—s—D—s—

**SUBCOMMISSION ON
DEVONIAN STRATIGRAPHY**

NEWSLETTER No. 24

R.T. BECKER, Editor
WWU Münster
Germany



February 2009

ISSN: 2074-7268

CONTENT

		Page
Message from the CHAIRMAN	1	
Reports		
SDS Annual Report to ICS 2008 (Chairman)	2	
Minutes of Oslo Business Meeting (Chairman)	7	
Minutes of Kitab Business Meeting (Chairman)	12	
Annual Report of IGCP 499 (P. Königshof)	16	
International Conference on Palaeozoic Climates, Lille (CM Mistiaen)	17	
SDS Documents		
Request and comments concerning the Emsian GSSP (Carls, Slavik & Valenzuela-Ríos)	20	
Astronomical tuning, Western Illinois Basin (Clark et al.)	27	
Position of the Eifelian-Givetian boundary in New York (TM Over)	35	
Early Devonian Ostracodes, Central Nevada (Dojen, Evola & Murphy)	36	
Conodonts around the Annulata Events (Hartenfels, Becker & Tragelehn)	40	
Ammonoids and Famennian Substages (Chairman)	49	
Meetings		
NAPC June 2009, Cincinnati, with Devonian fieldtrip	50	
IPC summer 2010, London	56	
Publications		
Palaeogeography, Palaeoclimatology, Palaeoecology, 269 (3-4) (TM Racki)	57	
Stratigraphie von Deutschland	58	
Bulletin of Geosciences, 83 (4)	60	
Geological Society of London, Special Publications, 314	60	
Palaeogeography, Palaeoclimatology, Palaeoecology, Middle Devonian volume	61	
Palaeontographica Americana	62	
Manuscript invitation by D. Holloway		63
Frasnian conodonts of the Eastern Russian Platform (Ovnatanove & Kononova) n- Abstract		63
Palaeontological Atlas of Phanerozoic Faunas and Floras of Uzbekistan		64
Membership News		
CM G.C. Baird		65
CM A. Bartholomew		66
TM R.T. Becker and the Münster Group		67
TM C.E. Brett		72
CM R. Brocke		73
CM P. Bultynck		74
CM C. Burrow		74
TM J.-G. Casier		75
CM C. Corradini		77
CM J. Day		78
CM J. Ebert		81
TM N. Izokh		82
CM U. Jansen (and publications of P. Königshof)		85
TM Ma X.-p.		87
CM Mark-Kurik		88
TM J. Marshall		89
CM H. Matyja		90
CM M.A. Murphy		92
TM J. Over		93
CM S. Turner		94
TM J.I. Valenzuela-Rios		95
CM C. VerStraeten		97
TM K. Weddige		98
CM M. Whalen		99
Editorial		
The SDS Newsletter is published annually by the International Subcommission on Devonian Stratigraphy of the IUGS Subcommission on Stratigraphy (ICS). It publishes reports and news from its membership, scientific discussions, Minutes of SDS Meetings, SDS reports to ICS, general IUGS information, information on past and future Devonian meetings and research projects, and reviews or summaries of new Devonian publications.		

Editor: Prof. Dr. R. Thomas BECKER
SDS CHAIRMAN
Institut für Geologie und
Paläontologie
Westfälische Wilhelms-
Universität
Corrensstr. 24
D-48149 Münster, Germany
rbecker@uni-muenster.de

Circulation 120 hard copies,
pdf files of current and past issues
are freely available from the SDS
Homepage at
www.unica.it/sds/

Submissions have to be sent electronically,
preferably as Word Documents or pdf files, to the
Editor or to Mrs. S. KLAUS, IGP, Münster
(sklaus@uni-muenster.de). Submission deadline is
the end of each calendar year.

MESSAGE FROM THE CHAIRMAN

In behalf of our Subcommission, I wish all members a happy, healthy and scientifically productive 2009.

The highlight of 2008 was certainly our Field Symposium in the Kitab Reserve. It included the incredible hospitality of our Uzbek hosts, a very nice and unexpectedly comfortable logistical set-up, wonderful and well prepared sections, beautiful nature, perfect weather, a very high level of constructive discussions in the field, and most interesting conference contributions with many new data. Our Uzbek team, especially Aleksej KIM, Natalia MESHCHANKINA, Utkir RAKHMONOV, Maya ERINA, Irina KIM, and Firuza SALIMOVA made a wonderful job. Equally important was the scientific and organisational input of the Novosibirsk Group, notably of Zenya YOLKIN, Kolya BAKHAREV, Olga OBUT, and Nadya IZOKH. SDS also gives its deepest thanks to Nariman MAVLYANOV, Chairman of the State Committee on Geology and Mineral Resources, Republic of Uzbekistan (SCGMR RUz), and to Ilkombay TURAMURATOV, Chairman of the Organizing Committee and Deputy Chairman of SCGMR RUz. Their highest level support and interest in SDS enabled our successful meeting.

The successful work and high level of activity of our Subcommission was acknowledged at the Oslo meeting of ICS, where all SC Chairmen had to give brief reports. As in the last Newsletter, the annual report to ICS from November 2008 is included in the report section. You should read it carefully since it gives a balance of our objectives, goals, and achievements. At the Oslo ICS evening, SDS finished in the spotlight since Carl BRETT, one of our most active TMs, was honoured for his lifetime achievements in stratigraphy by the ICS Digby McLAREN Medal. CONGRATULATIONS CARL – you really deserved this award.

Whilst our standing within ICS is good, the expected very low attendance to our Business Meeting was rather depressing. I knew that this was coming since the planned SDS symposium was cancelled by the IGC organizers because of too few contributions. I am aware of the high costs of IGC attendance and I do

remember well the bill for a bear in downtown Oslo when John, our secretary, and I sat together to discuss SDS matters. But I hope that we will have more SDS members at the next IGC in Brisbane in 2012. The presence of our Subcommission at IGCs is inevitable and it is the only international meeting where stratigraphers of any part of geological time come together, join forces for the discipline, and where new methods and trends of our science are exchanged. In the Devonian, for example, we will have to learn from other systems how to improve orbital tuning and the quantification of stratigraphical data, using available freeware programs.

The large amount of publications contributes significantly to the reputation of SDS. The official Annual Report of IUGS for 2007 mentions specifically our Geological Society Special Publication on “Devonian Events and Correlations” as the first outcome of co-operation between IUGS commissions and the GSL. In this context we also have to acknowledge the very fruitful and positive collaboration with IGCP 499, which, unfortunately, cannot continue for very long. At the German IGC Meeting at the end of the last year, Peter KÖNIGSHOF, in his function as IGC 499 leader, and I agreed and expressed our support, declared that they will apply to IUGS for a one year project extension.

We will have two SDS-IGCP 499 Devonian sessions at the forthcoming (this June) North American Paleontological Convention (NAPC) in Cincinnati. Please look at the NAPC homepage (some details included in this Newsletter). Carl BRETT, Gordon BAIRD, Alex BARTHOLOMEW etc. promised to lead us to the Devonian of the Ohio-Michigan-Kentucky-Pennsylvania regions, where SDS has never been before. I am sure that the symposia and the excursion(s) will attract many of you and I am looking much forward seeing you in Cincinnati, where we also will have our Annual Business Meeting.

Yours sincerely, R. Thomas BECKER

REPORTS

International Commission on Stratigraphy Subcommission on Devonian Stratigraphy

Annual Report 2008

1. TITLE OF CONSTITUENT BODY

Subcommission on Devonian Stratigraphy

Submitted by:

R. Thomas BECKER, Chair of SDS
Westfälische Wilhelms-Universität, Institut für
Geologie and Paläontologie, Corrensstr. 24, D-
48149 Münster, Tel. +49-251-83 339 51, fax –
49-251-83 339 68; rbecker@uni-muenster.de

2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

Since SDS has formally defined all its series and stage boundaries since many years, it has worked in the last years on the formal definition of substages and on the improvement of multidisciplinary international correlation, involving both standard and various modern stratigraphic techniques. In addition, after completion of 10 year moratoria, the revision of two GSSPs has arisen as major tasks. SDS objectives for 2008 can be summarized as:

- Formal definition of Givetian, Frasnian and Famennian substages
- Revision of the basal Emsian GSSP and Pragian/Emsian substages
- Revision of the D/C boundary definition, in conjunction with the Carboniferous Subcommission (initiation of a new D/C Boundary Working Group)
- Publication of high-resolution correlation data in special issues of high-level journals/series and in close co-operation with IGCP 499 on “Devonian land-sea interactions”
- Official Business meetings at Oslo IGC and in Uzbekistan (see below)
- International field symposium with focus on the Emsian in the Zinzilban Natural Reserve, Uzbekistan, September 2008
- Support for additional international Devonian symposia (Lille, August 2008 and Frankfurt a.M., October 2008)

- Compilation and distribution of SDS Newsletter 23
- Intensive cooperation with ICS
- Update and extension of SDS homepage

All listed objectives fit the directions of IUGS and ICS:

- development of an internationally approved chronostratigraphical timescale for the Devonian with maximum time resolution;
- promotion of new and modern stratigraphical techniques and their integration into Devonian multidisciplinary schemes;
- application of GSSP decisions internationally and as a base for a better understanding of patterns and processes in Earth History, including Devonian major global environmental changes.

3. ORGANIZATION

Officers for 2008-2012

Chair: Prof. Dr. R. Thomas BECKER, WWU Münster, Germany

Vice-Chair: Prof. Dr. Ahmed EL HASSANI, Institute Scientifique, Rabat, Morocco

Secretary: Dr. John E. MARSHALL, University of Southampton, U. K.

The Subcommission has currently further 18 Voting Members that cover many major Devonian outcrop areas and many stratigraphical disciplines (see Appendix).

The SDS Membership covers currently the following 29 countries (in alphabetical order): Australia, Austria, Belarus, Belgium, Bolivia, Bulgaria, Canada, China, Czechia, Estonia, France, Germany, Great Britain, Iran, Italy, Latvia, Lithuania, Morocco, Myanmar, New Zealand, Pakistan, Poland, South Africa, Spain, USA, Uzbekistan, Tadzhikistan, Turkey, Vietnam. There is still a lack of active workers from other countries with important Devonian outcrop, especially from Brazil, Argentine, Chile, Algeria, Libya, Kazakhstan, Kirgisia, Caucasian countries, and Thailand.

At national level several Devonian Subcommissions exist in various countries, partly under different organisational names

(e.g., Germany, Russia, “Friends of the Devonian” at GSA meetings).

Website: The website, run by Corresponding Members C. CORRADINI and S. GOUWY at the University of Cagliari (Sardinia), has been established in spring 2007: <http://www.unica.it/sds/>
The old SDS website at the University of Texas at Arlington is not served any more and should be deleted from links and bookmarks. The new website includes the last three and future issues of the SDS Newsletter, Minutes of SDS Business Meetings since 2002, a list of SDS publications (soon to be updated), its membership with full addresses, GSSP information, links to ICS and IUGS, and information on past and future SDS meetings. Members are offered to establish links to local sites, where Devonian Powerpoint presentations of past talks can be downloaded.

4. INTERFACES WITH OTHER INTERNATIONAL PROJECTS

SDS is traditionally strongly tied with IGCP projects that have a Devonian focus. This is currently IGCP 499 on “Devonian land-sea interaction: evolution of ecosystems and climate” (DEVEC), lead by P. KÖNIGSHOF and colleagues from the Senckenberg Institute, Frankfurt a. M., Germany. There is a strong overlap of SDS and IGCP 499 members and several joint field meetings have been organized: Dra Valley, Morocco (2004), southern Siberia, Salair, Rudny and Gorny Altai (2005), Nevada-Utah (2007), Uzbekistan (2008). SDS members took part in a Devonian fieldtrip to Algeria (in spring 2007), to Libya (in April 2008), and in the final IGCP Symposium at the Senckenberg Institute (October 2008). IGCP 499 meetings are generally advertised on the official SDS Homepage. In 2009 two joint symposia have been formally accepted for the programme of the North American Palaeontological Convention (Cincinnati, June 2009). Plans are currently made for a future Devonian IGCP since IGCP 499 will run out at the end of 2008 (although application for a one year extension has just been submitted to the UNESCO).

5. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2007

Chronostratigraphic definitions: The necessity and demand for formally defined substages has

been discussed and outlined repeatedly (for example in SDS Newsletter 18, p. 13-14). This can be summarized as follows:

- Several Devonian stages, especially the Emsian, and Famennian, are much longer than other Phanerozoic stages, which results in a hardly justified, rather uneven chronostratigraphic subdivision of time.
- Several Devonian substages, especially the Emsian, Eifelian, Givetian, Frasnian, and Famennian, are divided naturally by important and short-termed global events, connected with sedimentary (anoxia, eustatic pulses) and evolutionary perturbations (significant extinctions and post-event radiations).
- Recognition of additional time units separated by major events/crises enables a better and more realistic reconstruction of past biodiversity changes. It can serve relevant data bases and prevent the current misleading lumping of different global events of first to third order.
- Devonian substages are widely used in many publications but informally and with regionally or individually very different understanding. Formal chronostratigraphy should bring order into this current chaos.
- Fluctuating and disputed (between different schools of biostratigraphers) zonal schemes of conodont, ammonoids or dacroconarids cannot replace the rigid framework of a stable chronostratigraphy.
- If a more refined chronostratigraphy is possible, then ICS should provide the overall geoscientific community with a most refined and reliable standard subdivision of time.

PRAGIAN/EMSIAN SUBSTAGES

The current revision of the base of the Emsian in the Zinzilban Gorge opens the question how to deal with the status of the current GSSP level. Convincing evidence has been brought forward that the latter is at a position that puts more than half of the classical Pragian (Praha Limestone of Bohemia) into the lower Emsian, very much below the base of the classical Emsian in the German type region. Consequently, it has been proposed at the Kitab Business Meeting to subdivide the Pragian in future into two substages, using the current Zinzilban basal Emsian GSSP, keeping its position and definition, as future GSSP for an Upper Pragian or Zinzilbanian Substage. A name for the Lower Pragian substage has not yet been proposed.

Attempts to subdivide the very long Emsian into formal Lower and Upper substages have not proceeded much in 2008. It has become clear that the very low current basal Emsian GSSP resulted in different perceptions, where the base of an upper substage should be. The working goal for SDS was to search for a good biostratigraphical marker close to the base of the Daleje Shale (or Dalejan) of Bohemia, above the Zlichov Limestone and its globally widespread *Anetoceras* faunas. It turned out that this is complicated by a diachronous base of the Daleje Shale, by strong endemism in conodonts at the time and by difficulties to trace the supposed eustatic Daleje Transgression internationally. In Russia and Central Asia typical lower Emsian faunas of Europe (from the *nothoperbonus* Zone onwards) have been proposed to fall in the upper Emsian. A decision on Emsian substages can not be expected before a revision of the Emsian GSSP.

REVISION OF EMSIAN GSSP

The current Zinzilban GSSP section was intensively re-sampled by several groups during the Uzbekistan field symposium. It was agreed that all results have to be reported simultaneously to the SDS Newsletter and to the Uzbek and Novosibirsk colleagues. Eventually a joint publication with all new stratigraphical data shall be compiled. At the SDS Business Meeting there was a very intense and partly controversial discussion concerning traditional and current Emsian boundaries. Based on the high quality of outcrop, its fossil content, the amount of past research, and the excellent local research facilities, there is complete agreement that any revised GSSP shall remain in the Zinzilban section of the Kitab Reserve. Revision of a revised Emsian GSSP will concentrate on levels, where *Polygnathus excavatus*, including its various morphotypes or subspecies, appears.

GIVETIAN AND FRASNIAN SUBSTAGE SUBDIVISIONS

SDS has formally voted on the base of Middle Givetian, Upper Givetian, Middle Frasnian and Upper Frasnian substages. However, the formal procedure how to deal with the clear voting results was open. At the Oslo ICS meeting it was agreed with the ICS officers that substage proposals will be submitted to

ICS for ratification in the same way as stage proposals, with the exception that there will be no selected/formerly proposed GSSP. Instead, a list of reference sections for different continents will be included that document the potential of chosen levels for international correlation. The supposed best section will be documented in detail as a potential future GSSP section. This will ease a formal GSSP decision if required in future. In the case of the Givetian, new conodont and ammonoid data for the Givetian of Morocco have been presented (ABOUSSALAM & BECKER, 2007, 2009 in press; GOUWY et al., 2007) since the last report to ICS and will become part of the substage submissions.

FAMENNIAN SUBSTAGES

A call to produce new relevant Famennian data for the Oslo Business Meeting did not result in new documents. This indicates that all arguments have been brought forward. Consequently, a formal vote on the base of Middle, Upper, and Uppermost Famennian substages will take place in December 2008. All levels will be based on conodont boundaries. For the Middle Famennian, the base of the *rhomboidea* and *marginifera* Zones have been proposed, for the Upper Famennian, the base of the *velifer*, *postera/styriacus* and *expansa* Zones have been proposed, for the base of the Uppermost Famennian the base of the Upper *expansa* Zone has been proposed. Data presented to the SDS Meeting at Nevada (also HARTENFELS & BECKER in SDS Newsletter 23) and to the resulting SDS volume (see below) strongly speak against the base of the Lower *expansa* Zone as a substage level. The base of the Upper *expansa* Zone has been subject of an intensive discussion included in Newsletter 23.

REVISION OF D/C BOUNDARY

At the Oslo IGC members of SDS and SCS came together to formally initiate a new International Working Group on the Devonian/Carboniferous Boundary. There are ca. 10 members both from the Devonian and Carboniferous side. SDS has made two proposals for a working group chairman and vice-chairman; proposals from the Carboniferous side are still pending. It was decided that working group members will vote on the proposals. As a work plan is was agreed that problems of conodont taxonomy have to be addressed first, before any progress can be

made. The new La Serre GSSP conodont data that fully unwrapped the GSSP problems have been submitted by S. KAISER to the Newsletters on Stratigraphy. The Chinese WG members have invited the other members, and especially the conodont workers, for a workshop in summer 2009 in Beijing, with a possibility to visit and sample important boundary sections in South China. Preliminary results of re-sampling in 2007 at Nanbiancun, Muhua and Dapaoshang, unfortunately, proved to be rather unhelpful. At the Uzbekistan field symposium a new D/C boundary section close to the Uzbek/Tadzhikistan border was shown, with detailed conodont data by M. ERINA. Results of re-sampling by BECKER, KAISER & MATYJA should become available in summer 2009. Members of the working group will have the opportunity to meet at the NPC in Cincinnati in June 2009.

PUBLICATIONS:

- YOLKIN, E.A., KIM, A.I., TALENT, J. (Eds.) 2008. Devonian sequences of the Kitab Reserve area. – International Conference “Global Alignments of Lower Devonian Carbonate and Clastic Sequences” (SDS/IGCP 499 project joint field meeting), August 25 – September 3, 2008, Kitab State Geological Reserve, Uzbekistan, Field Excursion Guidebook, 100 pp.; Publishing House of SB Ras, Novosibirsk.
- KIM, A.I., SALIMOVA, F.A., MESHCHANKINA, N.A. (Eds.) 2008. “Global Alignments of Lower Devonian Carbonate and Clastic Sequences” (SDS/IGCP 499 project joint field meeting): Contributions of International Conference, August 25 – September 3, 2008, Kitab State Geological Reserve. - 121 pp.; Publishing House of SB Ras, Novosibirsk.
- KIM, A.I., ERINA, M.V., KIM, I.A. (Eds.) 2008. Atlas of the Paleontological plates. Supplement to a Guidebook of the Field Excursion. – International Conference “Global Alignments of Lower Devonian Carbonate and Clastic Sequences (SDS/IGCP 499 project joint field meeting), August 25 – September 3, 2008, Kitab State Geological Reserve, Uzbekistan, 34 pls; Publishing House of SB Ras, Novosibirsk.
- BECKER, R. T. (Ed.) 2008. SDS Newsletter 23. - 127 pp., Westfälische Wilhelms-Universität Münster.

SDS members contributed significantly to the following other Devonian volumes:

- BULTYNCK, P., NARKIEWICZ, M. (Eds.) 2007. Recent approaches to Devonian conodont zonation. – Geological Quarterly, 51 (4): 339-480. [results of Devonian contributions to Leicester 2006 ICOS meeting]
- KÖNIGSHOF, P., LINNEMANN, U. (Eds.) 2008. From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. – 20th International Senckenberg Conference and 2nd Geinitz Conference. Final Meeting of IGCP 497 and 499, Abstracts and Programme, 241 pp., Frankfurt a. M., Dresden.

Currently there are four more Devonian volumes in preparation, which mostly or partly stem from past meetings with SDS involvement:

- Bulletin of Geosciences [results of 2005 Novosibirsk meeting]
- Palaeontographica Americana (results of Nevada 2007 meeting)
- Palaeogeography, Palaeoclimatology, Palaeoecology [Middle Devonian special issue]
- Geological Society of London, Special Publication [results from past IGCP 499 meetings]

MEETINGS:

- SDS Annual Business Meeting at the 33rd International Geological Congress, Oslo, 6-14th August [the announced special symposium suffered from too few contributions and was eventually cancelled by the organizers]
- International Conference “Global Alignments of Lower Devonian Carbonate and Clastic Sequences (SDS/IGCP 499 project joint field meeting), August 25 – September 3, 2008, Kitab State Geological Reserve, Uzbekistan [including a 2nd Business Meeting]
- International Congress “Palaeozoic Climates”, August 25-29th, 2008 Lille, France [with formal SDS support]

MEMBERSHIP:

Three retired, very experienced voting members, who were part of the backbone of the subcommission for many years, C.E. SANDBERG (USA), T. UYENO (Canada), and K. WEDDIGE (Germany), reached their maximum voting time in 2008 and will

continue as CMs. Unfortunately, no new voting member from Canada is available; based on his work both in the central to western USA and Canada, J. DAY will cover Canada until a new Canadian TM becomes available. K. WEDDIGE will be replaced by U. JANSEN from the same institute.

New corresponding members from Czechia (J. FRYDA) and Uzbekistan (U. D. RAKHMONOV) were elected.

6. CHIEF PROBLEMS ENCOUNTERED IN 2008

Problems with funding raised in the 2007 report continued in 2008. Many members could not afford to attend meetings and the lack of ICS travel support in 2008 is very regrettable. IUGS and ICS should improve the funding situation and joint efforts should be made to raise the interest of companies with industrial stratigraphy in the work of ICS. A refined, stable and precise chronostratigraphy as well as improved biostratigraphic and eustatic scales are of such high value that it should be possible to acquire donations. It seems that missing connections between academic and industrial stratigraphers need to be bridged.

The decline of academic position for stratigraphers is felt in several membership countries, especially in Canada, Belgium, France, Australia, Russia, and China. For several years, SDS has not been able to recruit new young and active Devonian workers from these countries that have a permanent research position.

As it was expected, the number of SDS members that attended the rather (too) expensive Oslo IGC was low. Consequently, the planned symposium on Devonian stratigraphy and correlation across facies belts had to be cancelled. The shift of the Business Meeting from the day between the two conference halves to a day within the first half resulted in the fact that some members, including the Secretary, missed the Business Meeting. Others, including the Chairman, were unable to give their scheduled talk since business meeting and stratigraphy sessions finished in different congress parts. SDS was not very satisfied with the Oslo organisation and improvements should be made in Brisbane in 2012.

7. SUMMARY OF EXPENDITURES IN 2008

INCOME	
carried over from 2007	306 \$
IUGS subvention 2008	350 \$
Sum	656 \$
EXPENSES	
SDS Newsletter 24, 01/2009	
printing/mailing	450 \$
balance early 2009	206 \$

8. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR (2009)

- Submit proposals for the formal definition of Givetian and Frasnian substages to ICS for ratification
- Publication of a brief note on Givetian and Frasnian substage definition in Episodes after ratification by ICS
- Publication of volume on Middle Devonian stratigraphy and multi-disciplinary correlation in Palaeogeography, Palaeoclimatology, Palaeoecology (TM C. E. BRETT, Ed.)
- Publication of SDS Newsletter 24 in early 2009
- Publication of proceedings volume of 2007 Nevada Field Meeting in Palaeontographica Americana (J. OVER & J. MORROW, Eds.)
- Update of Devonian Timescale for next GTS volume (GRADSTEIN et al.)
- Annual Meeting, two Devonian symposia (already officially accepted), and field excursion to Ohio and Kentucky (led by C.E. Brett and co-leaders) at North American Paleontological Convention, Cincinnati, June 2009 [The two symposia will focus on terrestrial-marine correlation and on an improved sequence stratigraphy/eustatic sea-level curve for the Devonian. Apart from the substage discussion and GSSP revisions, both topics have currently the highest priority in SDS activities]
- Update of SDS homepage
- Communicate outcome of Famennian substage vote and start to prepare substage proposals (starting with the base of the Uppermost Famennian)

- D/C boundary conodont workshop in Beijing, summer 2009
- Intense cooperation with ICS and its bodies (e.g., SCS, ISSC)

9. BUDGET AND ICS COMPONENT FOR 2007

INCOME

balance from 2008 206 \$

EXPENSES

SDS Newsletter 25 450 \$
 support for two SDS members to attend NPC,
 Cincinnati (business meeting, Devonian
 excursion and symposia) 1600 \$
 SUM 2050 \$

request for support/subvention from
 IUGS/ICS 2000 \$

APPENDIX A

SUBCOMMISSION OFFICERS

CHAIRMAN + SDS NEWSLETTER EDITOR

R. Thomas BECKER

Westfälische Wilhelms-Universität, Geologisch-
 Paläontologisches Institut, Corrensstr. 24, D-48149
 Münster, Tel. +49-251-83 339 51, fax +49-251-83
 339 68; rbecker@uni-muenster.de

VICE-CHAIRMAN

Ahmed EL HASSANI, Département de Géologie,
 Institut Scientifique, B.P. 703-Rabat-Agdal,
 Marokko; elhassani@israbat.ac.ma

SECRETARY

John E. MARSHALL, School of Ocean and Earth
 Science, University Southampton, Southampton
 Oceanography Centre, European Way,
 Southampton SO14 3 ZH, U. K.,
 jeam@soc.soton.ac.uk

WEBMASTERS

Carlo CORRADINI, Sofie GOUWY, Dipartimento
 di Scienze della Terra, Università di Cagliari, Via
 Trentino 51, I-09127 Cagliari, Italy;
 corradin@unica.it

List of voting members, country, special fields,
 email:

1. A. BLIECK: France, micro- and macro-
 vertebrates; alain.blieck@univ-lille1.fr
2. C. E. BRETT: Eastern U.S., sequence and
 cyclostratigraphy; carlton.brett@uc.edu

3. J.-G. CASIER: Belgium, ostracods;
 casier@naturalsciences.be
4. CHEN Xiuqi: Nanjing, brachiopods;
 xqchen@nigpas.ac.cn
5. J. HLADIL: Czechia, stromatoporoids, tabulate
 corals, various modern stratigraphic methods;
 hlakil@gli.cas.cz
6. N. IZOKH: Siberia, Asian Russia, conodonts;
 izokhn@uiggm.nsc.ru
7. MA Xueping: Beijing, brachio R. MAWSON:
 Australia, conodonts;
 rmawson@laurel.ocs.mq.edu.au
9. J. OVER: U.S., conodonts; over@geneseo.edu
10. M. C. PERRI: Italy,
 conodonts; perri@geomin.unibo.it
11. G. RACKI: Poland, brachiopods, event and
 sequence stratigraphy; racki@uranos.cto.us.edu.pl
12. J. DAY, USA/Canada, brachiopods, sequence
 stratigraphy; jeday@ilstu.edu [to be confirmed]
13. E. SCHINDLER: Germany, tentaculites, event
 stratigraphy; eberhard.schindler@senckenberg.de
14. V. TSYGANKO: European Russia, corals;
 tsyganko@geo.komisc.ru
15. J. I. VALENZUELA-RIOS, Spain, conodonts;
 jose.i.valenzuela@uv.es.
16. U. JANSEN, Germany, brachiopods;
ulrich.jansen@senckenberg.de [to be confirmed]
17. G. YOUNG: Australia, micro- and
 macrovertebrates, general stratigraphy;
 gyoung@geology.anu.edu.au
18. ZHU Min: Beijing, vertebrates;
zhumin@ht.rol.cn.net

MINUTES OF THE SDS BUSINESS MEETING, OSLO, 33rd INTERNATIONAL GEOLOGICAL CONGRESS, Room Akershus, 8th August 2008, 18.30

R. Thomas BECKER

As requested by ICS, as announced by email (distribution of the Agenda) and in SDS Newsletter 23, the formal annual SDS Meeting for 2008 took place in conjunction with the 33rd IGC in Oslo, and in conjunction with various ICS symposia. Because of a shift of the congress talk by the Chairman to 17.30 on the same day, and because of overlap in time and of the meeting room with the Silurian Subcommission, the beginning of the Business Meeting was shifted to 18.30.

Attendance: A very low attendance was anticipated by experience with past IGCs and by the feedback with many members. Therefore, the huge amount of given apologies

will not be reported. Due to the rather late and somewhat unexpected shift of all ICS business meetings from the 10th to the 8th August, the SECRETARY, who was on a field trip at the time, could not attend and, consequently, the Minutes are prepared by the CHAIRMAN. Present TMs: The CHAIRMAN, A. BLIECK, C.E. BRETT, J. HLADIL; CMs: M. NARKIEWICS, S. TURNER, WANG, C.-Y.; Guests: P. HECKEL (outgoing Chairman of Carboniferous Subcommission), B. RICKARDS (new Chairman of Carboniferous Subcommission), Ji QIANG (Beijing).

No Documents were presented.

1. Introduction

The CHAIRMAN welcomed the participants and gave the apology of the SECRETARY, who recognized the change of date too late, and of the VICE-CHAIRMAN, who was not part of the Moroccan delegation to the IGC. He regretted that the planned SDS symposium on neritic-pelagic correlations also had too few contributions. Consequently, it was cancelled and talks were mostly transferred to the HPF-01 symposium on "General contributions to palaeontology and historical geology". The IGC organizers, unfortunately, were unable to combine, as proposed by the CHAIRMAN and by Peter KÖNIGSHOF, the SDS and IGCP 499 symposia, which then both were cancelled. Session HPF-01 and Session HPF-13 on "Major events in the evolution of marine biota" included several important Devonian talks on Devonian sea-level changes in Algeria (by VIDET et al.), on the classical Pragian (by HLADIL et al.), on Xinjiang (by SUTTNER et al.), on the trilobite faunas and extinction around the Frasnian-Famennian boundary of the Canning Basin (by K. MCNAMARA), on the Taghanic Event in the Baltic Basin (by the SECRETARY), on Frasnian ammonoids in neritic facies (by the CHAIRMAN), and on the Baltic Silurian-Devonian boundary (poster by LAZAUSKIENE et al.).

2. The few members present **approved** the **Minutes** of the Nevada Meeting 2007, published in SDS Newsletter 23, pp. 11-19.

3. CHAIRMAN'S Business

Lyudmila NEKHOROSHEVA reported in April 2008 on the death of our long-time CM Svetlana V. CHERKESOVA, who died already on the 28th September 2007. The Devonian

community has not only lost a kind and pleasant person but also an important member with immense knowledge of the Devonian of the Russian Arctic. The CHAIRMAN asked for a minute of memorial silence.

A very pleasant news is the award of the ICS Digby MCLAREN Medal for the outstanding lifetime contributions to stratigraphy to our TM C.E. BRETT. The CHAIRMAN warmly congratulated Carl and emphasized that the well-deserved award also shines some of its light on the progress in Devonian stratigraphy in general.

The annual report to ICS has been included in SDS Newsletter 23 (pp. 5-11) and summarizes the past (2007) goals, achievements and topics, which need to be followed further on. As requested for every four year period starting with an IGC, it includes objectives and a work plan for the period until the next IGC in Brisbane in 2012. All members are asked to read this carefully and to become actively involved with the realisation of the ambitious programme. In 2012 SDS will have to produce a hopefully positive balance of goals and achievements. Our SDS meetings shall be combined with symposia that deal with the major tasks, such as the improvement and revision of the global eustatic curve, advances in cross-facies (terrestrial-neritic-pelagic) correlation, event stratigraphy and in geochronology, for example based on cyclic stratigraphy ("orbital tuning") and new radiometric ages. Perhaps in 2011 we should give some time for a review of the correlation between formal global and regional chronostratigraphic units.

The CHAIRMAN drew attention to the highly interesting contributions on general aspects of stratigraphy and geochronology that have been made in the various ICS symposia in the past days of the IGC. He specifically mentioned discussions where stratigraphers were reminded about the rather variable and potentially long (several 100 Ka) residual time of crystallized zircons in melt before eventual volcanic eruption and volcanoclastic deposition. In other words, any zircon dating gives the crystallisation, not the depositional age, and the difference can be up to the length of a biozone - and there is no method to know or estimate the difference. The Devonian was used as a case study in a talk by M. VILLENEUVE and M. SCHMITZ (in Session HPS-05 on "Recent developments in the Geological Timescale") to apply the most up-

to-date knowledge to re-calculate all published zircon ages and their analytical and methodological error bars. Published ages are also assigned to different classes of reliability. In specific cases originally published and new ages differ significantly. The new data will be incorporated into the scaling of Devonian time and stage/zone durations in the Devonian chapter for the planned GTS 2010 timescale. The CHAIRMAN has to revise in co-operation with F. GRADSTEIN the previous HOUSE & GRADSTEIN chapter of the GTS 2004 book and welcomes outside advice and suggestions. He will approach specific persons in order to deal with the various problems.

4. ICS Matters

The new Chairman of ICS, starting with the current IGC, is Stan FINNEY, former ICS Vice-Chairman and Chairman of the Ordovician Subcommission; the new vice-chairman is Shanshi PENG, former Chairman of the Cambrian Subcommission. Therefore, there is a very deep understanding of problems of Palaeozoic stratigraphy among the current ICS officers. There has been a very positive and fruitful co-operation with the outgoing ICS officers and this will continue in the next four years to come. In addition to the mentioned D. McLAREN Medal to Carl BRETT, the ICS Medal in honour of single specific stratigraphical achievements was awarded to J. PALFY.

In general, ICS has been exceedingly active in the past year, partly in preparation for the IGC, where it was hoped to have as many new GSSPs decided as possible. Decisions on the base of the Visean, Thanetian, Selandian, Carnian and Bathonian stages were achieved and ratified. The CHAIRMAN took actively part in this process. In addition, the "Quarternary Problem" is far from being solved and, consequently, the IGC included several Quarternary sessions (e.g., symposium HPS-07 on "Plio-Pleistocene correlation and Global Change"), with a special discussion, including representatives of all relevant organisations, that took place on the evening of the 9th August. The selected Holocene GSSP has become unique since it is within a Greenland icecore. The Upper Pleistocene GSSP also has been proposed in a core, at Amsterdam Airport. At the IGC, it was not yet ratified since the proposal was part of the ongoing Quarternary discussion. It has been decided to make a complete new start, which includes

future new decisions on the status and base of the Quarternary, variably at ca. 1.8 Ma or at the base of the Gelasian, which is currently part of the Pliocene (and Neogene). It has to be acknowledged that the Quarternary discussion occupies a large part of ICS activities and capacities and its past handling has, unfortunately, deteriorated the ICS-IUGS relations.

Reports of each Subcommission are included in the voluminous ICS Report for 2007 to IUGS (GRADSTEIN & OGG 2007, 200 pp.), which is available from the CHAIRMAN on request. The same applies to the partly voluminous Newsletters of the International Subcommission on Stratigraphic Classification (ISSC), published by its Chairlady Maria Bianca CITA. Issues no. 12 and 13 were delivered in December 2007 and June 2008, respectively, and deal with much more than classification problems.

A review of all current GSSPs, stratigraphic scales and geochronological ages has been published as an update to the GTS 2004 by OGG, J.G., OGG, G. & GRADSTEIN, F.M. **"The Concise Geologic Time Scale"**, Cambridge University Press, 177 pp. (published formally under the auspice of IUGS and ICS). For the Devonian it adopted data from the chapter in GTS 2004. Unfortunately, the GSSP updates in "Courier 225" are not recognized. Also, there are multiple recent changes of zonations and correlations that will have to be included in the forthcoming GTS 2010, which will have more than 30 chapters.

Another major task of ICS and of ISSC has been progress towards a new "Stratigraphical Guide" that expands into modern stratigraphical fields, such as sequence, isotope and cyclostratigraphy. Outlines for future chapters on cyclostratigraphy (STRASSER et al. 2007) and chemostratigraphy (WEISSERT et al. 2008) have been published in "Newsletters on Stratigraphy" (42-2 and 42-3) and were meant to form a base for discussion before an eventual completion/revision. Chapters on magnetostratigraphy (LANGEREIS et al. 200) and sequence stratigraphy (EMBRY et al. 2007) have also been distributed. All four proposals can be requested from the CHAIRMAN if not available from local libraries. The current efforts towards a new Guide also lead to Symposium HPS-012 ("New developments in stratigraphic classification") and Workshop WSS-11 (with the same title) at the IGC. The ICS Business Meeting took place in the early

evening of the 7th August, where the CHAIRMAN gave a short report on current SDS activities.

ICS and ISSC Newsletter 13 drew attention to a new textbook on stratigraphy: **REY, A. & GALEOTTI, S. (Eds.), "Stratigraphy - Terminology and Practice"** (Editions TECHNIP, Paris, ISBN 976-2-7108-0910-4, 45 € or 54 \$ + 6 € postage).

5. Devonian Chronostratigraphic Definitions

The low attendance, lack of new documents, and time restrictions spoke against detailed substage discussions.

5.1. Emsian

A revision of the basal Emsian definition and subdivision into two substages will become the prime focus of the forthcoming Kitab Field Meeting.

5.2. Eifelian

A wealth of new data from North America and Morocco suggests that a subdivision into future formal Lower and Upper Eifelian substages could be achieved. The base of the *T. kockelianus australis* Subzone should be discussed for the base of the Upper Eifelian but aspects of sequence stratigraphy have to be taken into consideration.

5.3. Givetian

Separate formal substage proposals for the base of the Middle Givetian (base of *rhenanus-varcus* Zone) and Upper Givetian (base of *hermanni* Zone) have to be submitted soon to ICS for ratification. The Working Group Chairman (CM BULTYNCK) will be asked to take a leading role.

5.4. Frasnian

The same applies to the base of the Middle Frasnian (base of MN 5 or *punctata* Zone) and Upper Frasnian (transgression-controlled spread of *Pa. semichatovae*). The Working Group Chairman (TM OVER) will have, as in the past, a coordinating function.

5.5. Famennian

Although members were specifically asked to submit final Famennian documents, this has not happened. Two important papers on European and North African conodont successions by KAISER et al. and HARTENFELS & BECKER have been submitted to the Nevada

Proceedings Volume (see Topic 7) and these results will have to be considered during the vote. In the absence of further contributions it was decided that the formal ballot (by current TMs) should now proceed. No further straw vote will take place.

5.6. D/C Boundary

By the presence of the past (Phil HECKEL) and new (Barry RICKARDS) Carboniferous Chairmen, it was possible to formally start the new International Working Group on the Devonian Carboniferous Boundary. From the Devonian side it will consist of

1. R. Thomas BECKER (Germany)
2. Denise BRICE (France)
3. Carlo CORRADINI (Italy)
4. Brooks ELLWOOD (USA)
5. Ji QIANG (China)
6. Sandra I. KAISER (Germany)
7. John E. MARSHALL (U.K.)
8. Hanna MATYJA (Poland)
9. Claudia SPALLETTA (Italy)
10. WANG, Cheng-yuan (China)

From the Carboniferous side the following members have been proposed:

1. Jim BARRICK (USA)
2. Paul BRENCKLE (USA)
3. Geoff CLAYTON (Ireland)
4. Jiri KALVODA (Czechia)
5. Rich LANE (USA)
6. Svetlana NIKOLAEVA (Russia)
7. Vladimir PAZUKHIN (Russia)
8. Edouard POTY (Belgium)
9. Barry RICKARDS (Canada)
10. Yuan Jin-LIANG (China)

This composition covers the main and classical countries of D/C boundary research, with the exception of Australia. There are specialists for conodonts, ammonoids, spores, foraminifera, brachiopods, corals, trilobites, sequence stratigraphy, isotope stratigraphy, and magnetostratigraphy. This promises constructive, multi-disciplinary discussions. It is possible to expand the WG membership in order to cover additional fields of science and regions. The Chairman announced that C. CORRADINI agreed to candidate as forthcoming WG Chairman, Ji Qiang agreed to be a candidate for the Vice-Chairman position. The voting shall take place amongst the WG members. However, candidates from the

Carboniferous side have to be proposed, too, and probably there will be a competitive poll.

The present WG members agreed that no simple and fast solution (new GSSP) can be expected and that new and high-quality data from old and new sections need to be generated. As a rough work plan, the following major tasks can be formulated.

- conodont data for the La Serre GSSP by S. KAISER (first rejected by Episodes but now in print in Newsletters on Stratigraphy)
- Revision of taxonomy of critical siphonodellids and protognathodids in the D/C transition.
- Re-sampling of well-known sections in the light Publication of the new and critical of these revisions.
- Documentation of new or previously poorly studied D/C boundary sections.
- Improvements of the correlation between conodonts and other fossil groups.
- Application of other modern stratigraphical methods/techniques.
- Decision on the boundary level: confirmation of the current “*sulcata*” level or change to different level.
- Selection of suitable GSSP section: La Serre or new section(s).
- New, revised GSSP proposal.

Ji Qiang proposed a conodont workshop to take place in summer 2009 in Beijing, with the opportunity to re-sample the famous South Chinese sections, especially the recently re-excavated Dapoushang section in Guizhou Province. He promised significant support from the Chinese side, which was well received. The CHAIRMAN reported briefly the rather disappointing results of the re-sampling at Nanbiancun and at the partly covered and inaccessible Muhua and Dapoushang sections in summer 2007, jointly with Sandra KAISER. At the latter, but before the more recent re-excavation, the base of the Carboniferous was not reached (S. KAISER, wr. comm. June 2008) despite considerable efforts and help of some local people. This emphasizes the importance to re-sample and protect the site. The possibility was raised whether some WG members may meet in conjunction with the NAPC in June 2009 or with ICOS in Calgary. It is quite clear that the problems of conodont taxonomy need to be resolved first. In this respect, the CHAIRMAN announced that H.

TRAGELEHN is currently preparing a manuscript on siphonodellids from Franconia, which include pre-Hangenberg forms that in their asymmetric curvature already closely resemble *Siph. sulcata*. He should be invited to the planned conodont workshop.

6. Membership

In the absence of any Canadian candidate it was proposed that CM J. DAY should follow T. UYENO as future TM to cover the Canadian Devonian. K. WEDDIGE has reached his upper time limit as TM and has also recently retired from the Senckenberg Institute. It was proposed that he should be followed after the IGC by U. JANSEN. CM J. MORROW declined the nomination to follow C.A. SANDBERG as TM for western North America since he felt that he would not have the time and sufficient support to attend future SDS Meetings.

The current TMs still have to confirm the two new TM proposals.

No new CMs have been proposed.

7. SDS Newsletter and Publications

SDS Newsletter 23 was edited by the CHAIRMAN, with significant help by his secretary, Mrs. Susanne KLAUS, and distributed in February 2008. It became the most voluminous Newsletter so far, which in a very positive way reflects the high level of SDS activities. But the increase in length came with an increase in costs.

SDS can be proud that in 2007/2008 seven different volumes with Devonian contributions, involving many SDS members, and mostly in fruitful cooperation with IGCP 499, have been published, are in print, or are in preparation:

1. **Geological Society of London, Special Publications, 278**, “Devonian “vents and Correlations”, BECKER, R.T. & KIRCHGASSER, W.T. (Eds.) – mostly the outcome of 2004 Morocco Meeting.
2. **Geological Quarterly, 51 (4)**, “Recent approaches to Devonian conodont zonations”, Bultynck, P. & Narkiewicz, M. (Eds) – outcome of Leicester ICOS session.
3. **Geological Society of London, Special Publications, 341**, IGCP 499 volume on “Devonian Chance: Case Studies in Palaeogeography and Palaeoecology”, P. KÖNIGSHOF (Ed.).

4. **Bulletin of Geosciences**, **83 (4)**, P. KÖNIGSHOF, O. OBUT & N. IZOKH (Eds.) – partly the outcome of 2005 Novosibirsk meeting.
5. Proceedings volume of the 2007 Nevada Meeting, to be published in **Palaeontographica Americana**, J. OVER (Ed.)
6. IGCP 499 **special volume in Palaeogeography, Palaeoclimatology, Palaeoecology**, “Sea-level and climatic cyclicity and bioevents in Middle Devonian marine and terrestrial environments”, C.E. BRETT, E. SCHINDLER & P. KÖNIGSHOF (Eds.).
7. **Palaeogeography, Palaeoclimatology, Palaeoecology**, special volume on D/C boundary, P. ISAACSON (Ed.) [cancelled in the meantime, February 2009]

8. Financial Report

balance from early 2007	256 \$
private donation 2007	100 \$
ICS subsidy 2007	400 \$
balance end of 2007	756 \$
SDS Newsletter 23	450 \$
ICS subsidy 2008	350 \$
balance at IGC	656 \$
(open: SDS Newsletter 24	450 \$)

The poor funding by IUGS/ICS in 2008 did not allow to support any SDS Member to attend the IGC.

9. Future SDS Meetings

2008

Two more conferences with formal SDS support will take place in 2008: The Field Symposium in the Kitab Reserve, Uzbekistan, in late August and early September (25th to 3rd), and, unfortunately in parallel, the International Congress on “Palaeozoic Climates” in Lille, France (25th to 29th August). During the Kitab symposium, a second formal Business Meeting will be conducted.

2009

The Annual Business Meeting 2009 will be held in conjunction with the North American Paleontological Convention (NAPC), in June (12th to 26th) in Cincinnati, Ohio, U.S. (see www.napc2009.org), followed by a Devonian excursion to Ohio, Kentucky and adjacent

states, kindly offered by TM BRETT and collaborators.

2010

The 3rd International Palaeontological Congress has now been scheduled for London. This gives a second opportunity for the formerly cancelled fieldtrip to the Old Red Devonian in Scotland.

10. Any other business

None

MINUTES OF THE SDS BUSINESS MEETING

KITAB STATE GEOLOGICAL RESERVE, UZBEKISTAN

2nd September 2008, 15.10

R. Thomas BECKER, assisted by CM U. JANSEN (protocol)

Apart from TM HLADIL and the CHAIRMAN, none of the present members and guests attended the Business Meeting at Oslo. Consequently it was decided to go through the complete Agenda of the Oslo Meeting, but giving special emphasis (and time) to the Emsian discussion, the main reason for the Field Symposium. In order to allow everybody to follow the discussion in all details, CM OBUT offered a complete translation from English into Russian and reverse.

The following Minutes will not repeat all the information of the Oslo Minutes. It will only concentrate on additional data and on the Emsian discussion.

Attendance: The CHAIRMAN, TMs J. HLADIL, N. IZOKH, J.I. VALENZUELA-RIOS; CMs N. BAKHAREV, P. CARLS, R. FEIST, U. JANSEN, A. KIM, H. MATYJA, O. OBUT, L. SLAVIK; guests S. BERKYOVA (Prague), P. CEJCHAN (Prague), C. CRÔNIER (Lille), K. DE BAETS (Zürich), C. DOJEN (Münster), I. EVDOKINOVA (St. Petersburg), M. ERINA (Tashkent), J. FRYDA (Prague), F. KARIMOVA (Tashkent), I.A. KIM (Tashkent), V.G. KHROMYCH (Novosibirsk), L. KOPTIKOVA (Prague), O. MESENTSEVA (Novosibirsk), N. Meshchankina (Tashkent), E.D. MICHAILOVA (St. Petersburg), H.-G. MITTMAYER (Schlangenbad, Germany), S V. NIKOLAEVA (Moscow), U.D. RAKHMONOV (Kitab), O.

RODINA (Novosibirsk), F. SALIMOVA (Tashkent), M. SCHEMM-GREGORY (Frankfurt), G.D. WEBSTER (Pullman, Washington).

Document: CARLS, P., SLAVIK, L. & VALENZUELA-RIOS: Request and comments concerning the GSSP for the basal Emsian stage boundary, 9 pp., 1 Fig. [see this newsletter].

1. Introduction

The CHAIRMAN opened the SDS Business Meeting and expressed his warmest thanks to the Uzbek hosts, notably to I.B. TURAMURATOV, in his function as meeting Chairman, to N.G. MAVLYANOV, Chairman of the State Committee on Geology and Mineral Resources of Uzbekistan (SCGMR Ruz), and to the Devonian team of Uzbekistan, with A. KIM, U. RAKHMONOV, N. MESHCHANKINA, M. ERINA, and others. The present SDS members are overwhelmed by the Uzbek hospitality, by the pleasant and comfortable set-up in the Kitab Reserve, by the perfect organisation, the wonderful sections, and the beauty of the nature. The outcrop quality and fossil content are amongst the best on a global scale for the Lower Devonian and this ensures that many Devonian workers will like to return to the area. The CHAIRMAN emphasized the importance of the long Tashkent-Novosibirsk cooperation, which enabled this meeting, which allowed the significant recent research progress, and which is of highest importance for the solution of the current problems of Emsian stratigraphy. Amongst many others, special thanks is given to the unfortunately absent CM YOLKIN, to CM BAKHAREV, TM IZOKH, and CM OBUT. The sometimes tiring translation service of Olga was very crucial for the great success of the meeting and excursion. The oral presentations included many high-quality contributions that covered all of the Devonian and many regions. There were almost 30 talks and 18 posters. It is especially important that a wealth of new data for the Devonian of Uzbekistan and of Russian regions have been made available to the international scientific community. The Kitab Meeting will be long remembered and will result in a lasting improvement of communication between Devonian specialists and in true friendship between workers that had not much previous contact. Independent from the outcome of the Emsian revisions,

there is the unanimous feeling that the excursion and symposium of the last days has been a great success. All SDS members that did not attend will have to regret that they missed the event.

Stratigraphy as a geoscience discipline suffers in general from the lack of a first class journal with high international reputation and high impact factor. In this respect the CHAIRMAN draws attention to the rejuvenation of the “Newsletters on Stratigraphy”, which, since early 2008 (or starting with vol. 43), has the formal support of ICS and IUGS. The journal’s editorial board has been broadened and the format enlarged. SDS members are recommended to grab this improved publication opportunity.

5. Devonian Chronostratigraphic Definitions

5.1. Lochkovian

The CHAIRMAN stated that he recognized that some workers started to use subdivisions of the Lochkovian in publications. He asked whether there was a wish for future formal subdivision. TM VALENZUELA-RIOS, CM CARLS and C. DOJEN confirmed the use of three informal substages (lower, middle, upper). A formal substage recognition seems possible but requires additional work.

5.2. Pragian

In relation with the Emsian, a new Pragian discussion is inevitable. CM SLAVIK explained the difficulties of the basal Pragian definition since *Eognathodus sulcatus*, the traditional basal index taxon, is very rare in the Barrandian and has been found 20 cm below the GSSP. Currently, the entry of “*Icriodus steinachensis*” is used as approximation. M. ERINA, consequently, asked for a revision of the Pragian base. CM CARLS and SLAVIK reiterated the problem (see Document) that the current Emsian GSSP is placing more than half of the type region Pragian (or Praha Limestone) into the lower Emsian. In other words, the Pragian Stage has lost much of its distinction and duration.

5.3. Emsian

There was a prolonged discussion concerning the base of the Emsian and its substage subdivision. The long and free exchange of arguments, not repeating here the

Document statements, can be summarized as follows:

CM CARLS: The alleged 15.4 Ma duration of the Emsian in the absolute KAUFMANN scale needs to be critically evaluated by biostratigraphers. The current, strongly shortened Pragian, between the Pragian and Kitab GSSPs, as well as the interval between the latter and the traditional (German) Emsian can be re-defined as new chronostratigraphic units (substages).

CM BAKHAREV: A subdivision of the Emsian into three substages, keeping the Kitab GSSP, should be considered. Endemism and strong facies control on distributions characterize many brachiopods; this questions the significance of the German Emsian brachiopod zonation in relation with the conodont stratigraphy. The entry of *Po. kitabicus* works fine in the Salair.

CM JANSEN: The Siegenian-Emsian brachiopod succession of the Emsian type region has been long and well studied, especially the spiriferid phylogeny. It allows correlations with other European regions (Spain) and to some extent also with North Africa. It uses evolutionary changes, not facies-controlled local occurrences.

M. ERINA: The entry of *Po. kitabicus* marks a very important step in early polygnathid evolution, which was also emphasized in her oral contribution. Therefore, the GSSP should stay where it is.

TM VALENZUELA-RIOS: The Emsian revision requires a very careful restudy of the Zinzilban conodonts, especially the entry of the *Po. excavatus* Group, which includes several forms. *Po. kitabicus* provides a very important and useful time marker, but not for the basal Emsian since it enters much too early.

CHAIRMAN: GSSPs can and are often placed outside the traditional areas of chronostratigraphic units (e.g., Givetian, Frasnian, Famennian) but they should be close to the unit base in their classical type-region. The meaning of a chronostratigraphic term should not change too much in a type region since this would create great confusion. Without purpose, this rule has been violated in the case of the Emsian. A future subdivision of the Emsian into two substages has already been voted on by SDS. A revised GSSP decision must take other fossil groups into consideration, too. Statements are needed in which region the *kitabicus* boundary has been

successfully applied. As said before (SDS Newsletter 22), the appearance of true *Icriodus* or of the *I. corniger* Group is a very useful level in Europe and North Africa to recognize an Upper Emsian substage, also with the oldest anarcestids. Unfortunately, the entry of *Icriodus* s.str. has not yet been correlated into North America and Asia, mostly because of endemism in conodonts.

CM CARLS: The *kitabicus* level probably can be recognized in Nevada.

TM HLADIL: The gamma ray spectroscopy and magnetic susceptibility should be studied in the GSSP section, as it has been in the Barrandian. The Czech group has already started work in the Zinzilban Gorge and will complete the field work during an additional week after the meeting.

CM KIM: Studies of the Zinzilban nowakiids continue and the *Now. (Dmitriella) praesulcata* Group of the Barrandian needs to be re-investigated, too.

J. FRYDA: Investigations of Emsian isotope stratigraphy has started in Czechia and will be expanded to the Kitab sections. P. LUKES is currently finishing an extensive revision of Barrandian nowakiids, including *Now. cancellata*, which is important for the Emsian substage subdivision. The Bulletin of Geosciences is available for fast publication of new Zinzilban results and correlation summaries.

CM FEIST: New Zinzilban data need to be published quickly.

TM IZOKH: The entry of *Po. nothoperbonus* seems to be a good level for the intra-Emsian substage boundary but both *nothoperbonus* and *Po. inversus* should be restudied carefully.

CHAIRMAN: SDS has decided to search for a level close to the Dalejan Event (e.g. *Now. cancellata* level) for the substage boundary. *Po. nothoperbonus* enters much earlier, in the middle of the Zlichovian and in the middle of *Anetoceras* faunas.

The present members voted formally on the following conclusions:

1. A majority recommended to revise the base of the Emsian. A future GSSP level shall be searched for near the entry of *Po. excavatus* (its subspecies or morphotypes) in order to correlate more closely with the base of the brachiopod-defined classical Emsian of the German type-region and with the Zlichovian of the Barrandian.

2. In accord with the decision at the Novosibirsk Business Meeting in 2005, **any future new Emsian GSSP will be placed in the Zinzilban section**, too.
3. **The current Emsian GSSP** in the Zinzilban Gorge **shall become the GSSP for the base of a formal Upper Pragian substage**, possibly named as Zinzilbanian.
4. Formal voting on these issue will await the outcome of the new re-sampling by various working groups.
5. Results of the re-sampling shall be reported immediately to the Uzbek (CM KIM) and Novosibirsk SDS members and to the SDS Newsletter, preferably no later than in 2010.
6. All results shall be published in a joint international publication, coordinated by the Uzbek-Novosibirsk Devonian team. This requires taxonomic agreements between involved specialists.
7. Brachiopod and other specialists are asked to correlate their zonations better with the conodont and dacryoconarid successions, or to publish updated summaries of such correlations.
8. The Emsian substage definition has to await new dacryoconarid and conodont data and the outcome of the basal Emsian revision.

5.6. D/C Boundary

Based on her excellent work on the new Uzbekistan section, M. ERINA has been proposed as additional member of the new D/C Boundary Working Group. CM FEIST commented on the problems of the La Serre GSSP and on the problems to find any other good section in future that is not equally affected by the Hangenberg Event.

6. Membership

Two new CMs were proposed and voted on unanimously:

Utkir J. RAKHMONOV, Kitab State Geological Reserve, specialist of Devonian crinoids (especially of columnals), rahmonov06@mail.ru.

Jiri FRYDA, Czech Geological Survey, specialist of gastropods and multiple stratigraphic disciplines.

The CHAIRMAN welcomed both in SDS and emphasized the importance that Uzbekistan is represented by an additional active worker.

7. SDS Publications

Contributions to Newsletter 24 are due at the end of 2008.

9. Future SDS Meetings

The Devonian Meeting 2009 in conjunction with the North American Paleontological Convention (NAPC), in June in Cincinnati, will have a focus on the relation between sea-level changes and evolution. The main goal is to improve and revise the Devonian eustatic curve, a topic that is of highest significance for the hydrocarbon exploration industry. It is hoped to arrange in future some industrial sponsorship but this requires improved industry contacts.

The SECRETARY has repeated his offer to lead a field trip to the Old Red Devonian, in conjunction with the 2002 IPC in London.

The Novosibirsk Group, notably CM BAKHAREV, kindly offered a field meeting in 2011, visiting the Kuznetsk and Kusbass regions of southern Siberia. The area offers fine Middle and Upper Devonian successions and the D/C boundary. Since SDS has not yet been to those regions, and in memory of the wonderful 2005 meeting, the proposal was well received and accepted.

The 2012 Business Meeting will have to be held in conjunction with the Brisbane IGC.

10. Any other Business

CM KIM and CM RAKHMONOV held brief closing speeches, inviting all SDS Members and Devonian specialists to come back to the Kitab Reserve. The CHAIRMAN, once more, thanked everybody involved with the meeting organisation.

Annual report of IGCP project 499 (Devonian land-sea interaction: evolution of ecosystems and climate)

by **Peter KÖNIGSHOF**

During the last five years 16 field meetings and workshops as well as participation at International Congresses on different continents in various countries have been organized: 2004: Morocco (joint SDS /IGCP 499 meeting), Göttingen, Germany (joint meeting with the German Palaeontological Society); 11th International Palynological Congress in Granada, Spain; 32nd IGC, Firenze, Italy; Erlangen, Germany (joint meeting with IGCP 503); Geological Society of America in Denver (USA, November 7-10). 2005: North American Paleontological Convention (NAPC), Halifax, Nova Scotia Canada; joint IGCP 499 / SDS meeting in Novosibirsk, Russia; 6th Baltic Stratigraphic Conference, St. Petersburg, Russia; Istanbul, Turkey (bilateral cooperation project between Germany and Turkey); 2006: International Palaeontological Congress (IPC), Beijing, China; Symposium on Palaeozoic Palynology: CIMP-Meeting, Praha, Czech Republic; 2007: Field work in Morocco (Dra Valley, March 14 – 25), field workshop San Juan, (Argentina, May 14 – 22), SDS/IGCP 499 joint meeting, Eureka, Nevada, USA, (September 09 – 14). In the last year of the project three meetings took place:

Field workshop in the Ghadames Basin, Libya (April, 23 – 30, 2008)

The workshop and the field trip were devoted to the stratigraphic evolution of Devonian sequences in the Awaynat Wanin area, Southern Ghadamis Basin, with a focus on sequence stratigraphy, sedimentology and facies, and palaeoecology. The Devonian of Libya is of special interest for the project due to the excellent sequences mainly representing very shallow water environments and even fluvial sequences which are important with respect to similar sequences such as in Morocco. A 43-page abstract volume and a 67-pages field guide book have been published, edited by Milad Ben Rahuma, Jean-Noel Proust, and Remi Eschard. Scientists from seven countries attended the meeting. The report on the workshop has been published in *Episodes* (2008), vol 31 (4) by Königshof et al.

Kitab State Geological Reserve, Uzbekistan (August 25 – September 03, 2008)

The aim of the joint SDS/IGCP 499 meeting was to examine the successions of the Kitab Reserve in order to clarify questions of Lower Devonian chronostratigraphy (especially of Emsian stage/substage definitions) and of high-resolution correlation between different fossil groups and facies settings. The meeting was entitled “Global alignments of Lower Devonian carbonate and clastic sequences” and colleagues from nine countries attended the meeting. A 97-pages field guidebook and a 122-pages abstract volume have been published.

Final joint meeting of IGCP 497 and 499 (20th International Senckenberg Conference and 2nd Geinitz Conference), Frankfurt, Germany (September 30 – October 10, 2008)

Orogenic events involved in the history of the Rheic Ocean range from the Avalonian-Cadomian orogenies in the Latest Neoproterozoic up to the formation of Pangaea in the Devonian-Carboniferous time. Such incising events played a major role for the evolution of life, climate, palaeogeography, and environmental conditions. This was the major reason to combine the final meeting of IGCP 497 with the one of IGCP 499. A 241-pages abstract volume and a 159-pages excursion volume have been published, edited by P. Königshof and U. Linnemann. 130 participants from 26 countries attended the meeting. It was of international interest and we are proud that it was sponsored by the German Science Foundation.

Other activities concerned the participation on the IGC in Oslo and various field trips and meetings held in Turkey and Germany in conjunction with the German/Turkish bilateral IGCP 499 project (DEVEC-TR).

As in the past, many fruitful discussions, meetings (see above) – and not at least publications – do exist and are to be expected in the future (see the next year meetings in Salamanca, Spain and Cincinnati, USA). Also the close cooperation in the final stage of the IGCP's 497 and 499 has to be mentioned. Based on various working groups – regional and international – new IGCP's are planned. The international visibility of the project is excellent. Since 2004 more than 500 peer

reviewed papers have been published representing the improved knowledge on the following topics:

- climate change and events during the Devonian
- characterization of facies in marine-terrestrial transitions and their correlation
- sea-level changes in the Devonian on global and regional scale
- rapid evolution on early life on land and its interaction with sedimentary processes
- case studies of complex paleoecosystems in different palaeogeographic settings and their correlation
- biostratigraphic control even in neritic facies realms

It should be stressed that perfect cooperation between IGCP 499 and SDS was excellent. One example of this close cooperation between SDS and IGCP is the published volume of the Geological Society of London, Special Publication, no 278, edited by R.T. Becker and W. T. Kirchgasser on "Devonian events and correlations" as a result of the kick-off meeting held in Morocco in 2004. A special volume in Bulletin of Geosciences, edited by P. Königshof, O. Obut and N. Izohk dedicated to the IGCP 499 was published by the end of 2008. Another Special volume edited by P. Königshof on "Devonian Change – Case studies in Palaeogeography and Palaeoecology" has been accepted and will be published in Geological Society Special Publication, no 314 (2009). Furthermore, a special volume will be published on "Sea level and climate cyclicity and bioevents in Middle Devonian marine and terrestrial environments" in Palaeo 3, edited by C. Brett, E. Schindler and P. Königshof in 2009.

In the next year we will compile the last special volumes (see above) and it is planned to organize a final joint IGCP 479 and 499 meeting in Salamanca. The most important point is to evaluate if we should submit a successor IGCP project. There is a standing offer of working groups (colleagues from Spain, Canada, Germany and USA) but details will be discussed during the meeting. Furthermore, we will organize two special sessions in conjunction with the NAPC-2009 which will take place in Cincinnati, USA (June 21 – 26, 2009):

- (1) Rapid evolution of terrestrial ecosystems and their influence on marine

realms – land-sea interactions in the Devonian (convenor: R. Brocke, P. Königshof, J. Marshall) and

- (2) Biological response to Devonian sea-level changes and palaeoclimate (convenor: T. Becker, C. Brett, E. Schindler).

Further information is provided at <http://www.napc2009.org>.

On behalf of the project leaders I would like to express my thanks to all colleagues for their valuable contributions during the scientific meetings and the field trips. Cordial thanks are expressed to the local specialists for the organization and guidance of the field trips. We are grateful to these and many other individuals who helped make the workshops and field trips both successful and highly enjoyable. Finally, I would like to thank IUGS and UNESCO for their funding and support. Thank you all again.

Report on the International Conference on Palaeozoic Climates - International Congress, August 22-31, 2008, Lille, France

CM Bruno MISTIAEN

During the last week of August 2008, the "Palaeozoic Climate Conference" took place in the Lille's Catholic University, North of France. It brought together about 120 scientists from over 20 countries during a complete week. It was devoted to the closing meeting of IGCP 503 and managed by Thomas Servais, but was also extended to the upper Palaeozoic.

The two last days of the conference were devoted to the upper Palaeozoic and especially to Devonian climatic aspects and evolution. Several presentations focusing on the Frasnian/Famennian boundary were presented; relatively to this event, and using faunal, sedimentological and/or isotopic data, several presentations developed hypothesis of cooling versus maximum flooding or, in the contrary, suggesting glaciations across the F/F boundary. Some other presentations focused on the Silurian-Devonian and the early land plant diversification. Variations of biodiversity along the events or palaeobiogeographic relations were also developed in several presentations or posters and relatively to

different fossils groups, such as arthrodire placoderms, echinoderms, ostracods, brachiopods, corals...

A two days post-conference field trip, guided by Bruno Mistiaen, Denise Brice, Benoît Hubert and Emilie Pinte, was also offered. This trip included a visit of the Upper Palaeozoic (Devonian and Carboniferous) of the Ardennes, in France and Belgium, with stops at some historical and “stratotypical” places and outcrops, such as Givet, or localities in the vicinity of Frasnes and Couvin, and also Etroeungt, in the Avesnois.

The conference abstracts are online at <
[http://www.igcp503.org/
pdfs/lille2008_abstracts.pdf](http://www.igcp503.org/pdfs/lille2008_abstracts.pdf).

Report on the International Conference on Palaeozoic Climates - International Congress August 22-31, 2008, Lille, France

Organizers

Thomas Servais (Lille1, CNRS), chair,
Björn Kröger (Lille1), secretary,
Alain Blicek (Lille1, CNRS),
Benoit L.M. Hubert (UCL),
Bruno Mistiaen (UCL),
Nicolas Tribouillard (Lille1),
Marco Vecoli (Lille1, CNRS),
Jacques Verniers (Univ. Gent, Belgium)

Scientific committee

Michael Bassett, Cardiff (The Palaeontological Association)
Taniel Danelian, Paris (Association Paléontologique Française, APF)
David T. Harper, Copenhagen (Subcommission Ordovician Stratigraphy)
Alain-Yves Huc, Paris (Fédération Française de Géologie, FFG)
John Marshall, Southampton (Subcommission Devonian Stratigraphy)
Shanchi Peng, Nanjing (Subcommission Cambrian Stratigraphy)
Christian Ravnne, Paris (Société Géologique de France, SGF)
Francis Robaszynski, Mons (Société Géologique du Nord, SGN)
Michael J. Melchin, Antigonish (Subcommission Silurian Stratigraphy)
Denis Vaslet, Orléans (Comité National Français pour l'Année Internationale de la Planète Terre)

Organizing institutions

UMR 8157 Géosystèmes Lille1 - CNRS
 Université Catholique de Lille (UCL)
 Institut Supérieur d'Agriculture (ISA)
 Faculté Libre des Sciences et Technologies
 Université de Lille 1
 Centre National de la Recherche Scientifique (CNRS)
 Conseil Régional du Nord – Pas-de-Calais
 The Palaeontological Association
 Association Paléontologique Française (APF)
 Société Géologique du Nord (SGN)
 Société Géologique de France (SGF)
 Groupe Français du Paléozoïque (GFP)
 International Geoscience Programme n° 503
 Ordovician Palaeogeography and Palaeoclimate



An event of the **International Year of Planet Earth**, an initiative of UNESCO and IUGS aiming to raise public awareness of Earth Sciences. This is a contribution to the scientific topic: Earth & Life – the origins of diversity and Climate Change.



DOCUMENTS

Document submitted to the SDS business meeting, Kitab Reserve, Uzbekistan, Aug.-Sept. 2008

Request and comments concerning the GSSP for the basal Emsian stage boundary

Peter CARLS, Ladislav SLAVÍK & José Ignacio VALENZUELA-RÍOS

Request

We request the SDS and the IUGS Commission on Stratigraphy to annul the present GSSP for the lower boundary of the Emsian Stage in the Zinzilban section (Kitab Reserve, SE Uzbekistan), because the present GSSP is at too low a level. A new GSSP must be defined at a duly younger level that is sufficiently adapted to the traditional boundary. This could be done in strata of the Kitab area.

The redefinition of the lower boundary of a traditional stage by means of a GSSP has to be adapted as closely as practicable to the traditional boundary level, because divergence between the original sense of the stage name and the new GSSP causes irreparable confusion.

Biostratigraphic constraints from the traditional type region of the Emsian are referred herein; correlation with a closely comparable succession of faunas is demonstrated that also contains cosmopolitan conodonts and dacroconarids. A new basal Emsian GSSP in the Zinzilban section must provide optimum practicability for correlations in worldwide cosmopolitan biostratigraphic successions.

Present conditions

Presently, all references to the beginning of the Emsian Stage require awkward statements, whether they refer to the historical concepts or aim at the present GSSP, because both differ by an interval with numerous successive time-relevant evolutionary steps of guide fossils. (This difference has been estimated at an order of magnitude of 4.5 ma [Carls, 1999].) Concomitantly, already the middle and upper thirds of the original Pragian Stage and also the historical Siegenian from the upper half of the Early Siegenian onward would presently have

to be called as official "Emsian". Where age assignments in older and recent literature are jointly evaluated, these circumstances cause considerable confusion - in addition to the particular difficulties of correlation due to mid-Early Devonian conodont crisis and endemism in Europe.

Such problems are obvious, wherever the present basal GSSP of the Emsian is concerned. Also conodont zones that were coined or modified in the course of the installation of the GSSP, are prone to be misunderstood. As articles quoted here below exemplify, the following subjects suffer from the unexpected and inadequate position of the present Emsian GSSP:

Radiometry [Kaufmann, 2006, text-fig. 9] (Esopus datum assumed to be only 0.8 ma younger than the GSSP, against actual pers. comm. of Carls).

Calibration and synonymies of stages [Menning et al., 2006, 324, 326, text-fig. 2] (Praha Fm is shown to comprise hardly 2 ma; the "somewhat controversial taxon *Eolinguipolygnathus dehiscens*" is assumed to enter "lower than the top of the regional historical Pragian Stage", which cannot be proven - more probably, the taxon *dehiscens* s.s. is Zlichovian).

Conodont zonation from *pirenae* Zone through *gronbergi* Zone [the latter item and, e.g., Yolkin et al., 1994; Kaufmann, 2006, text-fig. 9] (the Middle *excavatus* Zone begins earlier than *Pol. gronbergi*; due to the uncertain age relations of the holotype of the index of the *dehiscens* boundary this zone cannot be delimited).

Sea-level fluctuations [Yolkin et al., 1997a, text-fig. 2] (as far as corresponding to the entry of *Pol. kitabicus*, the Siberian ASFA T-R cycle 3a does not correspond to the Euramerican cycle Ib of Johnson et al. [1985], but it is older).

Regional age assignments in Europe [Morzadec et al., 2000, 119, text-fig. 4] (not the Emsian GSSP was correlated, but all criteria aimed at the historical base of the Emsian), and in the Appalachians [Ver Straeten & Brett, 2006, 80-81] (the present GSSP cannot be correlated better than former reference levels; the Esopus base at F.I. 9 is over 3 F.I. of Johnson [1977] younger than the present GSSP).

More detailed verification of these examples exceeds the present scope.

General relations

The redefinition of the beginning of the Emsian and the future GSSP must aim at the following traditional level:

The limit between older faunas with *Acrospirifer primaevus* and *Hysterolites hystericus* (Siegenian faunas of Saxler Fm, Herdorf "Gruppe") and younger faunas with *Arduspirifer prolatestriatus* (Emsian faunas, Ulmen "Gruppe") in the SE Eifel Hills, Germany [Mittmeyer, 1974; Fuchs, 1974].

Traditionally, the basal limit of the Emsian Stage was traced and correlated according to this faunal change; but in its type region it is not provided with conodonts and other cosmopolitan taxa. However, this mark is correlated with the succession of brachiopod faunas in Celtiberia (Spain). There, conodonts and dacryoconarids are available and allow correlation with the Zinzilban etc. sections. In the Zinzilban section, the level of the traditional basal Emsian boundary is restricted within an interval that is little more than 114 m above the present GSSP.

In the Celtiberian distribution of Pragian conodonts (*Pelekysgnathus*, *Masaraella*; see below) and of claricolous brachiopods [Carls, 1999], also the level of the present GSSP is approximated. Thereby, it is confirmed that the present Emsian GSSP is at drastically too old a level.

Since Carls & Valenzuela-Ríos [1993], we have presented arguments and ample proof for these facts in several submissions to the SDS and its relevant working groups. Here, basic biostratigraphic aspects are resumed; additional facts in former submissions are still valid.

Statements on the equivalence of the present GSSP

The present GSSP level is much older than the traditional German Siegenian-Emsian boundary [Carls & Valenzuela-Ríos, 1993, 2000, 2007; Carls, 1999, 2007; Carls, Slavík & Valenzuela-Ríos, 2007]; it is amid the traditional Early Siegenian. According to conodonts, the present GSSP corresponds to the middle of J.G. Johnson's F.I. 5 in Nevada (close to faunal horizon COP II 295'). This horizon coincides with the highstand of global T pulse Ia and is older than T pulse Ib.

When the "*dehiscens*" boundary was selected for the beginning of the Emsian, the entry of the conodonts synonymized with the name-giving index was assumed to be close to the

F.I. 9 or 10 in Nevada and to the start of global T pulse Ib. Actually, also these Nevadan marks are somewhat older than the traditional base of the Emsian in Germany; but the distance between both Nevadan levels (F.I. 5 and F.I. 9-10) is much longer than the age difference between the so-called "*dehiscens*" boundary near F.I. 9-10 and the traditional base of the Emsian in Germany.

The level of the present GSSP is drastically older (order of magnitude of 5 ma) than the original end of the Pragian (boundary between Praha Fm and Zlichov Fm in the Prague Synform). It hardly reaches 1/3 of the originally conceived Pragian.

Thus, the present GSSP is at a much older level than was consensually and officially intended. At the official decisions installing the present GSSP, the high magnitude of error involved was ignored.

Present procedure

We explain how the divergence between the traditional boundary, the original intentions of redefinition, and the definition of the present GSSP developed.

- We correlate Rhenish brachiopods that characterize the traditional German base of the Emsian, with the Celtiberian successions of brachiopods and of conodonts, and we add dacryoconarid marks. These Celtiberian conodonts are correlated with those in the Zinzilban section 114 m and higher above the present GSSP. This correlation is corroborated by means of dacryoconarid records.

- We remind of the report, by Kim & Walliser [2001] of dacryoconarids that prove the late original Pragian, which overlaps with the early Early Emsian, over 130 m above the present GSSP, corroborating the above correlations.

- We refer to conodonts and dacryoconarids in the Prague Synform that support these correlations.

- Founded on this orientation, we propose to investigate the Zinzilban section (and connected sections) for an appropriate level for the redefinition of the basal GSSP of the Emsian Stage.

- In view of the recorded cosmopolitan taxa of *Polygnathus* s.l. and of our correlations, we suggest to place a new GSSP at a level not older than the entry of *Pol. excavatus* ssp. 114, because even this is notably though moderately older than the traditional base of the Emsian. A position of a prospective new GSSP early

within the prime of the genus *Guerichina* would be most appropriate.

Circumstances that led to the inappropriate position of the present basal Emsian boundary GSSP

For a revision of the Emsian GSSP it is convenient to recognize the reasons for its divergence from the tradition. We only refer to biostratigraphic concepts that led toward the definition of the present GSSP, but we do not discuss the taxonomy of *Pol. kitabicus*, because this concerns a time slice about 4 ma older than the interval of interest.

The global biostratigraphic mark, at which initial proposals for the redefinition of the beginning of the Emsian Stage aimed, was the appearance of conodonts that were then identified and synonymized as *Pol. dehiscens* Philip & Jackson, 1966. 1975, G. Klapper & D.B. Johnson had recorded such material (including synonymized *Pol. webbi excavatus* Carls & Gandl, 1969, = *Pol. excavatus excavatus*) from near the base of the Bartine Mbr in Central Nevada. Independently, also J.G. Johnson compared this level, by means of brachiopods, with the beginning of the traditional Emsian. Several taxa have been synonymized with *Pol. dehiscens*, but these synonymizations are throughout questionable. These conodonts have been subject to divergent interpretations. E.g., the "evolutionary step" of the holotype of *Pol. dehiscens* has been compared to that "of *Pol. perbonus* or *nothoperbonus*" [Yolkin et al., 1994: 150]. Indeed, the morphology of the oral side of the holotype of *Pol. dehiscens* is rather progressive. According to this criterion, an age amid the Zlichovian cannot be excluded. *Pol. dehiscens* s.s. is probably a scarce SE Australian endemic, as the characteristic oral side morphology of its holotype has not yet been found elsewhere. Accordingly, it cannot serve as an index for global zonation or for correlation of a GSSP.

Primitive *Polygnathus* s.l. are generally characterized through large and deep, not inverted basal cavities. This aboral feature was long considered to warrant the identification of other taxa with *Pol. dehiscens* - in spite of the particular oral surface of the holotype, which is, in reality, more significant but was hardly considered. Due to the synonymizations, this lumped collective seemed to be cosmopolitan and apt as a zonal index taxon. Actually, many of the synonymized specimens are *Pol.*

excavatus tota species. In the prevailing concepts of "*Pol. dehiscens*", the intra-specific variability of the ornamentation on the oral side and of the outlines was strongly overrated. Thus, rather different taxa could be lumped.

In addition to the problematic taxonomic concept of *Pol. dehiscens* s.l., there was a problematic concept of conodont zonation of the middle and late Pragian (the time of the middle and upper parts of the Praha Fm in the Barrandian). The zonal index *Pol. pireneae* Boersma, 1973, as the oldest *Polygnathus* s.l. then known, was considered to mark the "latest Pragian" and to be the only cosmopolitan *Polygnathus* s.l. below the envisaged Pragian-Emsian boundary interval. Valenzuela-Ríos (1997) has already challenged this opinion and suggested a lower position (lower Pragian) for the entry of *Pol. pireneae*. This was already shown by Weddige (in Chlupáč et al. 1986) who found this taxon in a rather low part of the Praha Fm and that it was at all unrelated to classical Emsian faunas. This very low position of the *Pol. pireneae* in the same section was later confirmed by further sampling [Slavík, 2004]. In the Zinzilban section it occurs with the *Pelekysgnathus serratus* group that ranges only in the early parts of the Praha Fm - like in Ibero-Armorica. Most *Polygnathus* s.l. of assumedly earliest Emsian age that are different from several endemic Central Asian species, were, in the 1980ies, treated as *Pol. dehiscens*. Thus, taxa ranging between *Pol. pireneae* and *Pol. dehiscens* were hidden in the synonymy of the latter, and thus, the opinion became general that *Pol. dehiscens* descended directly from *Pol. pireneae* - although comparison of the oral sides of both holotypes would not support this opinion.

A section with both taxa in due succession (overlap) was sought for the installation of the Pragian-Emsian boundary GSSP at the thus assumed *pireneae-dehiscens* offspring. When such succession was thought to exist in the Zinzilban section [Yolkin et al., 1989], the present GSSP was proposed for this so-called "*dehiscens* boundary". But neither *Pol. dehiscens* s.s. nor its more common synonyms of near-Emsian age (e.g., *Pol. excavatus*, *Pol. lenzi*) are present at the GSSP. First arguments against the deep position of the GSSP were forwarded by Carls & Valenzuela-Ríos (1993) and subsequently more elaborated by Carls & Valenzuela-Ríos (2000, 2007). The primitive species *Pol. kitabicus* Yolkin et al., 1994 was

then erected for specimens from near the GSSP in the Zinzilban section. It is not closely related to *Pol. dehiscens* s.s. nor is it very similar to the synonymized *Pol. excavatus*; however, its distinction from *Pol. pireneae* has been debated.

The GSSP was installed [Yolkin et al., 1997b] in spite of opposing opinions that criticized its very old stratigraphic level. This criticism is corroborated through the record of *Pol. excavatus excavatus* that appears 92m above the GSSP [Yolkin et al., 1994]. Even this entry is noticeably older than the traditional base of the Emsian. Nevertheless, in view of the distinction of *Pol. kitabicus*, it would have been understandable if the entry of *Pol. excavatus excavatus* had been considered as the mark aimed at, because it was then evident that the Australian *Pol. dehiscens* had been confounded with it, when the "*dehiscens*" boundary was addressed in Europe and North America.

Resuming, the conodont taxonomy and biostratigraphy on which the location of the GSSP in the Zinzilban section was founded since the 1989 proposal implied several errors. Unfortunately, deficits in biostratigraphic information and taxonomic errors appeared to corroborate each other mutually. But evidently, the conodont biostratigraphy of the Pragian-Emsian transition was not yet consolidated. The international (sub)commissions concerned based their procedures on inadequate concepts. Submitted counter-arguments [Carls & Valenzuela-Ríos, 1993, 2000, 2007] were not recognized, when the installation of the present GSSP [Yolkin et al., 1997b] was decided and carried out.

The age of the present GSSP

In the Field Guide of 1978 [Sokolov & Garkovets, eds., 1978], it was stated that the end of the Madmon Fm is not too different in age from the end of the Koněprusy Limestone of Bohemia. However, the local conditions differ. The Koněprusy Limestone ends under an unconformity due to local movements; late original Pragian levels are not demonstrated; *Pelekysgnathus* e.g. *serratus* was found in an upper part [e.g., Slavík et al. 2007: fig. 2], which hints at early Pragian age [Valenzuela-Ríos, 1997].

Immediately under the present GSSP, there is a facies change (deepening) at the boundary between Madmon Fm and Zinzilban Fm, due to a T-pulse. Whether this is accurately the

global T-pulse Ia must still be checked, but it is distinctly older than the start of global T-pulse Ib that has been assumed erroneously. In the Zinzilban "Horizon", there still follow Bohemian brachiopods of original Pragian age like "*Eospirifer*" and *Gorgostrophia*; they confirm that the Madmon Fm ends early in the original Pragian and that long Pragian time follows in the Zinzilban "Horizon". The following brachiopod distributions also hint at the age equivalence of the Madmon-Zinzilban boundary with early pre-Emsian levels: In Celtiberia, [Carls, 1999: 143] there occur 13 brachiopod taxa of the Bohemian Koněprusy Limestone in the interval from the top of the Noguerras Fm through the lower third of the Santa Cruz Fm, ending with *Sieberella sieberi*. From the upper part of the Madmon Fm *S. cf. sieberi* was reported and *Sieberella* sp. was figured from 108 m above the Madmon Fm [Sokolov & Garkovets, eds., 1978: 13, 38; pl. 48 fig. 2]. Therefore, the basal beds of the Zinzilban "Horizon" with the present GSSP must be correlated near the indicated interval in Celtiberia. In Celtiberia, it is independently demonstrated that the Koněprusy taxa are considerably older than the traditional base of the Emsian and the original end of the Pragian [Carls, 1987, 1999; Carls & Valenzuela-Ríos, 2000, 2007].

Regardless of the debated *Polygnathus* s.l. at the present GSSP, its conodont biostratigraphic age is unambiguously indicated through some age-diagnostic taxa that exist very closely below and above the GSSP and were recorded by Yolkin et al. [1989, text-fig. 1]. (The possibly endemic Central Asian *Polygnathus* s.l. that have not been found in other continents, are not considered here.) As these conodonts have not been figured, their specific identifications might be questioned by critical readers. Therefore, in order to prevent fruitless discussions, most of these conodonts are here listed in open terms. In these terms they can hardly be misidentified but still allow the datation of the interval including the GSSP:

eognathodontids (closely below the GSSP)

Polygnathus pireneae

Pedavis sp.

Pelekysgnathus e.g. *serratus*

Even these open terms warrant the unambiguous reference to a short interval that must be correlated below the middle of the original Pragian [Valenzuela-Ríos, 1997].

Elsewhere, conodonts comparable to these taxa do not range above the middle of the original Pragian. *Pelekysgnathus* e.g. *serratus* ends in Ibero-Armorica close to a last *Masaraella pandora* beta morphotype, before the entry of *Icriodus simulator*, and in Bohemia it disappears in the lower third of the Praha Fm. From the Požáry section, *Pol. pireneae* was reported from only 10 m above the Lochkovian-Pragian boundary [Chlupáč et al., 1986].

This independent age assignment is corroborated by the fact that *Pol. exc. excavatus* enters in the Zinzilban section as high as 92 m above the GSSP. In Celtiberia it is known from beds just older than original Emsian and from early Early Emsian. This underlines the length of the interval between the present GSSP and the original base of the Emsian.

Thus, independent of each other, two sets of age-relevant conodonts and, additionally, several brachiopods of Bohemian biofacies indicate a long-term pre-Emsian age of the present GSSP.

The traditional base of the Emsian in Germany, relevant Spiriferacea, and associated conodonts and dacryoconarids in Celtiberia

The traditional base of the Emsian is recognized in the SE Eifel Hills in Germany, in thick siliciclastic shallow neritic deposits (Rhenish Facies). In a lithostratigraphical sense, there the top of the Saxler Fm marks the end of the Herdorf "Gruppe" that represents the historical Late Siegenian Substage. The base of the Eckfeld Fm marks the base of the Ulmen "Gruppe" (traditional early Lower Emsian) and represents the beginning of the traditional Emsian Stage. Shelly faunas with characteristic Spiriferacea distinguish the older from the younger unit [Mittmeyer, 1974; Fuchs, 1974]. (In Belgium, the historical base of the Emsian was practised at a younger level, corresponding to the end of the Ulmen "Gruppe" [Godefroid & Stainier, 1982]. This level is close to the base of the Zlichovian. Here it is not considered in the GSSP context, because no appropriate cosmopolitan taxon of *Polygnathus* s.l. is available at this level and because this level is rather young, which would result in too short an Early Emsian. The latter argument is independent of the apparent brevity of the numerical age difference

between the Esopus and the Bundenbach radiometric data [see Kaufmann, 2006].)

At the end of the Siegenian, *Acrospirifer primaevus* and *Hysterolites hystericus* ended, furnishing a well established mark. The beginning of the traditional Emsian has been characterized more variously by relevant authors through entries of several Spiriferacea. In spite of this variety of proposals, the envisaged lithic boundary level was constant. Of the Spiriferacea, *Euryspirifer*, *Arduspirifer*, and *Filispirifer* have the best potential for the correlation of the Rhenish succession with Ibero-Armorican successions. Jansen [2001] has recently reviewed these genera in detail, and studies are continued. The Celtiberian Mariposas Fm has the most informative combination of these spiriferacean genera with cosmopolitan conodonts and dacryoconarids. Presently, an early radiation of *Arduspirifer* allows the most detailed correlation. Primitive *Arduspirifer* had developed since late Early Siegenian time in Mauro-Ibero-Armorica and in the Rheno-Ardennan basin, but in the latter the earliest taxa are scarce and were hardly applied for correlation.

In Celtiberia, in latest Siegenian to earliest Emsian time, there lived *Arduspirifer* sp. 1 (= "*Arduspirifer arduennensis antedecens* Morphotyp I" of Schriefer, 1988, pl. 1 figs. 1-9); it is frequent throughout the basal submember (d4a-alpha) of the Mariposas Fm. It overlaps with *Guerichina* sp. that enters 1.3 m above the formation base. At the end of *Arduspirifer* sp. 1, the radiation of its genus intensified and produced several divergent taxa. In Celtiberia, a high part of unit d4a-beta-1 of the Mariposas Fm bears *Ard. cf. prolatestriatus*. In that time interval in the SE Eifel Hills, *Ard. prolatestriatus* became the predominant index within the Ulmen "Gruppe". These occurrences are virtually coeval; the slight morphologic differences can possibly be attributed to biofacies and preservation. Consequently, the range of the Celtiberian *Arduspirifer* sp. 1 is most probably astride the traditional base of the Emsian, and the early part of its range would formerly have been termed final Siegenian. From 2.5 m above the base of the Mariposas Fm onward, there is *Filispirifer fallax* as the first German spiriferid that is not known from the Siegenian; it underlines the probability that *Arduspirifer* sp. 1 ranges astride the traditional Emsian base. The rich shelly fauna of the very boundary beds of the Santa Cruz Fm and the

Mariposas Fm has only one taxon (*Crinistrophia*) elsewhere delimited to the classic Emsian; this corroborates the pre-Emsian, Siegenian age of these beds.

The transitional basal bed from the Santa Cruz Fm to Mariposas Fm (from calcareous sandstones to arenaceous limestones, both with the same fauna, up to 50 cm thick) is the first conodont bed. Besides bearing several icriodontids, it is the type stratum of *Pol. excavatus*. *excavatus*. Its upper portion contains also *Pol. excavatus* ssp. 114. Consequently, it is as old as the entry of *Pol. excavatus* ssp. 114 in the Zinzilban section. The taxon here termed *Pol. excavatus* ssp. 114 was characterized by Yolkin et al. [1994:148] and was recorded from 114 m above the *kitabicus* GSSP onward, but it was identified as *Pol. "excavatus gronbergi"* and was considered as the index for their "Middle *excavatus* Zone". This was induced through incipient flattening of the posterior bottom of the basal cavity and through incipient ribs crossing the tongue (these features are also seen in the Mariposas Fm.). In the Mariposas Fm, *Icriodus celtibericus* and *Icr. sigmoidalis* enter together with *Pol. excavatus* ssp 114.

In Europe, *Pol. gronbergi* and the *gronbergi* Zone are recognized in younger, intra-Zlichovian levels, i.e., above the range of *Guerichina*. In the Zinzilban section atlas [Sokolov & Garkovets, 1978], such *Pol. gronbergi* was figured pl. 75 figs. 4-5 from 144 m resp. 149 m above the GSSP. The true origin of *Pol. exc. excavatus* cannot be identified in Celtiberia, due to lack of appropriate limestones below the basal bed of the Mariposas Fm. Although this bed is pre-Emsian in traditional sense, the entry of *Pol. excavatus* ssp. 114 in the Zinzilban section might be considered for the choice of a GSSP, because it can only be slightly older than the traditional boundary. This difference is of an order of magnitude much smaller than the aberrations in former inter-regional correlations of the base of the Emsian. A slightly younger entry of a cosmopolitan taxon would also be welcome for the correlation of a new GSSP.

The succession of spiriferaceans herein mentioned from the Mariposas Fm, developed within the range of *Pol. excavatus* ssp. 114, which ranges up into the Zlichovian. (It begins before and ends after the Ulmen "Gruppe".) *Guerichina* and *Peneauia* are still found at the entry of "*Pandorinellina*" miae s.s. and

Icriodus gracilis in the limestone level at the base of unit d4a-beta-2 of the Mariposas Fm; these are immediately below *Arduspirifer* sp. sp. that occur also in the Erbsloch Grauwacke and Rothäuser Grauwacke of early Early Emsian age (Ulmen). In the Prague Synform, the youngest strata of the Praha Fm (i.e., around the "graptolite interval" that is present in the NW limb of the Prague Synform) bear these conodonts and *Guerichina*.

Summary

The present GSSP of the Pragian-Emsian boundary in the Zinzilban Gorge section (Kitab Reserve, Zerafshan, Uzbekistan) is at too old a level. It adds most of the historical Siegenian to the Emsian and reduces the Pragian to notably less than half its original duration. A new basal Emsian GSSP is suggested at the origin of *Polygnathus excavatus* ssp. 114 or in its early range; it depends on availability of an appropriate index. This would be 114 m or moderately more above the present GSSP (i.e., early within the prime of the genus *Guerichina*). This change is necessary in order to avoid further confusion concerning the base of the Emsian Stage and the Pragian-Emsian boundary.

References

- Carls, P. (1987): Ein Vorschlag zur biostratigraphischen Redefinition der Grenze Gedinium/Siegenium und benachbarter Unterstufen. - Cour. Forsch.-Inst. Senckenberg, **92**: 77-121.
- Carls, P. (1999): El Devónico de Celtiberia y sus fósiles. - In: J.A. Gómez Vintaned & E. Liñán, (eds.): VI Jornadas Aragonesas de Paleontología, 101-164.
- Carls, P. (2007): Faunal and cyclicity controls for the calibration of the early Devonian. Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Eureka, NV, 9.9. - 18.9. 2007, San Diego State University & SUNY-Geneseo, Eureka. SDS & IGCP 499 Eureka, NV 2007 Program and Abstracts (Ed.: Over D.J., Morrow J.), p. 20-21.
- Carls, P. & Valenzuela-Ríos, J.I. (1993): Materials near the redefined Base of the Emsian Stage. - SDS Newsl., **10**: 30, 1 Tab.; Arlington, Texas.
- Carls, P. & Valenzuela-Ríos, J.I. (2000): Faunas, correlations, various boundaries, and opinions concerning the early Emsian sensu lato and a *cancellata* Boundary. - Web page of SDS Emsian Working Party: http://www.es.mq.edu.au/mucep/emsian/carls_and_rios/carls_and_rios.htm

- Carls, P. & Valenzuela-Ríos, J.I. (2007): From the Emsian GSSP to the early late Emsian-correlations with historical boundaries SDS. – Newsl. **22**, 24-28.
- Carls, P., Slavík, L., Valenzuela-Ríos, J., (2007): Succession of Biostratigraphic marks for the Early Emsian. Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Eureka, NV, 9.9. - 18.9. 2007, San Diego State University & SUNY-Geneseo, Eureka. SDS & IGCP 499 Eureka, NV 2007 Program and Abstracts (Ed.: Over D.J., Morrow J.), p. 22-23.
- Chlupáč, I., Hladil, J. & Lukeš, P. (1986): Barrandian-Moravian Karst - Guidebook of the Field Conference of the International Subcommission on the Devonian Stratigraphy, Ustredni ustav geologicky, Praha, 1, 1-62.
- Fuchs, G. (1974): Das Unterdevon am Ostrand der Eifeler Nordsüd-Zone. - Beitr. naturk. Forsch. Südwest. Deutschl., Beih., **2**, 163 p.
- Godefroid, J. & Stainier, P. (1982): Lithostratigraphy and biostratigraphy of the Belgian Siegenian on the south and south-east borders of the Dinant Synclinorium. - Cour. Forsch.-Inst. Senckenberg, **55**, 139-163.
- Jansen, U. (2001): Morphologie, Taxonomie und Phylogenie unter-devonischer Brachiopoden aus der Dra-Ebene (Marokko, Pr.,-Sahara) und dem Rheinischen Schiefergebirge (Deutschland). - Abh. senckenberg. naturf. Ges., **554**.
- Johnson, J.G. (1977): Lower and Middle Devonian Faunal Intervals in Central Nevada based on brachiopods. - In: Murphy, M.A., Berry, W.B.N. & Sandberg, C.A. (Eds.): Western North America: Devonian, Univ. California, Riverside Campus, Museum Contribution **4**, 16-32.
- Johnson, J.G., Klapper, G. & Sandberg, C.A. (1985): Devonian eustatic fluctuations in Euramerica. - Geol. Soc. Amer. Bull., **96**, 1349-1359.
- Kaufmann, B. (2006): Calibrating the Devonian Time Scale: A synthesis of U-Pb ID-TMS ages and conodont stratigraphy. - Earth-Science Reviews, **76**, 175-190.
- Menning, M. et al. (2006): Global time scale and regional stratigraphic reference scales of Central and West Europe, East Europe, Tethys, South China, and North America as used in the Devonian-Carboniferous-Permian Correlation Chart 2003 (DCP 2003). - Palaeogeography, Palaeoclimatology, Palaeoecology, **240** (2006), 318-372.
- Mittmeyer, H.G. (1974): Zur Neufassung der Rheinischen Unterdevon-Stufen. - Mainzer geowiss. Mitt., **3**, 69-79.
- Morzadec, P., Brice, D., Cygan, C., Feist, R., Majeste Menjoulas, C., Paris, F. & Racheboeuf, P.R. (2000): The Devonian of France: a tentative tie with the GSSP of the Devonian stages. - Cour. Forsch.-Inst. Senckenberg, **225**, 115-129.
- Philip, G.M. & Jackson, J.H. (1967): Lower Devonian subspecies of the conodont *Polygnathus linguiformis* Hinde from southeastern Australia. – J. Paleont. **41**, 1262-1266.
- Schriefer, U. (1988): Entwicklung von *Arduspirifer* (Brachiopoda, Spiriferacea) im Bereich der Grenze Siegenium/Emsium in Süd-Aragón (Spanien). - Diploma thesis (Unpublished), 55p., Nat. Sci. Fac., Techn. Univ. Braunschweig (unpubl.).
- Slavík, L. (2004): A new conodont zonation of the Pragian in the Stratotype area (Barrandian, central Bohemia). Newsl. Strati, **40/1-2**, 39-71.
- Slavík, L., Valenzuela-Ríos, J.I., Hladil, J. & Carls, P. (2007): Early Pragian conodont-based correlations between the Barrandian area and the Spanish Central Pyrenees. – Geolog., **42**, 499-512.
- Sokolov, B.S. & Garkovets, V.G., eds. (1978): Type sections of the Lower and Middle Devonian boundary beds in the Middle Asia. - A Guide to Field Excursions, 55 pp., Atlas of the paleontological plates. Supplement to A Guide of the Field Excursions. Field session of the International Subcommission on Devonian Stratigraphy Samarkand, USSR, 1978. Tashkent.
- Valenzuela-Ríos, J.I. (1997): Can *Polygnathus pirenae* be the index of a standard conodont Zone? - Newsl Strat. **33** (3), 173-179.
- Ver Straeten, Ch.A. & Brett, C.E. (2006): Pragian to Eifelian strata (Middle Lower to lower Middle Devonian), northern Appalachian Basin - stratigraphic nomenclatural changes. - Northeastern Geology & Environmental Sciences, **28** (1), 80-95.
- Walliser, O.H. & Kim, A.I. (2001): On lowermost Emsian tentaculites from the Zinzilban boundary section and their utility for correlation. - Document submitted to the Subcommission on Devonian Stratigraphy. May 2001, 2 p. Frankfurt a.M.
- Yolkin, E.A., Apekina, L.S., Erina, M.V., Izokh, N.G., Kim, A.I., Talent, J.A., Walliser, O.H., Weddige, K., Werner, R. & Ziegler, W. (1989): Polygnathid lineages across the Pragian-Emsian boundary, Zinzilban Gorge, Zerafshan, USSR. - Cour. Forsch.-Inst. Senckenberg, **110**, 237-246.
- Yolkin, E.A., Gratsianova, R.T., Izokh, N.G., Yazikov, A.Yu. & Bakharev, N.K. (1997a): Devonian sea-level fluctuations on the southwestern margin of the Siberian continent. - Cour. Forsch.-Inst. Senckenberg, **199**, 83-98.
- Yolkin, E.A., Kim, A.I., Weddige, K., Talent, J.A. & House, M.R. (1997b): Definition of the Pragian/Emsian Stage boundary. - Episodes, **20**, 235-240.
- Yolkin, E.A., Weddige, K., Izokh, N.G. & Erina, M.V. (1994): New Emsian conodont zonation (Lower Devonian). - Cour. Forsch.-Inst. Senckenberg, **168**, 139-157.

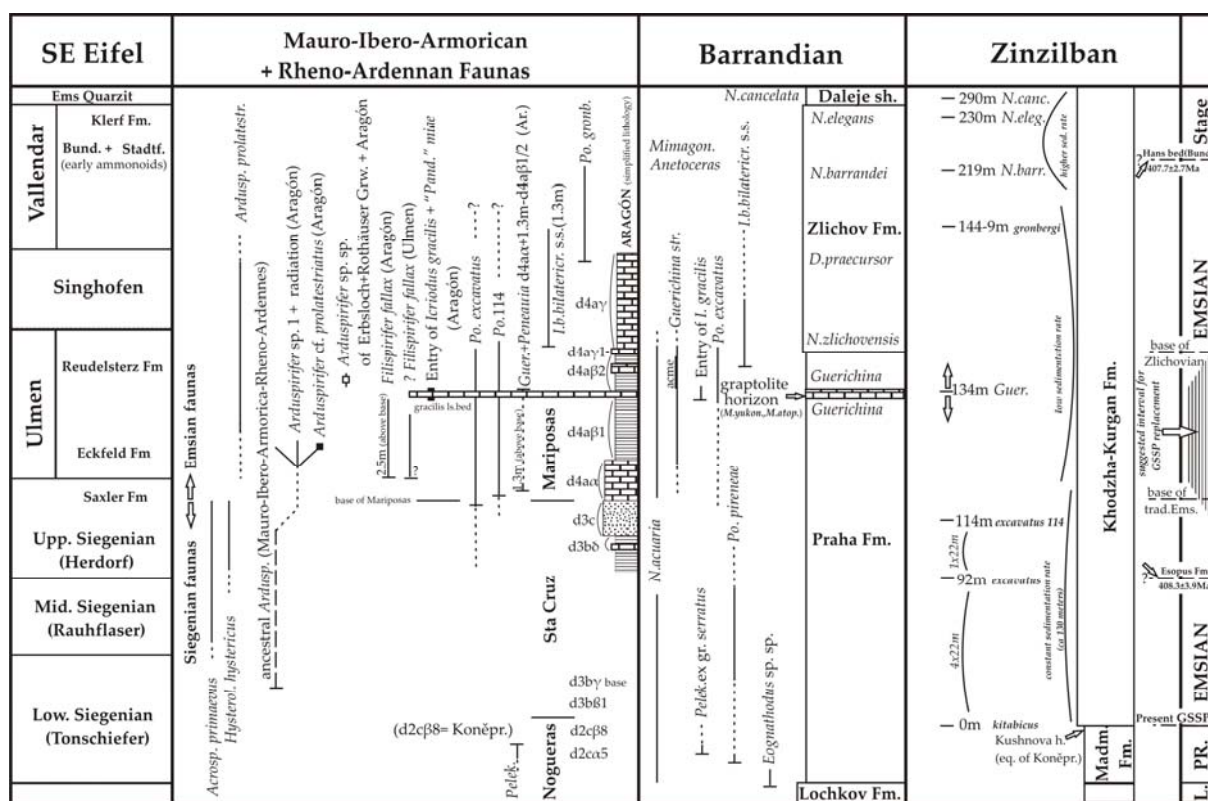


Figure 1: Simplified inter-regional correlation scheme showing the distribution of cosmopolitan taxa and vertical arrangement of lithostratigraphic units. The relative position of important levels in relation to the present basal Emsian GSSP is marked on the right. The vertical extensions of lithostratigraphic units and taxon ranges are not to scale, but are "zoomed up" near the traditional base of the Emsian. The measured radiometric ages from the basal Esopus and from Bundenbach Hans Bed are too close to each other; they should differ by about 2.5 to 3 ma.

Astronomical Tuning of Integrated Upper Famennian-Early Carboniferous Faunal, Carbon Isotope and High Resolution Magnetic Susceptibility Records: Western Illinois Basin

Sarah CLARK, Geography & Geology, Illinois State University, Normal, IL; Jed DAY, Geography-Geology, Illinois State University, Normal, IL; Brooks ELLWOOD, Dept of Geology and Geophysics, Louisiana State University, Baton Rouge, LA; Rowe HARRY, Geology, University of Texas-Arlington, Arlington, TX; Jonathan TOMKIN, Geology, University of Illinois Urbana-Champaign, Urbana, IL

ABSTRACT

A complete marine sedimentary record spanning the late Frasnian and Famennian stages and early Tournasian is preserved and

was sampled from long cores from southeastern Iowa. Preliminary results of biostratigraphic, paleomagnetic, and isotopic study of the Upper Famennian and Early Carboniferous interval in the H-32 core are presented. Units sampled in the H-32 core include the upper Saverton Shale, Maple Mill Shale, English River Formation, Louisiana Limestone, and lowermost Prospect Hill Formation. A continuous 87 foot long half split of the H-32 core was sampled at one foot or less intervals for conodonts; megafauna wherever encountered; at every one foot for whole rock inorganic C13 and trace element geochemistry, and at 5 cm intervals for whole rock magnetic susceptibility (MS). Conodont data support correlation of the H-32 core with the Upper *postera* (upper Saverton) to Upper *praesulcata* zones (Louisiana) spanning the Upper Famennian, entire Uppermost Famennian substages, and lowest Tournasian

(uppermost Louisiana? and Prospect Hill). Inorganic $\delta^{13}\text{C}_{\text{carb}}$ data record 11 significant carbon isotope excursions showing progressively higher positive values of +1/mil in the upper Saverton, +2/mil in the Maple Mill Shale, excursions ranging from +3.5 to +4/mil in the English River, and maximum observed values from +6 to +7/mil in the Louisiana Limestone (interglacial Hangenberg Carbon Excursion). Fourier Transform analysis of MS data identify two significant peaks (at 41st harmonic and 243rd harmonic). We assign the 41st harmonic a value of 100,000 years as E2, then the 243rd harmonic is P1 of 16,872 yrs, recalculated from Berger for 360 Ma = 16,970 yrs. for P1. A strong peak represented by the 123rd harmonic appears to represent a value of 33,333 for O1 obliquity. The calculated astronomical duration of the integrated data set is 4.1 million years.

INTRODUCTION

The Carboniferous was characterized by a global icehouse climate and associated glacial-eustatic sea level changes controlling the timing and patterns of deposition in cratonic and continental margin basins of Laurussia and Gondwana (Fig. 1A). The transition from the Devonian Greenhouse to Carboniferous Icehouse began during the very late Devonian during the interval of the Upper Famennian (Fig. 3). This global climate transition is known to have occurred at or near the boundary of the Middle and Upper Famennian substages, coinciding with the onset of at least two very late Famennian glacial climate cycles and associated glacial-eustatic sea level fluctuation during the interval of Euramerican Devonian Transgressive-Regressive Cycle IIF of Johnson et al. (1985) as shown in Figure 3.

Complete marine successions that span this critical interval are under investigation by a number of working groups. Our group is focused on developing high-resolution faunal-biostratigraphic, geochemical-isotopic climate proxy, and magnetic susceptibility (MS) records of this transition in western Laurussia in both subtropical (study area shown in Fig. 1) and equatorial sites (western Canada).

The IGS Sullivan and H-32 cores in southwestern Iowa were selected for investigation because they feature a complete record of the Upper Devonian to Early Carboniferous interval deposited along the western margin of the Illinois basin (Fig. 1). Sediments preserved in the IGS H-32 core that accumulated in southeastern Iowa were not buried to significant depth, and organic matter in the core is thermally pristine (conodont CIA values <1, and vitrinite reflectance values of 0, Fig. 1B). The stratigraphy and sea level history of the succession is well understood through numerous stratigraphic and biostratigraphic investigations including Pavlicek (1986), Woodruff (1990), Witzke and Bunker (2002) and Day (2006).

Late Devonian units present in the core and sampled are shown in Figure 3. These include the upper part of the Upper Saverton Shale, Maple Mill Shale, English River Formation, Louisiana Limestone, and Prospect Hill Formation. Based on the Existing biostratigraphy, the sampled interval of the H-32 core to just below the top of the Louisiana Limestone appears to span the interval of the Upper *postera?* to Upper *praesulcata* Zones. The Prospect Hill is of Tournaisian age (Figs. 2 and 3).

SAMPLING MATERIALS AND METHODS

The core was measured and described at the Iowa Geological Surveys' (IGS) Oakdale Core Library in Oakdale, Iowa. IGS geologists B. Witzke and B. Bunker permitted J. Day and S. Clark to cut the entire IGS H-32 core interval selected for study (Fig. 3). Whole rock carbon powders were drilled at one foot intervals through the entire IGS H32 core split for $\delta^{13}\text{C}_{\text{carb}}$ analysis, and 10 gram core chips were taken every 5 cm for MS measurement. The remaining part of the core split was taken to Illinois State University and J. Day sampled continuously at one foot intervals through the Maple Mill, English River and Louisiana Limestone (shorter intervals in the shales) for conodonts. Conodont sample intervals shown as vertical lines in Fig. 3).

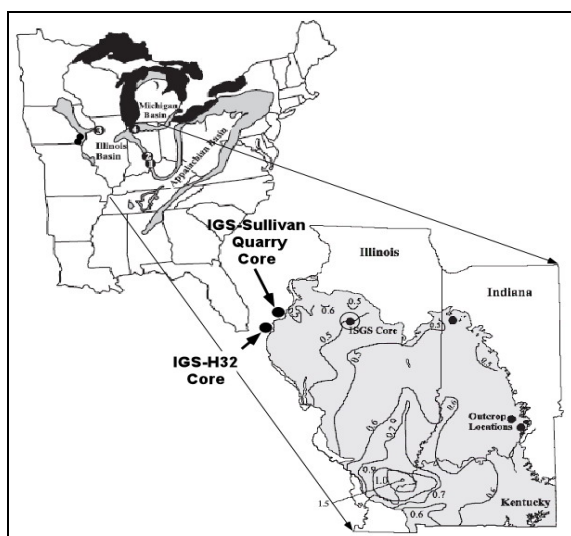


FIGURE 1.--Map showing distribution of Upper Devonian black shales of the New Albany Group in the Illinois Basin, vitrinite reflection values, and locations of important cores under study. The IGS H-32 well is located on the western margin of the Illinois Basin in southeastern Iowa. Map after figs. 1 & 5 of Brown and Kenig (2005).

For investigation of secular changes in $\delta^{13}\text{C}_{\text{carb}}$, 500 milligram whole rock powders were milled from polished core faces with a 2mm masonry bit using a Dremmel variable speed drill. The bit was cleaned after milling each powder sample by immersion in 0.1 molar hydrochloric acid (20 seconds), rinsed in DI water, followed by immersion in an ultrasonic DI water bath for 20 seconds, then dipped in ethanol to increase rate of evaporation for drying. MS samples were chiseled from a core split using a rock hammer and chisel. Rock powders were into a glass vial, capped and numbered. The part of the core that was sample with the chisel and hammer were bagged and numbered well. Rock Powders were prepared using standard methods by H. Rowe and the stable isotopic composition of inorganic carbon ($\delta^{13}\text{C}$) was analyzed using a GasBench II (hotblock at 50C) coupled to a ThermoFinnigan DeltaPlus XP isotope ratio mass spectrometer. Values were standardized to V-PDB using NBS-19, with a precision of 0.1 permil for $\delta^{13}\text{C}_{\text{carb}}$.

ISOTOPIC AND MAGNETIC SUSCEPTIBILITY AS PROXIES TO STUDY DEVONIAN - CARBONIFEROUS CLIMATE CHANGE

$\delta^{13}\text{C}_{\text{carb}}$ Isotopic Chemostratigraphy

Investigation of $\delta^{13}\text{C}$ excursions are common features of carbonate successions deposited in

ancient epeiric seas. They are typically explained as the result of increased rates of organic C burial in contemporaneous oceans, which in turn are related to changes in primary productivity in surface ocean waters or increased anoxia in bottom waters (e.g., Arthur et al., 1988; Kump and Arthur, 1999). This assumes that epeiric seas inherited their $\delta^{13}\text{C}$ signatures from contemporaneous oceans without additional overprinting by processes of local C-cycling. Carbon burial and sequestration recorded by significant excursions may be associated with climatic cooling as demonstrated recently in the Late Frasnian by Joachimski et al. (2004).

Our results from the H-32 core section are shown in Figure 4. There appear to be as many as 11 small and larger scale positive excursions visible in the data set (Excursions 1 to 11, Fig. 4). The first significant event is excursion 2 in the upper Saverton Shale, followed by $\delta^{13}\text{C}$ values reaching plus 4 *per mil* Excursion the lower Maple Mill Shale associated with the initial Upper Famennian sea level rise of T-R cycle IIf-1 (Figs. 3and 4), followed by excursions 6 and 7. The abrupt and pronounced increase in $\delta^{13}\text{C}$ within excursion 8 and continuing through 11 coincides directly with the Hangenberg Carbon Isotope Excursion documented in recent studies of Kaiser et al. (2004), Day et al. (2005), Cramer et al. (2008). The position where the Green House-to-Icehouse climate

transition most likely occurs is shown by the red line in Figure 4 coinciding with the onset of Excursion 5 where $\delta^{13}C$ values increase dramatically. And coinciding directly to the

major shift towards high positive in δMS values at exactly the same position (base of English River Formation, Figs. 2, 3, 4, 5).

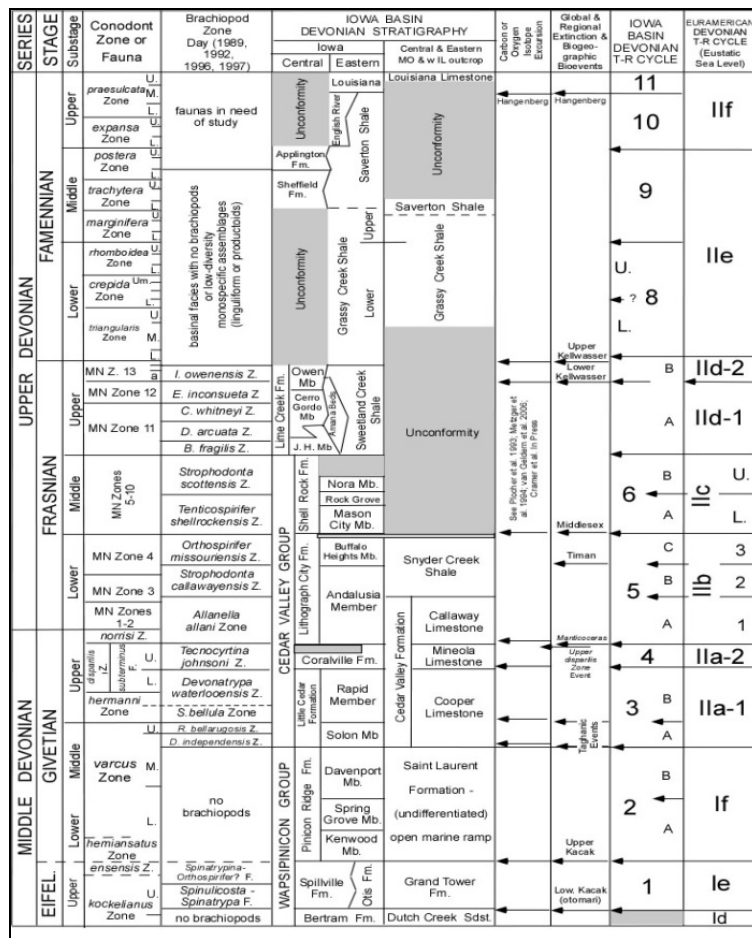


FIGURE 2.—Stratigraphic and biostratigraphic framework for the Middle-Late Devonian (late Eifelian-Famennian) middle and outer shelf facies of the eastern part of the Iowa Basin showing relationships between: the qualitative eustatic T-R cycles of Johnson *et al.* 1985). After fig. 3 of Day (2006), see that paper for additional references to Iowa Devonian conodont & brachiopod biostratigraphy.

Magnetic Susceptibility

It is now well established that magnetic susceptibility (MS) data sets in both unlithified and lithified marine Phanerozoic sediments often record Milankovitch cyclicity, and the cyclostratigraphy of these sequences can be used for astronomical calibration of geologic time scales (Mead et al., 1986; Hartl et al., 1995; Weedon et al., 1997; Shackleton et al., 1999b; Weedon et al., 1999). It has been argued that of those climate cyclicities observed, the ~400,000 year eccentricity cycle has a robust, long-term paleoclimatic stratigraphic record that is often preserved

(Shackleton et al., 1999a). Testing of the utility of MS data sets as climate proxy record for the Devonian is still being investigated MS data sets to independently verify its applicability for climate studies in deep time through correlation with other independently derived coeval climate proxy records including $\delta^{13}C$ from whole rock carbonate and brachiopod calcite studies, and δO_{18} sea surface temperature (SST) records derived from study of in conodont apatite (see Joachimski et al., 2004; Breisig et al., 2006).

Our results plotted as δMS in Figure 5 display a pattern of short term cyclic fluctuations in

δ MS values recording numerous small-scale variations, with significant and progressive increase in values up section, with the most impressive increase in δ MS (Fig. 5) correlating directly to the first major δ C13 Carbon Excursion 5 (Fig. 4). Fourier Transform time

series analysis appears to verify that our Late Devonian MS data set shown in Figures 5 record both short and longer period Milankovitch cyclicity.

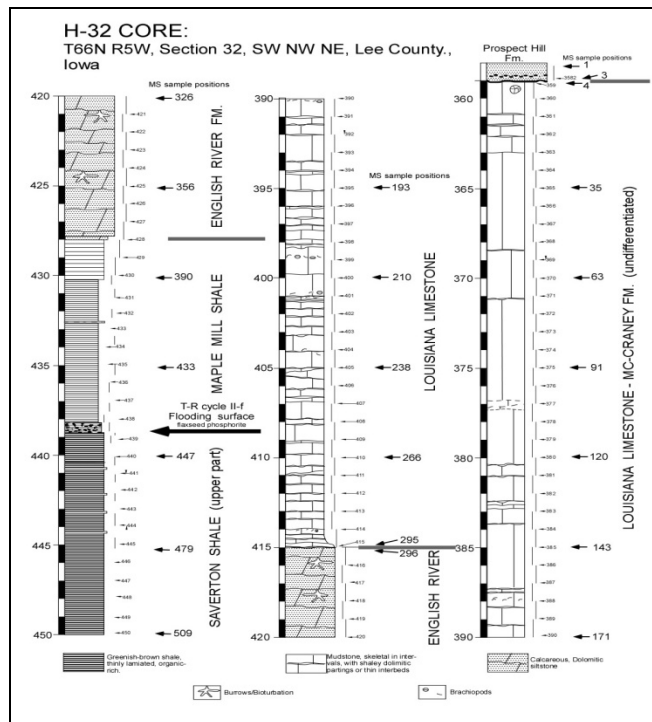


FIGURE 3.—Upper (Saverton Shale) and Uppermost Famennian and early Carboniferous (Tournaisian) stratigraphy in the H-32 Core from southeastern Iowa (Fig. 1B). Whole-rock powders for $\delta^{13}\text{C}_{\text{carb}}$ analysis were drilled every foot beginning at 455 feet in through the entire core section (see Fig.4), and ten gram core chips were sampled at 5 cm intervals for MS measurements (Fig. 5). MS sample numbers at 5 foot intervals in the core are shown to the right of the stratigraphic columns of the core log.

Fourier Transform Analysis of MS Data

Time-series analysis (J. Tomkin) performed of the raw MS data (independent of smoothing) as shown in Figure 5. The initial assumption is that the spacing of samples (every 5 cm) is linearly related with time, i.e., Dx is spectral graph. The spectral power of the three MS data sets was obtained with Fourier Transform (FT) analysis. The data were both detrended and subjected to a Hanning window so as to reduce spectral leakage and increase the dynamic range (Jenkins and Watts, 1968). Incidences of statistically significant peaks in the resulting spectrum are determined by employing the multi-taper method (Ghil et al, 2002), as calculated with the SSA-MTM toolkit (Dettinger et al., 1995).

ASTRONOMICAL CALIBRATION & DURATION UPPER FAMENNIAN-TOURNAISIAN

Fourier Transform (FT) analysis identified two significant peaks. The 4.1 m.y. comes from multiplying 41 (the first significant peak - the 41st harmonic) x 100,000, the eccentricity (E2) cycle. Given that age, then the other peaks must fit the assumption of a 4.1 m.y. age for the core - so we simply divided 4,100,100 by 123 (the harmonic number of the other significant peak) and the result is the precessional (P1) peak reported.

If we assign the 41st harmonic a value of 100,000 for E2 eccentricity, then the 243rd harmonic is 16,872 Precession-P1 value, recalculated from Berger for 360 Ma = 16,970

for P1. In addition, a strong peak represented by the 123rd harmonic (significant) then has a value of 33,333 for O1 obliquity.

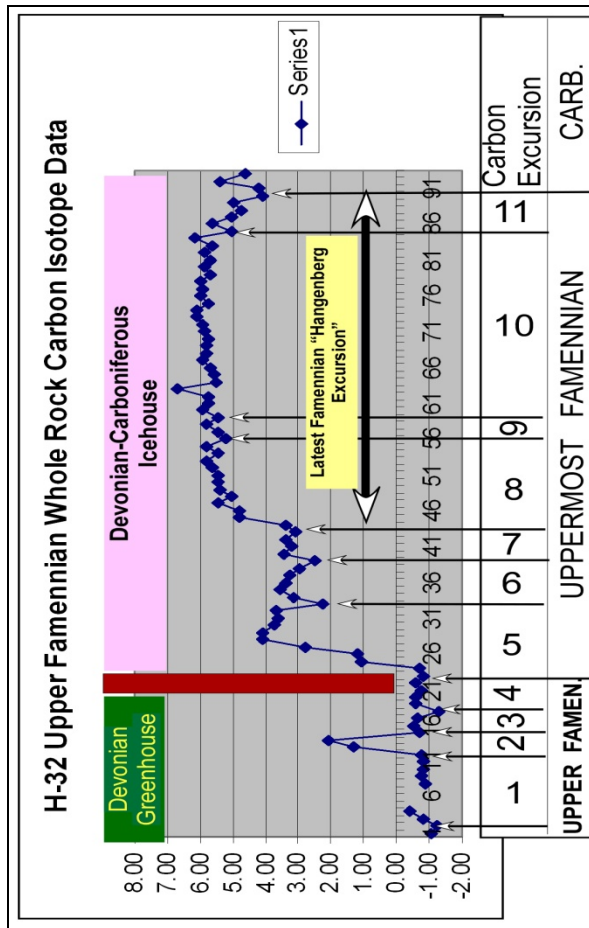


FIGURE 4.--Plot of $\delta^{13}C_{carb}$ carbon isotope data from Upper Famennian to earliest Tournaisian rocks sampled in the IGS H-32 core (see Figs. 2 and 3), numbered isotope excursions (starting points of climbing limbs designated by arrows) from the sampled Upper Famennian strata in the H-32 Core. The interval of excursions 8 to 11 where $\delta^{13}C_{carb}$ values display peak values (vertical arrow) of 5 to 6 per mil provide the most complete record known of the prolonged “Hangenberg Excursion” of Kaiser et al. (2004), Day et al. (2005), Cramer et al. (2008). The position where the Green House-to-Icehouse climate transition is thought to occur is shown by the red line.

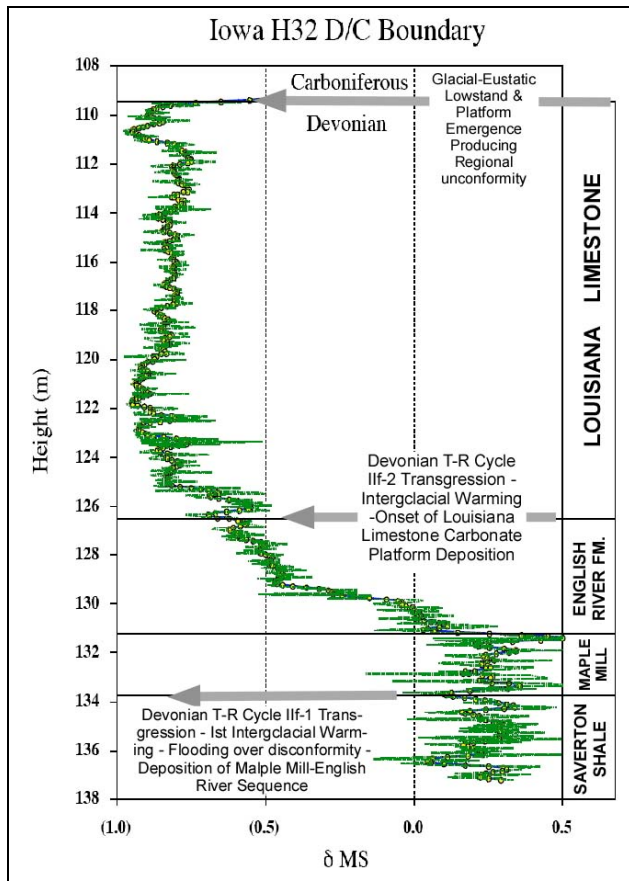


FIGURE 5.--Plot of δ Magnetic Susceptibility (MS) values calculated from raw MS measurement from 509 samples from the IGS H32 Core. Stratigraphy as shown in Figures 2 to 4. Gray arrows show positions of major marine flooding events presumed to coincide with inter-glacial eustatic sea level rises of the two Uppermost Famennian Gondwana continental glaciations. Gray arrow at top of plot shows position of earliest Tournaisian glacial eustatic sea level lowstand producing a regional unconformity across the U.S. midcontinent. Carbon excursion 5 begins at base the Maple Mill Shale, excursion 8 begins at base of Louisiana Limestone (Figs. 2 to 4).

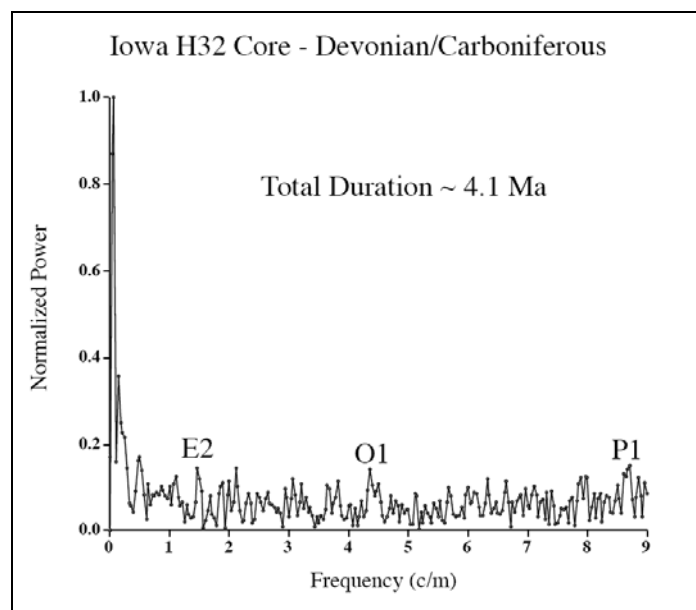


FIGURE 6.—Fourier Transform analysis of MS cyclicity in the IGS H-32 core. Two significant peaks, one at the 41st harmonic and the other at the 243rd harmonic were indicated

KEY RESULTS

1. As many as 11 $\delta^{13}\text{C}$ Excursions are documented, including the most complete record known of the prolonged Hangenberg Carbon Excursion, in the Late Devonian-Earliest Carboniferous H-32 core.
2. Significant short and longer term periodicity in the raw MS and δMS data record both short and longer period Milankovitch cyclicity.
3. Significant shifts in the δMS data correlate directly to the onset of the prolonged Hangenberg $\delta^{13}\text{C}$ Excursion (HCE) represented by H-32 Excursions 8 to 11, and the HCE may actually begin much lower (onset of H-32 Carbon Excursion 5).
4. FT analysis of the MS data set identified significant peaks signifying P1 Precession, E2 Eccentricity, and O1 Obliquity signals.
5. The estimated duration of the time interval represented data sets is 4.1 million years (duration of combined intervals of the Upper *postera?* to Upper *praesulcata* Zones).
6. Both MS and $\delta^{13}\text{C}$ data from the IGS H-32 Core indicate that the timing of the Greenhouse-Icehouse transition occurred at or near the base of Devonian T-R cycle II as previously proposed

References

Brown, T.C., and Kenig, F., 2005, Water column structure during deposition of Middle Devonian–Lower Mississippian black and green/gray shales of the Illinois and Michigan Basins: a biomarker approach. *Palaeogeography, Palaeoclimatology, Palaeoecology* **215** (2004), 59–85.

Cramer, B. D., Saltzman, M.R., Day, J. and B.J. Witzke, 2008, Record of the Late Devonian Hangenberg Global Positive Carbon Isotope Excursion in an Epeiric Sea Setting: Carbonate Production, Organic Carbon Burial and Paleoceanography During the Late Famennian.

Day, J. E., 2006, Overview of the Middle-Upper Devonian sea level history of the Wapsipinicon and Cedar Valley Groups, with discussion of new conodont data from the subsurface Cedar Valley Group of southeastern Iowa, in Day, J. E., Luczaj, J., and Anderson, R., eds., *New Perspectives and Advances in the Understanding of Lower and Middle Paleozoic Epeiric Carbonate Depositional Systems of the Iowa and Illinois Basins*: Iowa Geological Survey Guidebook Series. **25**, 3-21.

Dettinger, M.D., Ghil, M., Strong, C.M., Weibel, W., Yiou, P., 1995. Software expedites singular-

spectrum analysis of noisy time series. *Eos, Transactions of the American Geophysical Union* **76**, 12–21.

Ellwood, B. and Day, J.E. 2006. Magnetic Susceptibility magnetostratigraphy for the middle-upper Devonian sequences in Southeastern Iowa, and provisional correlation to the Eifelian-Givetian and Givetian-Frasnian GSSPS in North Africa and Europe. Guidebook for the 36th annual field conference of the Great Lakes Section, Society for Sedimentary Geology (SEPM) and the 67th annual Tri-State Field Conference. Iowa Geological Survey Guidebook Series, 25, 59-73.

Ghil M., Allen, R.M., Dettinger, M.D., Ide, K., Kondrashov, D., Mann, M.E., Robertson, A., Saunders, A., Tian, Y., Varadi, F., Yiou, P., 2002. Advanced spectral methods for climatic time series. *Reviews in Geophysics* **40**, 3.1-3.4.

Isaacson, P.E., Hladil, J., Jian-wei, S., Kaldova, J., and Grader, G., 1999, Late Devonian (Famennian) glaciations in South America and marine offlap on other continent: *Abh. Geol. B.-A*, **54**, p. 239-257.

Jenkins, G.M., Watts, D.G., 1968. *Spectral analysis and its applications*. Holden-Day, San Francisco, 525.

Joachimski M.M., van Geldern R., Breisig S., Buggisch W., and J. Day, 2004. Oxygen Isotope Evolution of Biogenic Calcite and Apatite during the Middle and Late Devonian. *International Journal of Earth Science*, **93**, 542-553.

Kaiser, S., Steuber, T., and Becker, R. T., 2004, Conodont biostratigraphy, oceanic anoxia and climatic change during the latest Devonian to earliest Carboniferous: *in Devonian Neritic-Pelagic Correlation and Events: Abstracts of the Subcommission on Devonian Stratigraphy Annual Meeting, Rabat, Morocco 2004*, 25.

Mead, G.A., Yauze, L., and LaBrecque, J.L., 1986, Oligocene paleoceanography of the South Atlantic: paleoclimate implications of sediment accumulation rates and magnetic susceptibility, *Paleoceanography*, **1**, 273-284.

Over, D.J. Frasnian-Famennian Boundary at the type Sweetland Creek Shale locality. Guidebook for the 36th annual field conference of the Great Lakes Section, Society for Sedimentary Geology (SEPM) and the 67th annual Tri-State Field Conference. Iowa Geological Survey Guidebook Series **25**, 75-79.

Pavlicek, M. I., 1986, Upper Devonian conodont biostratigraphy in the subsurface of south-central and southeastern Iowa. M.S. Thesis, University of Iowa, Iowa City, 142 pp.

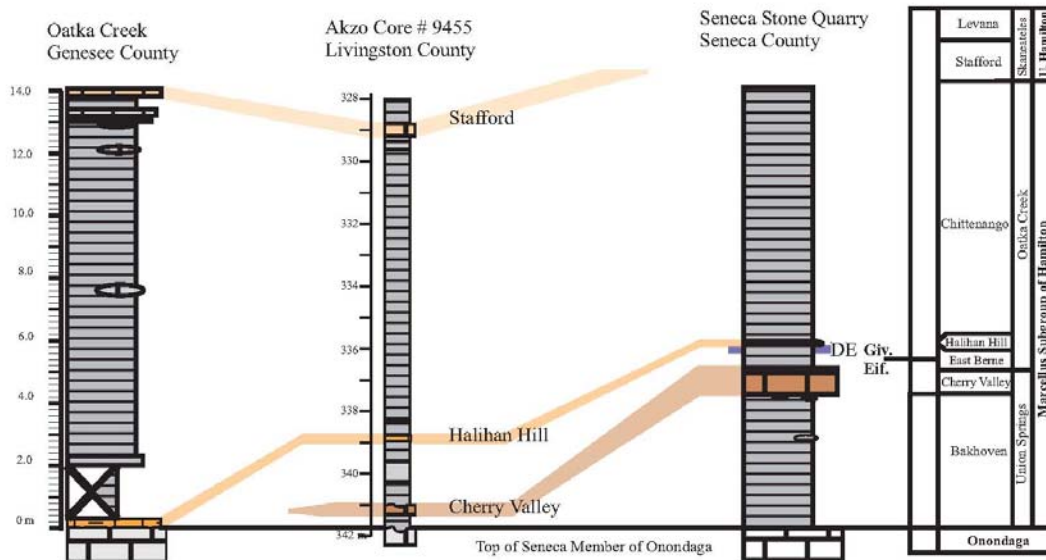
Scotese, C.R., and McKerrow, W.S., 1990, Revised world maps and introduction, in McKerrow, W.S., and Scotese, C.R., eds., *Paleozoic Palaeogeography and Biogeography: Geological Society Memoir*, **12**, 1-21.

Shackleton, N.J., McCave, I.N., and Weedon, G.P., 1999a, Preface, *Philosophical Transactions of the Royal Society London, A*, **357**, 1733-1734.
 Shackleton, N.J., Crowhurst, S.J., Weedon, G.P., and Laskar, J., 1999b, Astronomical calibration of Oligocene-Miocene time, *Philosophical Transactions of the Royal Society London, A*, **357**, 1907-1929.
 Strel, M., 2003, Report from the informal "uppermost Famennian working subgroup". *SDS Newsletter*, **19**, 47.
 Witzke, B. J., and B. J. Bunker, 2002, Bedrock geology in the Burlington area, southeastern Iowa. *In Iowa Geological Survey Guidebook* **23**, 23-48.
 Woodruff, M. L., 1990, Middle and Upper Devonian (Givetian-Famennian) conodont biostratigraphy and lithostratigraphy in the

subsurface of northeastern Missouri. M.S. Thesis, University of Iowa, Iowa City, 239 p.
 Weedon, G.P., Jenkyns, H.C., Coe, A.L., and Hesselbo, S.P., 1999, Astronomical calibration of the Jurassic time-scale from cyclostratigraphy in British mudrock formations, *Philosophical Transactions of the Royal Society London, A*, **357**, 1787-1813.
 Weedon, G.P., Shackleton, N.J., and Pearson, P.N., 1997. 5. The Oligocene time scale and cyclostratigraphy on the Ceara Rise, western equatorial Atlantic. *Int: Shackleton, N.J., Curry, W.B., Richter, C., and Bralower, T.J. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results*, **154**, 101-114.

Position of the Eifelian – Givetian boundary in New York

by D. J. OVER



Early Devonian Ostracodes from the Coal Canyon Sections (Northern Simpson Park Range, Central Nevada)

by Dojen, C.¹, Evola, G.M.² & Murphy, M.A.³

¹ Westfälische Wilhelms-University, Institute of Geology and Palaeontology, Corrensstr. 24, 48149 Muenster, Germany; email: c.dojen@uni-muenster.de

² Chevron, Bakersfield

³ Earth Science Department, University of California, Riverside, California 92521-0423, USA

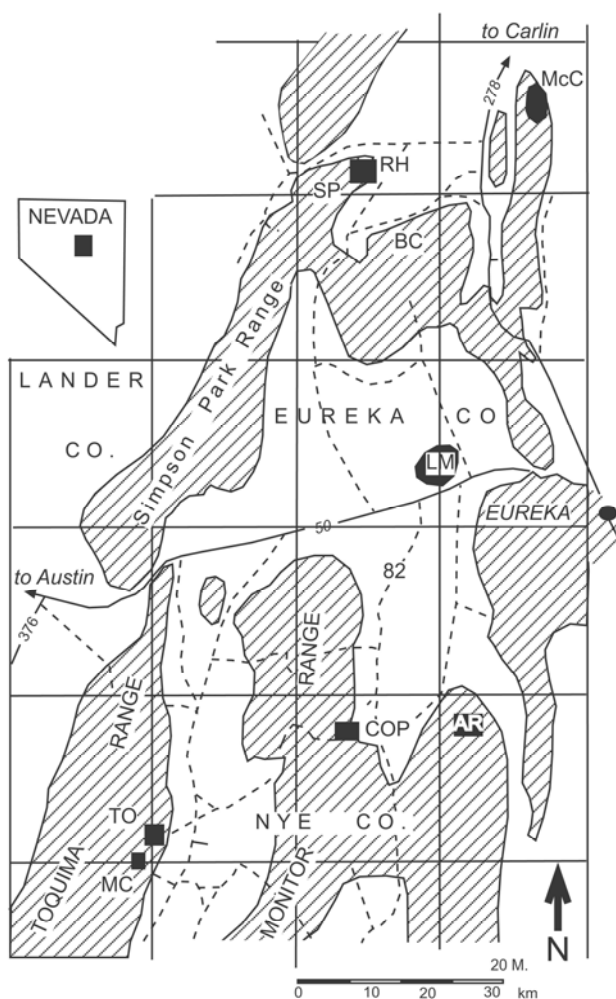
Silurian and Early Devonian ostracodes of central Nevada have received very little study in comparison with other groups of fossils. Only five publications are primarily concerned with ostracodes (Berdan, 1953, 1977, 1986; Kennedy, 1977; Stone & Berdan, 1984). Several other papers deal peripherally with ostracodes and a number of excellent theses contain a great deal of taxonomic and biostratigraphic information.

In contrast, several studies on Late Devonian ostracodes have been published in recent years by Casier and colleagues (e.g., Casier et al. 1996, 2006, Casier & Lethiers, 1997, 1998a, b). More than 100 ostracode species are described by these authors and suggest late Devonian faunal exchanges between Nevada and the Russian Platform via the Western Canadian Platform (Casier et al. 2006).

Fig. 1: Index map showing the location of the stratigraphic sections at Coal Canyon in the Simpson Park Range (SP). Also shown are the locations of the stratigraphic sections at Copenhagen Canyon in the Monitor Range (COP), at Ikes Canyon in the Toquima Range (IC), at Wenban Peak (WP), in the Robert Mountains (RM), and at Mill Creek in the Toquima Range (MC). Dashed lines represent graded roads

However, the sections are of great interest for biostratigraphy as the conodont record of the Central Nevadan sequences (including section SP VII) together with those from the Spanish Pyrenees has permitted the subdivision of the Lochkovian (Murphy & Valenzuela-Ríos, 1999). The work currently in progress is based on the thesis of one of us (GME) and the subsequent augmentation of those collections. The goal of the work is to summarize the knowledge on Lochkovian ostracodes from Nevada, primarily the stratigraphic sections at Coal Canyon in the Simpson Park Range (Fig. 1). Once the basic elements of this faunal sequence are described, we will seek to incorporate material known from other ranges in the region, primarily the Cortez Range, the Roberts Mountains, and the Toquima Range, and to integrate the ostracode biostratigraphy with the already established conodont, graptolite, and brachiopod sequences. The combined work will establish a robust biostratigraphic framework for the region and for the time interval.

All in all, the Nevadan ostracode faunas are composed by both heavy-walled palaeocopes indicating shallow marine environments and thin-walled, frequently spinose podocopines typically for low-energy environments. Some of the latter such as *Tricornina* sp. aff. *T. jahnkei* and n.gen. aff. *Acravicula*, are of special interest, as they occur in Lochkovian strata of Nevada and the Spanish Pyrenees. This might be useful for prospective



correlations between different facies and areas (Fig. 2), as the near shore faunas from both Nevada and the Spanish Pyrenees can be used

for the correlation to Canada and Celtiberia, respectively.

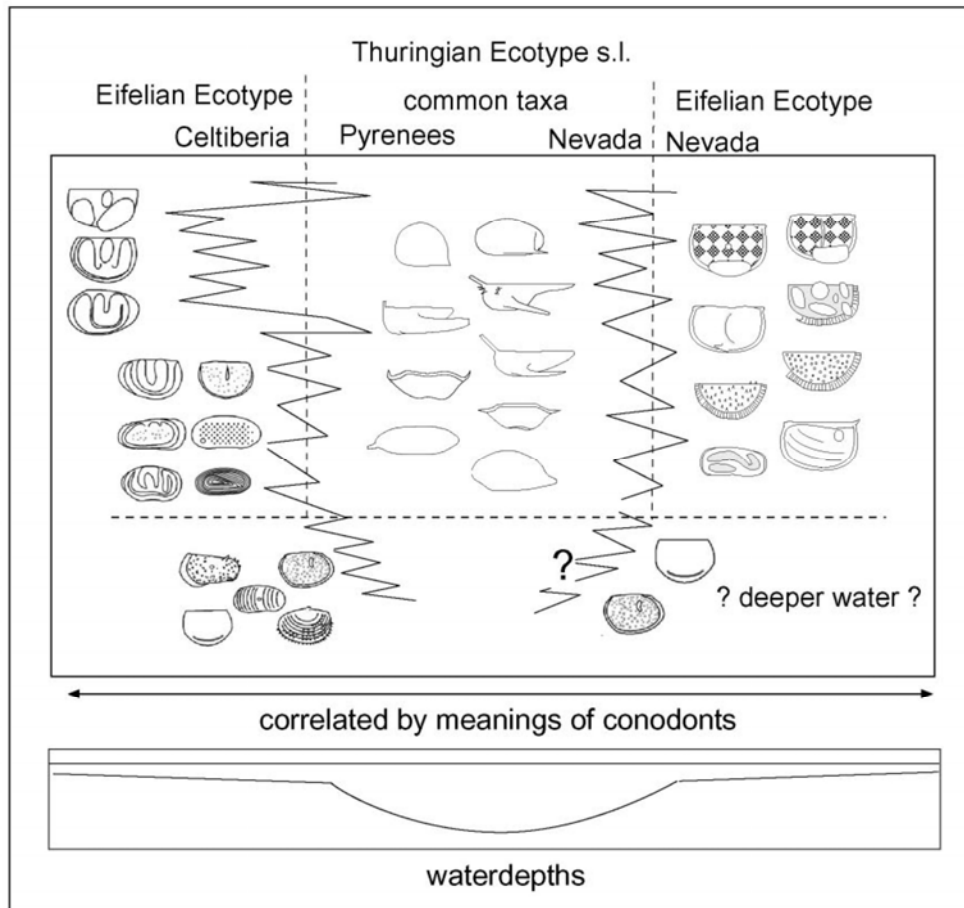


Fig. 2: Relations between Lochkovian ostracode faunas of Nevada, the Spanish Pyrenees and Celtiberia.

The Coal Canyon series predominately consist of shelly limestones yielding abundant conodonts, brachiopods, corals and graptolites, which are used for the correlation between the various sections. Thus, the ostracode faunas are tied to a well-established faunal network. Within the sections, 24 ostracode-bearing horizons are present, covering the interval between the *eurekaensis* to *triconicus* conodont zone.

So far, about 60 ostracode taxa belonging to 33 genera have been identified in Lochkovian strata from the Coal Canyon sections (Tab. 1). From these, 15 species, 1 genus and 1 subgenus are new. The fauna will be described in a forthcoming publication. Like in the late Devonian, the Early Devonian ostracode

faunas expose similarities not only to those from the Northern American, but also to the Russian Platform. Moreover, similarities to faunas from Europe are exposed, too. For the most parts relations on generic level are found, but further investigations are necessary.

Monograptus uniformis occurs at 1300 feet at SP I in sequence with *Saetograptus willowensis* and *M. birchensis*, indicating a position around the S/D-boundary. But the oldest identifiable ostracode faunas occur in the *eurekaensis* conodont zone: *Ampletochilina* (n.subgen.) n.sp. A is very close related to *Eurekabolbina*, which has been described by Berdan (1986) from the upper *pesavis*-Zone in Nevada. A new species of *Alaskabolbina* evidences the close connections to Alaska and

Western Canada, and *Sohnia* sp., cf. *summacuminata* shows relations to the Middle Devonian of New York. Three species of *Garniella* have been found and extend the range of the genus into the early Lochkovian; relations to the Baltics and respectively to the Northern American species *G. concentrica*, *G. uniserata*, and *G. triseriata* exist. *Kirbyella* (*Berdanella*) aff. *unicornis* has close relations to *K. (B.) unicornis* mentioned from Middle Devonian beds in North America and Europe. *Arikloedenia* (*A.*) n.sp., aff. *A. magna*, *Arikloedenia* (*Crassikloedenia*) n.sp., and *Bodzentia* sp., cf. *B. solitaris grandis* link the ostracode faunas to the Middle Devonian Grzegorzkwice Beds in the Polish Holy Cross Mountains. *Mesomphalus berdanae*, *M. rhomboidales?* and *M. striatellus?* represent the Devonian ostracode species known from Northern America, but the genus is also reported from the Russian Platform. Also, *Lichwinella* sp. aff. *L. adelaidae* reveals relations to the Russian Platform. *Xixionopsis* aff. *angularis* supports at species level relations to eastern North America (Albany County, N.Y.) and at genus level relations to Europe. Possibly, *Xixionopsis* is a younger synonym to *Saumella*, as it was suggested by Feist & Groos-Uffendorde (1979) and by Coen (1985). However, all these occurrences are of Emsian age, whereas we find this taxon already in the early Lochkovian (*eurekaensis*-Zone).

The youngest faunas found so far in the Coal Canyon sections are of late middle Lochkovian age (*trigonicus* conodont zone). *Ogilvites?* n.sp. A, *Ampletochilina* (n.subgen.) n.sp. A and B, *Pseudocyproides* n.sp. A, *Beecherella* sp., aff. *B. carinata*, *Mesomphalus berdanae* and *M. rhomboidales?*, *Dolichoscaphoides copelandi* and *D.* n. sp.A, *Trepostella* n.sp. A, T. cf. *borealis*, two new species of *Nevadabolbina*, as well as new species of *Yukonibolbina* and *Arikloedenia* (*Crassikloedenia*) and some *Acanthoscapha* and *Tricornina* have been found.

We hope that the confirmation of our studies will improve the biostratigraphic significance and correlation potential of lowermost Devonian ostracodes.

References

- BERDAN, J.M. (1953): Devonian ostracode fauna from Nevada.- G.S.A. Bull., **64**: 1394.
- BERDAN, J.M. (1977): Early Devonian ostracode assemblages from Nevada.- In: MURPHY, M.A., BERRY, W.B. N. & SANDBERG, C.A. (eds.): Western North America: Devonian.- Univ. Calif, Riverside Campus Mus. Contr. **4**: 55-64.
- BERDAN, J.M. (1986): New ostracode genera from the lower Devonian McMonnigal Limestone of Central Nevada.- J. Paleont. **60** (2): 361-178.
- CASIER, J.-G., BERRA, I., OLEMPSKA, E. SANDBERG, C. & PREAT, A. (2006): Ostracods and facies of the Early and Middle Frasnian at Devils Gate in Nevada: Relationship to the Alamo Event.- Acta Palaeont. Pol. **51** (4): 813-828.
- CASIER, J.-G. & LETHIERS, F. (1997): Les Ostracodes survivants à l'extinction du Dévonien supérieur dans la coupe du Col de Devils Gate (Nevada, U.S.A.).- Geobios **30**: 811-821.
- CASIER, J.-G. & LETHIERS, F. (1998a): Les Ostracodes du Frasnien terminal (Zone à *linguiformis* des Conodontes) de la coupe du col de Devils Gate (Nevada, USA). Bull. Inst. r. Sci. nat. Belg., Sci. Ter. **68**: 77-95.
- CASIER, J.-G. & LETHIERS, F. (1998b): The recovery of the ostracode fauna after the Late Devonian mass extinction: The Devils Gate Pass section example (Nevada, USA). C. R. Acad. Sci, Paris, Sci. de la terre et des planètes, **327**: 501-507.
- CASIER, J.-G., LETHIERS, F. & CLAEYS, P. (1996): Ostracod evidence for an abrupt mass extinction at the Frasnian / Famennian boundary (Devils Gate, Nevada, USA).- C.R. Acad. Sci. Paris, **322**, série II. a: 415-422.
- GROOS-UFFENDORDE, H. (1979): Die Ostrakoden-Fauna.- In: FEIST, R. & GROOS-UFFENDORDE, H. (1979): Die „Calcaires à polypiers siliceux“ und ihre Ostracoden-Faunen (Oberes Unter-Devon; Montagne Noire, S-Frankreich).- Senck. lethaea **60**, (1/3): 83-187.
- KENNEDY, P.J. (1977): The lower Devonian ostracode sequence at Table Mountain, near Eureka, Nevada.- In: MURPHY, M.A., BERRY, W.B. N. & SANDBERG, C.A. (eds.): Western North America: Devonian.- Univ. Calif, Riverside Campus Mus. Contr. **4**: 80-88.
- MURPHY, M.A. & VALENZUELA-RÍOS, J.I. (1999): *Lanea* new genus, lineage of Early Devonian conodonts.- Boll. Soc. Paleont. Ital. **37** (2/3): 321-334.
- STONE, S. M. & BERDAN, J.M. (1984): Some Late Silurian (Pridolian) ostracodes from the Roberts Mountains, central Nevada.- J. Paleont. **58** (4): 977-1009.

sample	early Lochkov.			middle Lochkovian																					
	SP-VII 150	SP VII 4a	SP VII 186	SP VIII 10A	SP 112A	SP VII 11	SP 112B	SP VII 12-54'	SP VII 12-44'	SP VII 12-27'	SP VII 12	SP V 41A	SP VIII F118-2	SP V 41B	SP VII F104+6'	SP VIII -G-31-4-8'	SP VIII -G-31-4-3'	SP VIII -G-31-4	SP VIII -G-31-4+1'	SP VII F-104+2	SP VIII 11	SP VII 15	SP VIII 13	SP VIII 15	
<i>Mesomphalus berdanae</i>			x		x								x			x	x					x	x		
<i>Mesomphalus rhomboidalis?</i>			x	x	x	x							x			x								x	
<i>Mesomphalus striatellus?</i>			x			x							x			x	x	x							
<i>Dolichoscaphoides copelandi</i>									x	x			x	x			x	x			x		x	x	x
<i>Dolichoscaphoides</i> sp. cf. <i>D. copelandi</i>											x		x	x			x	x					x	x	
<i>Dolichoscaphoides</i> n.sp. A						x					x		x	x			x				x		x	x	
<i>Treposella</i> sp. cf. <i>T. boralis</i>													x	x			x				x		x	x	
<i>Treposella</i> n.sp. A														x			x	x					x	x	
<i>Treposella?</i> sp.									x					x			x						x		
<i>Garniella</i> sp., cf. <i>G. concentrica</i>				x																					
<i>Garniella</i> sp. cf. <i>G. uniseriata</i>				x																					
<i>Garniella</i> sp. cf. <i>G. triseriata</i>				x																					
? <i>Strepula concentrica</i>		x	x																						
<i>Nevadabolbina</i> n.sp. A								x							x	x			x			x	x		
<i>Nevadabolbina</i> n.sp. B					x										x							x	x		
<i>Aparchites</i> sp. A																									x
<i>Aparchites</i> sp. B																									x
<i>Arikloedenia</i> (A.) n.sp. aff. <i>A. magna</i>		x	x																						x
<i>Arikloedenia</i> (<i>Crassikloedenia</i>) sp.														x											x
<i>Alaskabolbina</i> n.sp. A								x	x																
<i>Alaskabolbina</i> sp. cf. n.sp. A		x						x	x																
<i>Alaskabolbina</i> sp.																							x		
<i>Yukonibolbina</i> n.sp. A				x				x																	
<i>Yukonibolbina</i> n.sp. B				x					x		x	x	x												
<i>Yukonibolbina galea</i>									x	x	x	x	x			x			x						x
<i>Yukonibolbina quadriverruca</i>				x					x	x	x	x	x	x	x	x	x							x	x
<i>Yukonibolbina</i> sp.																									
<i>Yukonibolbina?</i> sp.																							x	x	
n.gen. A n.sp. A											x		x												
<i>Pseudomyomphalus spicatus</i>										x								x	x				x	x	
<i>Pseudomyomphalus</i> n.sp. A																									x
<i>Ogilvites?</i> n.sp. A				x				x	x		x		x			x			x						
<i>Kirkybella</i> (<i>Berdanella</i>) aff. <i>unicornis</i>		x																							
<i>Falsipollex</i> sp. A																									
<i>Hollina</i> sp. A																									x
<i>Hollina</i> sp. B																									x
<i>Hollinella</i> sp.														x			x			x	x	x	x	x	
<i>Ampletochilina</i> (n.subgen.) n.sp. A		x	x	x																					
<i>Ampletochilina</i> (n.subgen.) n.sp. B					x								x												x
Kloedenellidae gen et sp. indet																									x
" <i>Punctoprimitia</i> " ? sp.																									x
<i>Chironiptrum</i> sp.													x				x	x							x
<i>Nezamyslia</i> sp.														x			x								x
<i>Nezamyslia</i> n.sp.																									x
<i>Bodzentia</i> sp. cf. <i>B. solitaria grandis</i>																	x	x							x
<i>Lichwinella</i> sp. aff. <i>L. adelaidae</i>		x	x											x			x								
<i>Margina</i> sp. cf. <i>M. ollii</i>													x												
<i>Pseudocyproides</i> sp. cf. <i>P. alatus</i>																									x
<i>Pseudocyproides</i> n.sp. A					x						x	x	x	x					x			x			
<i>Tricornina</i> sp. aff. <i>T. jahnkei</i>																									x
<i>Tricornina</i> sp.																									x
<i>Sohnia</i> sp. cf. <i>S. summacuminata</i>		x		x				x								x	x		x	x					x
<i>Sohnia</i> sp. A																									x
<i>Sohnia?</i> sp.								x			x		x		x	x	x								x
n.gen. aff. <i>Acravilcula</i> n.sp. A																									x
<i>Xixionopsis</i> aff. <i>angularis</i>			x																						
<i>Beecherella</i> sp. cf. <i>B. carinata</i>							x	x			x	x	x			x			x						
<i>Beecherella</i> sp.																									x
<i>Acanthoscapha</i> sp. cf. <i>A. navicula</i>										x	x														x
<i>Acanthoscapha</i> sp. A																									x
<i>Berounella</i> sp.											x		x												

Tab. 1: Provisional faunal list of ostracodes from the sections Simpson Park Range.

MARKER CONODONTS AROUND THE GLOBAL ANNULATA EVENTS AND THE DEFINITION OF AN UPPER FAMENNIAN SUBSTAGE

Sven HARTENFELS, Ralph Thomas BECKER & Harald TRAGELEHN

Introduction

As decided by formal voting of SDS in 2004 (BECKER 2005), the Famennian will be divided in future into four substages. In a fourfold system, BECKER (2003, 2005) proposed to place the base of an Upper Famennian substage near or just above the global *Annulata* Events (HOUSE 1985), which reversed for very brief intervals the overall regressive trend of the higher Famennian (e.g., BECKER 1992a, 1992b, 1993, BECKER et al. 2004). The eustatic pulse of the Lower *Annulata* Shale allowed the sudden spread of *Platyclymenia* faunas, which define the base of Upper Devonian (UD) IV-A and the *Platyclymenia* Stufe of the ammonoid scale (BECKER 1993, BECKER & HOUSE 2000a.). Older *Platyclymeniidae* fall in the distinctive genera *Varioclymenia* and *Stenoclymenia* (BECKER 1993, 2000); in the past there was also sometimes confusion with the longidomic genus *Pleuroclymenia* of the *Hexaclymeniidae*. There was a rather significant goniatite and ammonoid extinction between UD III-C and IV-A (e.g., BECKER 1993, KORN 2004). *Prionoceras*, the oldest genus of the bradytelic superfamily *Prionoceratacea*, is a second important marker for the base of IV-A. In thick successions of the Rhenish Massif (SCHMIDT 1924, ZIEGLER 1962) or Morocco (BECKER et al. 2002), hypoxic to anoxic Lower and Upper *Annulata* Shales can be distinguished and are separated by a better oxygenated interval with one or two micrite subcycles. In condensed sections there may be only one black shale, marl and/or black limestone interval. Apart from blooms of *Pl. subnautilina* (much more common than *Pl. annulata*), mass occurrences of the bivalve *Guerichia* are typical and resemble the younger Hangenberg Blackshale. The Upper *Annulata* level is overlain by regressive and often very fossiliferous cephalopod limestones, the “Wagnerbank” of the Bohlen, Thuringia (e.g., SCHINDEWOLF 1952), and its micritic (“*Annulata* Limestone”) or marly equivalents (Fig. 1).

Since conodonts, not ammonoids, are given priority to define the future substage boundary, the supposed correlation of the two groups has been used to propose the base of the (Lower) *postera* or, better, (Lower) *styriacus* Zone to define the Upper Famennian (BECKER 2003, 2005). If the proposal to place the base of the Uppermost Famennian at the base of the Upper *expansa* Zone becomes accepted, the Upper Famennian would roughly correspond to UD IV (*Platyclymenia* Stufe) and V (*Clymenia-Gonioclymenia* Stufe). This equals the classical “Obere Hemberg” and “Dasberg Stufen” of German chronostratigraphy.

The current ammonoid-conodont correlation, unfortunately, is based on a very limited data base (ZIEGLER 1962, KORN & LUPPOLD 1987, KORN & ZIEGLER 2002, SCHÜLKE et al. 2003). Even more disturbing, there are hardly any published sections (apart from ZIEGLER 1962, DZIK 2006) with a well documented bed-by-bed conodont record across the interval from the Upper *trachytera* to the Upper *postera* Zone. Sample gaps still exist in the best studied sections of the Carnic Alps (e.g., PERRI & SPALLETTA 1991, 2001a, 2001b, PERRI et al. 2001, SPALLETTA & PERRI 2001), Sardinia (CORRADINI 2003), and Turkey (CAPKINOGLU 2005), and even more in the Cantabrian Mountains (SANZ-LOPEZ et al. 1999), South China (JI & ZIEGLER 1993), or eastern Iran (YAZDI 1999). The ranges of important marker taxa in the Famennian have been summarized by ZIEGLER & SANDBERG (1984) but in many cases the justification for lowest and last ranges remained unclear. Clarification was also needed, whether specific taxa appear and disappear synchronously or whether there are distinctive and stratigraphically meaningful differences between the range limits of marker forms. Consequently, we have sampled in the last three years fifteen sections of Germany, SE Morocco, and the Holy Cross Mts. (Poland) in order to establish ranges and conodont faunal overturns around the *Annulata* Events with the highest precision.

The best correlation of all sections is achieved when the Lower and Upper *Annulata* Shales and the immediately following “Wagnerbank Regression” are used as tie points. Our new data set allows also a refined correlation with the ammonoid zonation. Whilst the recognition of distinctive steps within established zones is based on a relative robust record, the widespread local and

regional overprinting makes it difficult to select and propose an outstanding level for chronostratigraphic subdivision.

Studied sections

In the Rhenish Massif we re-sampled the active Effenberg Quarry (KORN & LUPPOLD 1987, KORN 2004; with both *Annulata* Shales, separated by two micrite levels, and followed by marly “Wagnerbank” equivalents), the famous road cut section along the B7 at Hemer-Oese (e.g., ZIEGLER 1962, PAPROTH et al. 1986; with both *Annulata* Shales separated by marls and two nodular limestones, and followed by marly correlatives of the “Wagnerbank”), and the cliffs above Beringhauser Tunnel (e.g., SCHÜLKE et al. 2003, SCHÜLKE & POPP 2005; condensed middle grey limestone with *Platyclymenia*, followed by *Platyclymenia* nodules, squeezed out thin dark shale, and one “Wagnerbank”). The Hönnetal section of ZIEGLER (1962) is now mostly overgrown and could not be re-sampled. From Franconia detailed data are available from the famous Schübelhammer section (Köstenhof Quarry, TRAGELEHN & HARTENFELS 2002, without *Annulata* Shales but with the “Wagnerbank”) and from Geuser (e.g., ZITZMANN 1968; with minor gap of the event interval). In Thuringia we have re-sampled the Gositzfelsen near the famous Bohlen (e.g., BARTZSCH et al. 1990; with single *Annulata* Shale followed by the double-layered “Wagnerbank”) and the active Kahlleite Quarry (e.g., GEREKE 2004; with two very thin *Annulata* Shales, separated by a 6 cm thick Flaserkalk, followed by two “Wagnerbank” layers). The Famennian conodonts at Grünau in the Wildenfelser Zwischengebirge (Saxony) have last been studied by ZIMMERMANN (1960). The outcrop contains a single *Annulata* Shale, followed by three limestone layers that are equivalents of the “Wagnerbank”.

G. RACKI kindly lead two of us (SH & HT) to the Kowala Quarry (e.g., DZIK 2002), where two *Annulata* Shales are well exposed. In the Maider of the eastern Anti-Atlas the famous Mrakib section (BECKER et al. 2000, 2002; CORRADINI et al. 2001) was re-sampled once more. Two thick Lower and Upper *Annulata* Shales are separated by a package of marls sandwiching a single layer of micritic nodules. Three very fossiliferous nodular limestones (“*Annulata* Limestone”) form the equivalent of the “Wagnerbank”. In the northern Tafilalt, at

Bine Jebilet (BECKER 1992a), the *Annulata* Shales are developed as *Platyclymenia*-rich greenish marls with small limestone nodules, separated by a more continuous nodular limestone. The higher “*Annulata* Limestone” consist of two beds. In the central Tafilalt, at Jebel Erfoud or Bordj d’Erfoud (KORN 1999), Bou Tchrafine (BECKER & HOUSE 2000b), and Ouidane Chebbi NW, there is no dark *Annulata* Shale but the “*Annulata* Limestone” can be recognized and consists of one condensed (Bou Tchrafine, Ouidane Chebbi NW) or two marl-limestones cycles (Jebel Erfoud). In the SE Tafilalt, at Hassi Nebech (BECKER et al. 2002), the succession resembles Bine Jebilet but three “*Annulata* Limestone” beds are developed. In the extensive Amessoui Syncline of the southern Tafilalt (KORN et al. 2000), a black limestone with masses of *Platyclymenia* (ammonoid pack- to rudstone) and prionoceratids transgressed and reworked older strata: it represents, in comparison with the other Tafilalt region, a high-energy deposit that recurrently wedges out laterally. It is well developed at Takhbit West on the northern limb and re-appears as loose boulders at Jebel Ouaoufilal Pass, near the eastern end of the southern limb of the syncline.

In general, the Moroccan sections have more ammonoids but a much poorer conodont record than the German successions. Rather long-ranging taxa commonly dominate the less diverse assemblages. This may reflect the more southern palaeolatitude but a dominance of long-ranging taxa can also be seen in European samples (see SANDBERG 2008).

Steps in conodont evolution around the *Annulata* Events

1. Lower *trachytera* Zone

The Lower *trachytera* Zone is defined by the entry of *Palmatolepis rugosa trachytera*. Based on Köstenhof samples, we extend the range of relatives (cf. specimens) of *Polygnathus obliquicostatus* downwards into this zone. Transitional forms between *Pa. gracilis gracilis* and *Pa. gracilis sigmoidalis* (cf. *sigmoidalis* in Fig. 1) also occur so early. This may explain an overlap of first *gracilis sigmoidalis* (specimen not figured) and last *Pa. marginifera marginifera* in the Istanbul region of NW Turkey (CAPKINOGLU 2005). The latter subspecies finally disappears in the lower half of the Lower *trachytera* Zone (ZIEGLER & SANDBERG 1984).

Shallow-water carbonates of North America (e.g., SANDBERG & POOLE 1977, SANDBERG 1979) and Belgium (DREESEN & THOREZ 1994) yielded very early morphotypes of *Po. homoirregularis* that overlap with *Pa. distorta* and also with *Pa. marginifera*. This suggests a range into or below the Lower *trachytera* Zone. Unfortunately, there is so far no detailed documentation or any illustration of these oldest *homoirregularis* relatives.

2. Lower part of Upper *trachytera* Zone

The Upper *trachytera* Zone is defined by the **entry of *Pseudopolygnathus granulosus***, which allows an alternative naming as *Ps. granulosus* Zone. *Po. perplexus* has been listed as an additional index species in ZIEGLER & SANDBERG (1984) and been used as zonal marker, e.g., by PERRI & SPALLETTA (1990). At Beringhauser Tunnel and Kahlleite *Po. perplexus* enters much earlier than *Ps. granulosus*. This agrees with the range extension in JOHNSTON & CHATTERTON (2002), who found the species associated with *Pa. marginifera*. A range even below *Sc. velifer* was documented (but without photos) in Belgium by DREESEN (1978) and subsequently considered in SANDBERG & ZIEGLER (1979).

3. Regional entry of *Po. n. sp. aff. styriacus*

A distinctive new species intermediate between *Po. granulosus* and *Po. styriacus* enters at Köstenhof and in several other sections of Franconia in the higher part of the Upper *trachytera* Zone but well below the “Wagnerbank” (TRAGELEHN & HARTENFELS in prep.). It was previously known to HELMS (1961) and overlaps with youngest *Pa. glabra leptota* (= *Pa. falcata* in multi-element taxonomy of METZGER 1994), *Pa. rugosa trachytera*, and *Scaphignathus velifer velifer*. Unfortunately, this phylogenetically important taxon enters much later in all other studied regions. It is first found at the top of the “Wagnerbank” equivalents (Effenberg, Grünau, Beringhauser Tunnel) or just above (Beringhauser Tunnel, Oese, Kahlleite, Geuser, Gositzfelsen). It is lacking in Poland (Kowala) and in Morocco but seems present in South China (part of *Po. styriacus* in JI & ZIEGLER 1993). Therefore, it is of restricted use for precise or international correlations.

Typical forms of *Pa. gracilis sigmoidalis* enter at Köstenhof together with *Po. n. sp. aff. styriacus* and well below the Lower *Annulata* Event at Effenberg, Beringhauser Tunnel,

Grünau, Kahlleite, and Jebel Erfoud. In other sections typical morphotypes are delayed (Oese, Bine Jebilet, Geuser, Gositzfelsen, Kowala) or, so far, absent (Hassi Nebech, Mrakib, Ouidane Chebbi NW, Takhbit West). In Sardinia (CORRADINI 2003) typical *gracilis sigmoidalis* have been used to identify the Upper *trachytera* Zone in absence of *Ps. granulosus*. This is confirmed here but the zonal base should be sought somewhat below (see Malpasso data, SPALLETTA & PERRI 2001).

The combined evidence of *Po. n. sp. aff. styriacus* and *Pa. gracilis sigmoidalis* s.str. may allow, at least in some regions, a subzonal subdivision of the Upper *trachytera* Zone. Typical forms of *Po. obliquicostatus* enter at Köstenhof slightly higher than *Po. n. sp. aff. styriacus*.

4. Lower *Annulata* Event

Few conodonts die out and none enters at the base of the Lower *Annulata* level if the complete record is considered. The youngest but rare *Pa. rugosa grossi*, including cf. specimens, were found slightly or just below the event level at Effenberg and Köstenhof. The subspecies is lacking in Morocco. A small form related to *Po. duolingshanensis* (aff. *duolingshanensis* in Fig. 1) or *Po. breviaminus*, which both may be placed in *Ctenopolygnathus*, ranges at Effenberg into the second limestone below the Lower *Annulata* Shale.

But the data set is restricted by the fact that the widespread black shales were not or could not be processed. Partly due to these limitations, several important taxa may disappear locally slightly or just below the onset of the Lower *Annulata* Event. This applies to *Pa. rugosa trachytera* (at Oese, Kahlleite, Geuser, Grünau, and Kowala; for Hönnetal and Ballberg/Hövel see ZIEGLER 1962, 1971), *Pa. glabra leptota* (at Effenberg and Köstenhof, for Hönnetal and Ballberg/Hövel, under *Pa. glabra elongata*, see ZIEGLER 1962, 1971), and *Pa. minuta minuta* (at Oese, Grünau, Kahlleite, and Jebel Erfoud; for Hönnetal see ZIEGLER 1962). Locally, *Alternognathus beulensis* (Beringhauser Tunnel, Köstenhof: cf. specimens, Kahlleite: cf. specimens) and *Alt. regularis* (Beringhauser Tunnel, Grünau, Kahlleite) may also disappear before the Lower *Annulata* Event, sometimes as low as in the Lower *trachytera* Zone (Oese).

5. Upper *Annulata* Event

Several taxa have their last record between the two *Annulata* levels. The final extinction (globally youngest record) of *Pa. rugosa trachytera* at Effenberg allows to characterize the interval from just below the Upper *Annulata* Event to the base of the *styriacus* Zone as a ***trachytera-styriacus* Interregnum** or Interval Subzone. *Pa. rugosa trachytera* and *Po. styriacus* s.str. are not known to overlap in any section on a global scale, which emphasizes the significance of this short interval.

Sc. velifer velifer reaches into the Lower *Annulata* level at Beringhauser Tunnel, where it is represented by limestone, and at Kahlleite (GEREKE 2004). It was still found in the solid limestone between the two *Annulata* Shales at Effenberg by KORN & LUPPOLD (1987) but not in our samples. The species is last recorded just below the Lower *Annulata* Event at Oese, Hönnetal (ZIEGLER 1962), and at the Bohlen (HELMS 1959), and disappears somewhat earlier at Grünau, Geuser, Mrakib, Hassi Nebech, Jebel Erfoud, and in Sardinia (Corona Mizziu I, CORRADINI 2003). Other species that disappear between the two *Annulata* levels are *Pa. glabra lepta* (records from Oese and Beringhauser Tunnel) and *Pa. minuta minuta* (records from Effenberg and Beringhauser Tunnel).

The *Platyclymenia*-rich black limestones of the Amessoui Syncline (KORN et al. 2000) contain a new subspecies of *Bispathodus stabilis* that appears to be a regional marker form. It is probably ancestral to *Bi. stabilis* Morphotype 3. At Jebel Ouauoufilal Pass oldest *Po. margaritatus* are associated.

6. “Wagnerbank” and its correlatives

***Po. cf. rhabdotus* first occurs** in the *Platyclymenia*-rich light grey micrites (“*Annulata* Limestone”) at Jebel Erfoud. At Effenberg the “Wagnerbank” equivalents still have *Alt. beuelensis*, *Alt. regularis*, and *Alt. aff. regularis* (morphotype with continuous carina). This shows that the presence of *Alt. regularis* at the top of the Trident Member of the Three Forks Formation in Montana (ZIEGLER & SANDBERG 1984, discussion in SANDBERG 2008) is in no conflict with a topmost *trachytera* Zone age or with the Trident Member UD IV-A ammonoids (KORN & TITUS 2006). The same unit and correlatives in Utah contain also early morphotypes (illustrated in SANDBERG & ZIEGLER 1979) of

Po. homoirregularis that differ from our slightly younger cf. specimens. Beds above the “Wagnerbank” at Malpasso (SPALLETTA & PERRI 2001) with *Alt. beuelensis*, *Alt. regularis*, *Po. margaritatus* and *Po. rhabdotus* (not figured) may also still fall in the *trachytera-styriacus* Interregnum. The same applies to sample CSA6 from Casera Colinetta di Sotto (PERRI & SPALLETTA 2001a), which has associated *Alt. beuelensis*, *Alt. regularis*, *Po. marginvolutus*, and *Po. rhabdotus* (not figured) just before the onset of *Po. styriacus*. Section DN of CAPKINOGLU (2005) has first but somewhat atypical *Po. rhabdotus* below the entry of *Po. obliquicostatus* and *Po. styriacus*.

7. Base of *styriacus* Zone (*postera* Zone)

The **entry of *Po. styriacus*** lies at some distance above the *Annulata* Events if sections are not too condensed. Previously (ZIEGLER 1962: Hönnetal and Ballberg/Hövel, ZIEGLER 1971, KORN & ZIEGLER 2002: Enkeberg; consequently adopted by BECKER et al. 2004) it was thought that the base of the *postera* Zone follows immediately the top of the upper event interval. The entry of early morphotypes of *Po. styriacus* s.str. can be well traced at Oese, where it overlaps with last *Alt. aff. regularis*, and at Effenberg, Kahlleite, and Grünau. In the latter two localities *Po. rhabdotus* s.str. is associated.

At Beringhauser Tunnel early and advanced *styriacus* morphotypes enter together with *Pa. perlobata* aff. *postera* above a maly unit that overlies the “Wagnerbank”. A joint entry of *styriacus* and *rugosa postera* was reported by ZIEGLER (1962) for the Hönnetal section. In the condensed Köstenhof quarry, *Pa. perlobata* cf. *postera* and *Pa. cf. homoirregularis* occur together with *Po. margaritatus* one sample below the first early morphotype of *Po. styriacus*. In the other studied German sections, *Pa. perlobata postera* shows a slightly (Geuser) or much delayed entry (Effenberg, Kahlleite), up to the Lower *expansa* Zone at Oese (compare the delay in the vertical range table in ZIEGLER 1962), or it is even missing (Grünau, Gositzfelsen). Its absence in Sardinia was noted by CORRADINI (2003), its almost absence from the Carnic Alps by PERRI & SPALLETTA (2001a, 2001b), whilst the entry of *Po. styriacus* Zone can be well recognized at Casera Colinetta di Sotto (PERRI & SPALLETTA 2001). In the southern Urals (KONONOVA 1979), *Po. styriacus* enters

earlier than the delayed (associated with *Pa. rugosa rugosa*) *Pa. perlobata postera*. The combined evidence supports the view that *Po. styriacus*, whose phylogenetic source now can be documented, is a better (less facies sensitive) index taxon than *Pa. perlobata postera*. However, at Gositzfelsen the *styriacus* Zone is only recognizable by *Po. rhabdotus* s.str. In Morocco none of the discussed marker taxa has been found and neither the (Lower) *styriacus* or (Lower) *postera* Zone levels can be recognized without the help of ammonoids. At Kowala only late *styriacus* morphotypes have been recognized so far, overlapping with *Po. homoirregularis* s.str.; locally there is no *postera* record. This gives another case that shows a wider distribution of *styriacus* than *postera*.

Our samples include no overlap of *Po. styriacus* or *Pa. perlobata postera* with *Alt. beuelensis* or *Alt. regularis* but, based on "*Po. subserrata*" from the Ballberg and Hönnetal sections (ZIEGLER 1962), both are shown to range into the Lower and Upper *postera* Zones, respectively, in the summary chart of ZIEGLER & SANDBERG (1984). Further limited support for an overlap comes from a single sample (100-2) of the extremely condensed Antoinettenweg section of the Harz Mountains (HÜNEKE 1995).

Pa. rugosa ampla enters well above the base of the *styriacus* Zone, for example at Effenberg, Oese, Beringhauser Tunnel, Köstenhof, Kahlleite, and Kowala. It is missing in Morocco.

8. Base of Upper *postera* Zone

The entry of *Pa. gracilis manca* allows a subdivision of both the *styriacus* or *postera* Zones (with alternative naming as *gracilis manca* Zone). ZIEGLER & SANDBERG (1984) summarize other markers, such as *Bi. stabilis* Morphotype 3 and *Clydagnathus ormistoni*. Our samples from Kahlleite extend the range of *Ps. granulosus* into the oldest levels with *gracilis manca*; its disappearance, therefore, is not any more a reliable index for the top of the Lower *postera* Zone. But *Po. n. sp. aff. styriacus* is last seen at the top of the Lower *postera* Zone. BAI et al. (1994) claim a co-occurrence of last *Pa. glabra lepta* with *Pa. gracilis manca* at Nandong, Guangxi, but the first, which would be the youngest on a global scale, have not been figured and are, therefore, not accepted here.

Correlation with the ammonoid zonation

The most detailed ammonoid successions from around the *Annulata* Events are known from the Rhenish Massif, Saxothuringia, the Urals, and North Africa (southern Morocco and southern Algeria). The principal zonation has been summarized by BECKER & HOUSE (2000a) and BECKER et al. (2002) but minor refinements are possible. Based on new data from the Tafilalt (Hassi Nebech and Jebel Erfoud) and Sauerland (Enkeberg, KORN & ZIEGLER 2002, KORN 2004), the *Prolobites* Zone (UD III-C, in southern Morocco with rare *Afrolobites* and *Pricella*) can be subdivided in the western Prototethys (but not in the Urals) by the entry of the distinctive *Sulcochymenia sulcata*, which defines UD III-C2. Both at Enkenberg and Jebel Erfoud the *sulcata* (Sub)Zone correlates with the lower part of the Upper *trachytera* Zone; in the latter section there is an overlap with *Pa. gracilis sigmoidalis* s.str.

The base of the *Pl. annulata* Zone can now be precisely correlated with the highest range of *Sc. velifer velifer* and *Pa. rugosa trachytera* in the upper (but not topmost) part of the Upper *trachytera* Zone. In Morocco, the entry of the large-sized *Pl. ibnsinai* in the "*Annulata* Limestone" allows to recognize a regional *ibnsinai* Subzone (UD IV-A2) that falls in the short *trachytera-styriacus* Interregnum. Due to successive new records of *Franconicyclomenia* and *Protoxyclomenia* at Beringhauser Tunnel, the base of UD IV-B can be placed just a little bit above the base of the *styriacus* Zone. The new very early occurrence of *Franconicyclomenia* questions the regional *serpentina* Zone of KORN & LUPPOLD (1987). The base of the Upper *postera* Zone is not known to coincide with any change in ammonoid faunas.

Conclusions

1. The new and so far most detailed conodont record from the Lower *trachytera* to Lower *styriacus/postera* Zones of European and North African pelagic sections provide no outstanding conodont level for the definition of the future Upper Famennian substage.
2. There are no sharp extinctions or originations in conodonts associated with the Lower and Upper *Annulata* Events, although there is gradual loss of at least four important species high in the Upper *trachytera* Zone: *Sc. velifer velifer*, *Pa. rugosa trachytera*, *Pa. minuta minuta*, and *Pa. glabra lepta*.

3. *Po. styriacus* is a better (more widespread and less diachronous) index conodont than *Pa. perlobata postera*, at least in Europe. Its presence in Thailand (SAVAGE et al. 2007) and its dominance in comparison with *perlobata postera* in Turkey (CAPKINOGLU 2000, 2005) underlines this statement.
4. Amongst all recognized levels, only the entry of *Po. styriacus* near the boundary between UD IV-A and IV-B allows, with some restrictions, international correlation. However, the species seems to be absent from North Africa and is rare in North America (see SANDBERG 2008). Early morphotypes of *Pa. perlobata postera* can aid the correlation in Nevada and California.
5. SDS should consider to use the base of the global (Lower) *Annulata* Event in combination with its distinctive ammonoid (base of UD IV) and sequence stratigraphic (eustatic rise) signal to define the future Upper Famennian. The extinctions of *Sc. velifer velifer* (see HELMS 1959, ZIEGLER 1962; but reworking has been documented by MATYJA 1993), *Pa. minuta minuta* (compare ZIEGLER 1962, KONONOVA 1979 and PERRI & SPALLETTA 2001a), *Pa. glabra lept*a (compare KONONOVA 1979 and SPALLETTA & PERRI 2001), *Pa. rugosa grossi*, and *Pa. rugosa trachytera* (compare ZIEGLER 1962, PERRI & SPALLETTA 2001a, SPALLETTA & PERRI 2001 and CORRADINI 2003) can be used to approximate this level in conodont sequences.
6. The correlation of the pelagic sequence into neritic successions remains a challenge. The association with *Platyclymenia* faunas and diverse brachiopods in the Piker Hills Formation of NW Australia suggest that first *Po. collinsoni* enter near the *Annulata* Events level (conodonts in KLAPPER 2009 in press). Data from many former Soviet regions (e.g., ARISTOV 1994) are not yet detailed enough for a precise correlation of their extensive shallow-water strata. Generally, the longer ranging *Po. communis communis* and *Pelekysgnathus inclinatus* blossomed ca. with the *Annulata* Events (SANDBERG & POOLE 1977, SANDBERG 1979), which is confirmed for the first species in several of our samples.
7. In the miospore succession, the *Annulata* Shales may fall within the VCo Zone but the miospore-conodont correlation of the Middle/Upper Famennian is still problematic (see discussion in STREEL 2007, 2008).

8. The Lower *Annulata* Event obviously caused changes in rhynchonellid associations (e.g., extinctions of *Pugnaria* and *Leptoterorhynchus*) that can be used for correlation between the Tafilalt, Sauerland, and Holy Cross Mountains.

References

- ARISTOV, V.A. 1994. Devonian and Lower Carboniferous conodonts of the Eurasia: Assemblages, Zonal Subdivisions, Correlation of Different Facies Sediments. – Russian Academy of Sciences, Geological Institute, Transactions **484**, 1-192 [in Russian].
- BAI, S.L., BAI, Z.Q., MA, X.P., WANG, D.R. & SUN, Y.L. 1994. Devonian Events and Biostratigraphy of South China. – 303 pp. + 45 pls., Peking University Press
- BARTZSCH, K., BLUMENSTENGEL, H., PFEIFFER, H., SCHUBERT, R. & WEYER, D. 1990. Thüringen-Exkursion. Unterkarbon und Oberdevon im Raum Saalfeld-Schleiz. – Guidebook, Subcommission on Carboniferous Stratigraphy, 1-46.
- BECKER, R.T. 1992a. Regional developments of the global hypoxic *Annulata* Event (Middle Famennian). – Fifth International Conference on Global Bioevents, Göttingen, February 16-19, 1992, Abstract Volume, 13-14.
- BECKER, R.T. 1992b. Zur Kenntnis von Hemberg-Stufe und *Annulata*-Schiefer im Nordsauerland (Oberdevon, Rheinisches Schiefergebirge, GK 4611 Hohenlimburg). – Berliner geowissenschaftliche Abhandlungen **E3**, 3-41.
- BECKER, R.T. 1993. Anoxia, eustatic changes, and Upper Devonian to lowermost Carboniferous global ammonoid diversity. – Systematics Association, Special Volume **47**, 115-163.
- BECKER, R.T. 2000. Taxonomy and evolutionary history and distribution of the middle to late Famennian *Wocklumeriina* (Ammonoidea, Clymeniida). – Mitteilungen aus dem Museum für Naturkunde in Berlin, Geowissenschaftliche Reihe **3**, 27-75.
- BECKER, R.T. 2003. Famennian ammonoid zones of the eastern Anti-Atlas – implications for substage definition. – SDS Newsletter **19**, 20-24.
- BECKER, R.T. 2005. Minutes of the SDS Business Meeting, Rabat, 1st of March 2004. – SDS Newsletter **21**, 3-8.
- BECKER, R.T. & HOUSE, M.R. 2000a. Devonian ammonoid zones and their correlation with established series and stage boundaries. – Courier Forschungsinstitut Senckenberg **220**, 113-151.
- BECKER, R.T. & HOUSE, M.R. 2000b. The Famennian ammonoid succession at Bou Tchratine (Anti-Atlas, Southern Morocco). – Notes et Mémoires du Service géologique du Maroc **399**, 37-42.
- BECKER, R.T., BOCKWINKEL, J., EBBIGHAUSEN, V. & HOUSE, M.R. 2000. Jebel Mrakib, Anti-Atlas, a potential Upper Famennian substage boundary

- stratotype section. – Notes et Mémoires du Service géologique du Maroc **399**, 75-86.
- BECKER, R.T., HOUSE, M.R., BOCKWINKEL, J., EBBIGHAUSEN, V. & ABOUSSALAM, Z.S. 2002. Famennian ammonoid zones of the eastern Anti-Atlas (southern Morocco). – Münstersche Forschungen zur Geologie und Paläontologie **93**, 159-205.
- BECKER, R.T., ASSHOURI, A.R. & YAZDI, M. 2004. The Upper Devonian *Annulata* Event in the Sotori Range (eastern Iran). – Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen **231**, 119-143.
- CAPKINOGLU, S. 2000. Late Devonian (Famennian) conodonts from Denizliköyü, Gebze, Kocaeli, northwestern Turkey. – Turkish Journal of Earth Sciences **9**, 91-112.
- CAPKINOGLU, S. 2005. Famennian conodonts from the Ayineburnu Formation of the Istanbul Zone (NW Turkey). – Geologica Carpathica **56** (2), 113-122.
- CORRADINI, C. 2003. Late Devonian (Famennian) conodonts from the Corona Mizziu Sections near Villsalto (Sardinia, Italy). – Palaeontographia Italica **89** (for 2002), 65-116.
- CORRADINI, C., PERRI, M.C. & SPALLETTA, C. 2001. The Mrakib section (Morocco) as possible Upper Famennian (Devonian) stratotype section: conodont data. – SDS Newsletter **18**, 67-69.
- DREESEN, R. 1978. Position stratigraphique de la formation de Souverain-Pré dans le synclinorium de Dinant et le Bassin de la Vesdre. – Service géologique de Belgique, Professional Paper **150**, 1-146.
- DREESEN, R. & THOREZ, J. 1994. Parautochthonous – allochthonous carbonates and conodont mixing in the Late Famennian (Uppermost Devonian) Condruz Sandstones of Belgium. – Courier Forschungsinstitut Senckenberg **168**, 159-182.
- DZIK, J. 2006. The Famennian „Golden Age“ of conodonts and ammonoids in the Polish part of the Variscan Sea. – Palaeontologia Polonica **63**, 1-359.
- GEREKE, M. 2004. Das Profil Kahlleite Ost – die stratigraphische Entwicklung einer Tiefschwelle im Oberdevon des Bergaer Sattels (Thüringen). – Geologica et Palaeontologica **38**, 1-31.
- HELMS, J. 1959. Conodonten aus dem Saalfelder Oberdevon (Thüringen). – Geologie **8**, 634-677.
- HELMS, J. 1961. Die „*nodocostata*-Gruppe“ der Gattung *Polygnathus*. – Geologie **10**, 674-711.
- HOUSE, M.R. 1985. Correlation of mid-Palaeozoic ammonoid evolutionary events with global sedimentary perturbations. – Nature **213**, 17-22.
- Ji, Qiang & ZIEGLER, W. 1993. The Lali Section: An Excellent Reference Section for Upper Devonian in South China. – Courier Forschungsinstitut Senckenberg **157**, 1-183.
- HÜNEKE, H. 1995. Early Devonian (Emsian) to Late Devonian (Famennian) stratigraphy and conodonts of the Antoinettenweg section in the Lower Harz Mountains (Germany). – Courier Forschungsinstitut Senckenberg **188**, 99-131.
- JOHNSTON, D.I. & CHATTERTON, B.D.E. 2001. Upper Devonian (Famennian) conodonts of the Palliser Formation and Wabamun Group, Alberta and British Columbia, Canada. – Palaeontographica Canadiana **19**, 1-154.
- KLAPPER, G. 2009 in press. Conodont Biostratigraphy. – Geological Survey of Western Australia, Bulletin **145**.
- KONONOVA, L.I. 1979. Upper Frasnian, Famennian and Tournaisian conodonts of the Sikaza River Section (southern Urals). – Service Géologiques de Belgique, Professional Paper **161**, 74-86.
- KORN, D. 1999. Famennian Ammonoid Stratigraphy of the Ma'der and Tafilalt (Eastern Anti-Atlas, Morocco). – Abhandlungen der Geologischen Bundesanstalt **54**, 147-179.
- KORN, D. 2004. The mid-Famennian ammonoid succession in the Rhenish Mountains: the “*annulata* Event” reconsidered. – Geological Quarterly **48** (3), 245-252.
- KORN, D. & LUPPOLD, F.W. 1987. Nach Clymenien und Conodonten gegliederte Profile des oberen Famennium im Rheinischen Schiefergebirge. – Courier Forschungsinstitut Senckenberg **92**, 199-223.
- KORN, D. & TITUS, A. 2006. The ammonoids from the Three Forks Shale (Late Devonian) of Montana. – Fossil Record **9** (2), 198-212.
- KORN, D. & ZIEGLER, W. 2002. The ammonoid and conodont zonation at Enkenberg (Famennian, Late Devonian; Rhenish Mountains). – Senckenbergiana lethaea **82** (2), 453-462.
- KORN, D., KLUG, C. & REISDORF, A. 2000. Middle Famennian ammonoid stratigraphy in the Amessoui Syncline (Late Devonian; eastern Anti-Atlas, Morocco). – Travaux de l'Institut Scientifique, Série Géologie & Géographie Physique **20**, 69-77.
- MATYJA, H. 1993. Upper Devonian of Western Pomerania. – Acta Geologica Polonica **43** (1-2), 27-94.
- METZGER, R.A. 1994. Multielement reconstructions of *Palmatolepis* and *Polygnathus* (Upper Devonian, Famennian) from the Canning Basin, Australia, and Bactrian Mountain, Nevada. – Journal of Paleontology **68**, 617-647.
- PAPROTH, E., BECKER, R.T., CLAUSEN, C.-D., KOMPA, R., KORN, D. & STOPPEL, D. 1986. Field trip to the Late Devonian outcrops in the northern Rheinisches Schiefergebirge (Federal Republic of Germany). – Aachen 1986, Field Conference on “Late Devonian Events around the Old Red Continent”, Field Trip Guidebook, 1-19.
- PERRI, M.C. & SPALLETTA, C. 1990. Famennian conodonts from climenid pelagic limestone, Carnic Alps, Italy. – Palaeontographia Italica **77**, 55-83.
- PERRI, M.C. & SPALLETTA, C. 1991. Famennian conodonts from Cava Cantoniera and Malpasso sections, Carnic Alps, Italy. – Bolletino della Società Paleontologica Italiana **30** (1), 47-78.

- PERRI, M.C. & SPALLETTA, C. 2001a. Stop 1.5 – Latest Devonian and Early Carboniferous conodonts from the Casera Colinetta di Sotto A section (Carnic Alps, Italy). - *Giornale di Geologia*, serie 3a, **60**, 168-181
- PERRI, M.C. & SPALLETTA, C. 2001b. Stop 2.5 – Late Famennian conodonts of the Malpasso section (Carnic Alps, Italy). – *Giornale di Geologia*, serie 3a, **60**, 220- 227.
- PERRI, M.C., SPALLETTA, C. & PONDRELLI, M. 2001. Stop 2.6A - Late Famennian conodonts from the Pramosio Bassa section (Carnic Alps, Italy). – *Giornale di Geologia*, serie 3a, **60**, 228-233.
- SANDBERG, C.A. 1979. Devonian and Lower Mississippian Conodont Zonation of the Great Basin and Rocky Mountains. – *Brigham Young University Geology Studies* **26** (3), 87-106.
- SANDBERG, C. A. 2008. Reiteration of proposal for the only two Famennian substage boundaries that are globally recognizable and coincident with major transgressions. – *SDS Newsletter* **23**, 46-53.
- SANDBERG, C.A. & POOLE, F.G. 1977. Conodont biostratigraphy and depositional complexes of Upper Devonian cratonic-platform and continental-shelf rocks in the Western United States. – *University of California, Riverside Campus Museum Contribution* **4**, 144-182.
- SANDBERG, C.A. & ZIEGLER, W. 1973. Taxonomy and biofacies of important conodonts of Late Devonian styriacus-Zone, United States and Germany. – *Geologica et Palaeontologica* **13**, 173-212.
- SANZ-LOPEZ, J., GARCÍA-LOPEZ, S., MONTESINOS, J.R. & ARBIZU, M. 1999. Biostratigraphy and sedimentation of the Vidrieros Formation (middle Famennian-lower Tournaisian) in the Gildar-Montó unit (northwest Spain). – *Bolletino della Società Paleontologica Italiana* **37** (2-3), 393-406.
- SAVAGE, N.M., SARSDUD, A. & LUTAT, P. 2007. Famennian (Upper Devonian) conodonts from Mae Sariang, Northwestern Thailand. – *Proceedings of the International Conference on Geology of Thailand: Towards Sustainable Development and Sufficiency Economy*, 87-92, figs. 3-5.
- SCHINDEWOLF, O.H. 1952. Über das Oberdevon und Unterkarbon von Saalfeld in Ostthüringen. Eine Nachlese zur Stratigraphie und Ammonoiten-Fauna. – *Senckenbergiana* **32** (5/6), 283—306.
- SCHÜLKE, I. & POPP, A. 2005. Microfacies development, sea-level change and conodont stratigraphy of Famennian mid- to deep platform deposits of the Beringhauser Tunnel section (Rheinisches Schiefergebirge, Germany). – *Fazies* **50**, 647-664.
- SCHÜLKE, I., KORN, D., POPP, A. & ZIEGLER, W. 2003. Potential reference section for the Early/Middle Famennian boundary at the Beringhauser Tunnel (Rheinisches Schiefergebirge, NW Germany). – *SDS Newsletter* **19**, 36-46.
- SPALLETTA, C. & PERRI, M.C. 2001. Subdivision and substages of the Famennian, an opinion and possible candidates for the upper part. – *SDS Newsletter* **18**, 64-66.
- STREEL, M. 2007. West Gondwanan and Euramerican climate impact on early Famennian to latest Viséan miospore assemblages. – *SDS Newsletter* **22**, 53-57.
- STREEL, M. 2008. Upper and Uppermost Famennian miospore and conodont correlation in the Ardenne-Rhenish area. – *SDS Newsletter* **23**, 35-39.
- TRAGLEHN, H. & HARTENFELS, S. 2002. Köstenhof Quarry (Frankenwald, Bavaria) – a potential reference section for the Early/Middle and Middle/Late Famennian boundary. – Document submitted to the International Subcommission on Devonian Stratigraphy, Annual Meeting at Toulouse, 1-7.
- YAZDI, M. 1999. Late Devonian-Carboniferous conodonts from eastern Iran. – *Rivista Italiana di Paleontologia e Stratigrafia* **105** (2), 167-200.
- ZIEGLER, W. 1962. Taxonomie und Phylogenie oberdevonischer Conodonten und ihre stratigraphische Bedeutung. – *Abhandlungen des Hessischen Landesamtes für Bodenforschung* **41**, 1-184.
- ZIEGLER, E. 1971. Rhenish Slate Mountains and hartz Mountains. - *Symposium on Conodont Taxonomy, Marburg/Lahn, September 4 to 18, 1971. A Field Trip Guidebook*, 1-47.
- ZIEGLER, W. & SANDBERG, C.E. 1984. *Palmatolepis*-based revision of upper part of standard Late Devonian conodont zonation. – *Geological Survey of America, Special Paper* **196**, 179-194.
- ZIMMERMANN, E. 1960. Conodonten aus dem Oberdevon von Wildenfels (Sachsen). – *Freiberger Forschungshefte* **C89**, 177-229.
- ZITZMANN, A. 1968. Das Paläozoikum im Grenzbereich zwischen Bayerischer und Thüringischer Faziesreihe des Frankenwaldes (Einzelbeschreibungen unter besonderer Berücksichtigung des Devons). – *Geologisches Jahrbuch* **86**, 579-654.

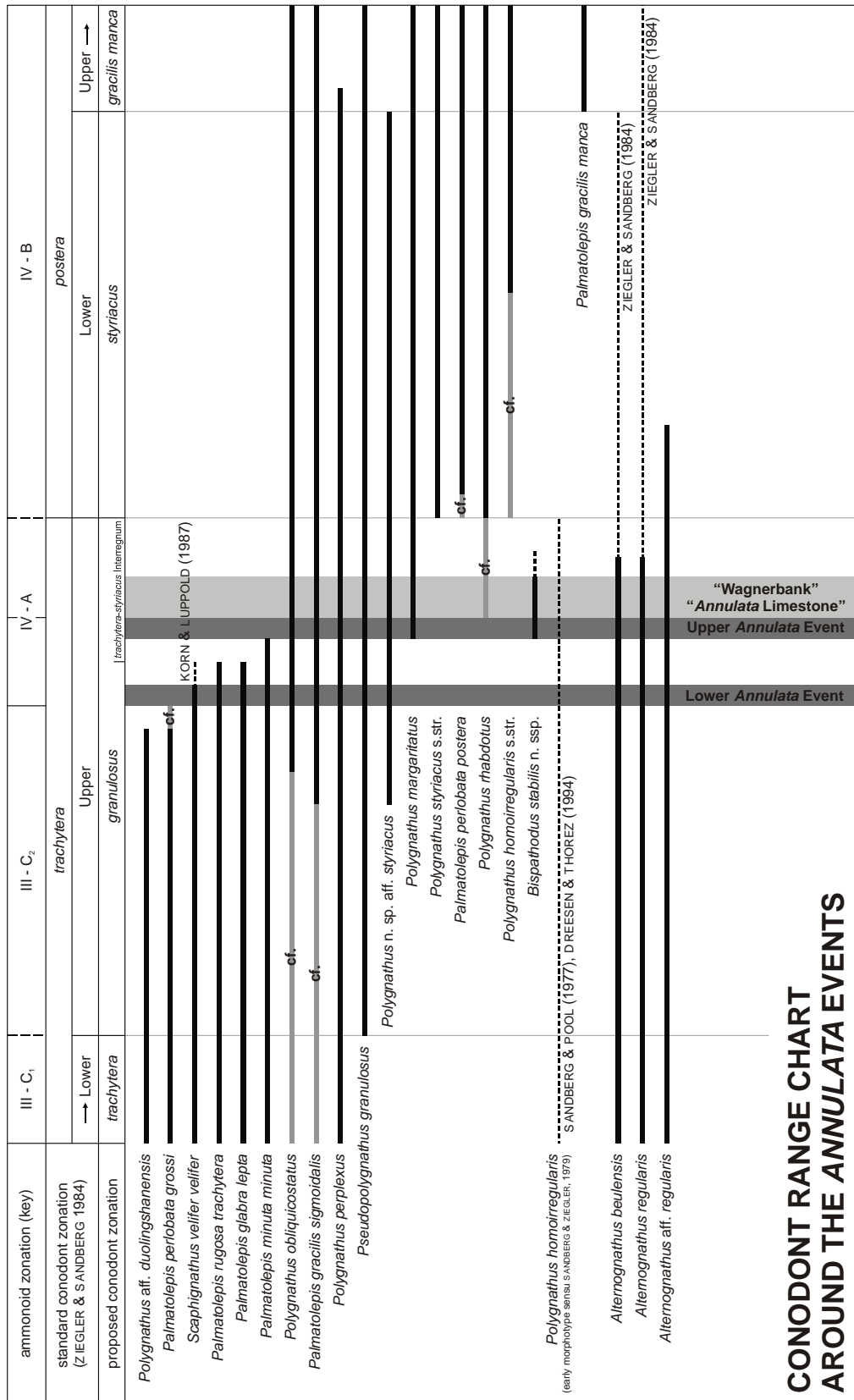
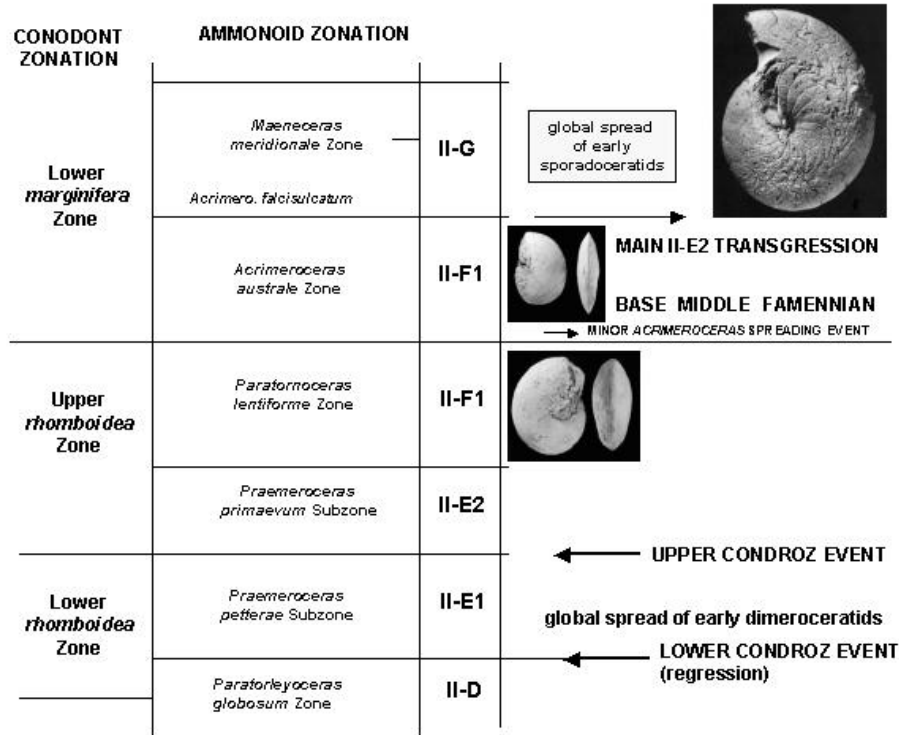


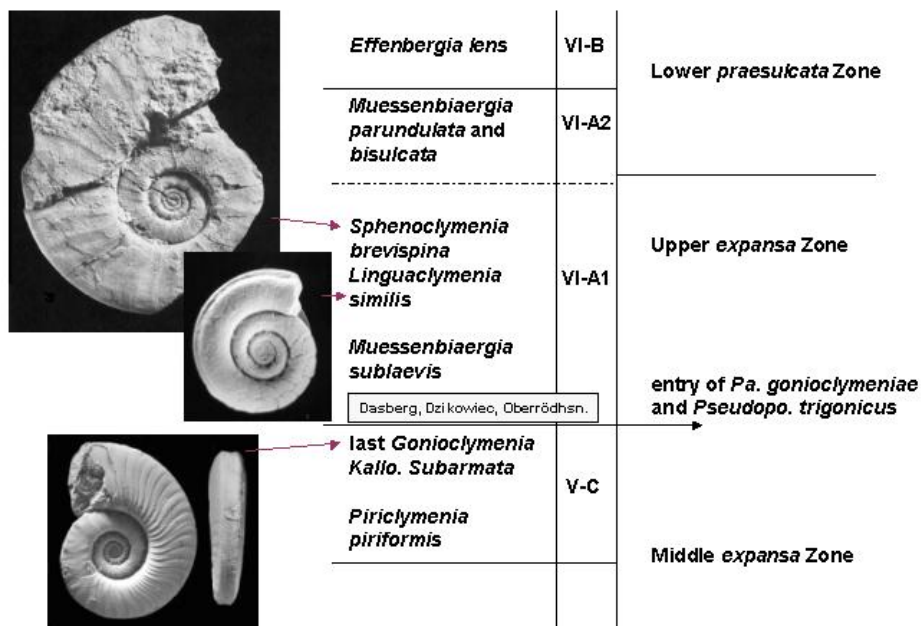
Fig. 1. Stratigraphical ranges of important conodont taxa around the *Annulata* Events. The base of an Upper Famennian substage could be placed at the base of the transgressive Lower *Annulata* level and base of UD IV-A or at the base of the *styriacus/postera* Zone near the base of UD IV-B.

AMMONOIDS AND THE DEFINITION OF MIDDLE AND UPPERMOST FAMENNIAN SUBSTAGES

R. Th. BECKER



AMMONOIDS AND THE UPPERMOST FAMENNIAN SUBSTAGE DEFINITION



**SDS
MEETINGS**

January, 2009

<http://www.napc2009.org/>



Important Dates:

Abstract-Submission Deadline:

February 12

Pre-Registration Begins:

March 15

Pre-Registration Deadline:

June 1

Abstract submission and pre-registration will both be conducted at the meeting website:

<http://www.napc2009.org/>

Inside this circular

Abstract submission	1
General Schedule and Meeting Highlights	1
Creation Museum Visit	2
Education and Public Outreach	2
Tentative Field Trip Schedule	3
Tentative Meeting Costs, Lodging, and Student funding	4
Travel Advice and Letters of Invitation	4
Meeting Amenities and Summer Weather in Cincinnati	4

**North American Paleontological Convention 2009
Third Circular**

**June 21-26, 2009
University of Cincinnati
Cincinnati, Ohio**



Abstract Submission Is Underway for NAPC-2009

The 9th North American Paleontological Convention will be held on the campus of the University of Cincinnati, June 21-26, 2009. In addition to a wide range of plenary sessions, symposia, and technical sessions, there will be a full slate of regional field trips (page 3) and social activities. Based on the diversity of symposia proposed for NAPC-2009, and the interest expressed by colleagues from around the world, the organizing committee anticipates an eclectic meeting!

The NAPC website (<http://www.napc2009.org/>) is now open

for submission of abstracts, with a deadline of February 12 (NOT a random choice...). A complete list of symposia is available at the abstract-submission site.

This circular provides an overview of activities planned for NAPC-2009. A fourth circular will be issued when pre-registration commences, in which details will be provided about pre-registration procedures, meeting costs, food/lodging, and registration for field trips.



Tangeman University Center, the site of NAPC. Top: Front entrance. Bottom: Central atrium.

General Schedule and Meeting Highlights: An Overview

NAPC-2009 will commence on Sunday evening, June 21, with a welcoming party in the central atrium of Tangeman University Center. This will be followed on

Monday morning by a special plenary session: "What Darwin didn't know: Evolution in the 21st century". Symposia and technical sessions will begin on Mon-

day afternoon and continue through the day on Tuesday, followed by a "break" day for field trips and other activities

(—continued on page 2—)

General Schedule and Meeting Highlights: An Overview (continued)

(—continued from page 1—)
on Wednesday. Regular sessions will resume on Thursday morning, with a plenary session, organized by Catherine Badgley, Lisa Park, and Josh Trapani on “Evolution and Society”. The session is part of our broader focus that day on evolution and

public outreach (see above). The broader slate of symposia and technical sessions will resume that afternoon, continuing through the conclusion of the meeting on Friday afternoon.

Most sessions will be one-half day in duration, but two special full-day symposia are in the

works: “Through the end of the Cretaceous in the type locality of the Hell Creek Formation: Montana and adjacent areas” on Tuesday, and “Biotic response to environmental change: ecology, evolution and the future – a symposium in honor of Jeremy B.C. Jackson” on Friday.



Isotelus maximus, state fossil of Ohio (<http://drydredgers.org/>)

In May, 2007 a “Creation Museum” opened near the Cincinnati Airport in northern Kentucky, immediately garnering broad media attention amid much regional fanfare. Owned and operated by *Answers-in-Genesis Christian Ministries*, the museum provides a visually striking rendition of the young-earth-creationist vision.

After considerable discussion,

the NAPC organizing committee decided that it would be valuable for meeting participants to have an opportunity to visit the museum. Arrangements have therefore been made for a group visit on Wednesday, the mid-week “break” day from formal symposia and technical sessions. We are hoping to couple the museum visit with a stop at nearby Big Bone Lick State Park, the classic Pleisto-

cene megafauna locality first made famous by Thomas Jefferson.



Education and Public Outreach: A Special Focus on Thursday

Although the Creation Museum has served recently as a fulcrum for debate in the Cincinnati region, the state of Ohio has long been enmeshed in controversy concerning the teaching of “Intelligent Design” in public-school science classrooms. It therefore seems especially appropriate to use

the visibility afforded by NAPC-2009 to consider broader themes in paleontology and evolution. With this in mind, teachers from throughout the region will be invited to join us on Thursday for a morning plenary session on “Evolution and Society”, with discussion of the creationism versus evolution

controversy, as well as the current biodiversity crisis. Speakers will include Eugenie Scott, Ken Miller, and Jeremy Jackson, and opportunities for open discussion will be built into this session. Teachers will also be invited to remain for two afternoon symposia on science literacy and K-12 education.

Tentative Field Trip Schedule

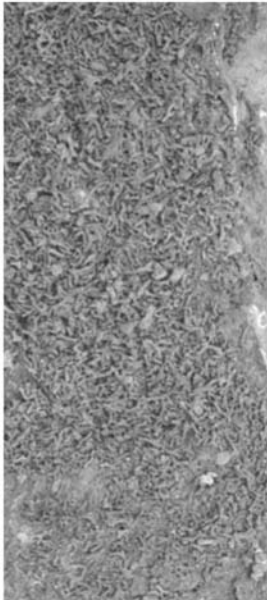
Carl Brett is working actively to assemble a diverse roster of regional field trips. A tentative schedule is provided here. A final roster, logistical details, full descriptions, and costs will be provided in the fourth circular, in time for the start of pre-registration.

Field Trip	Date(s)	Leaders
Depositional Environments and Paleoeology in a Sequence Stratigraphic Context: Upper Ordovician Strata in the Classic Cincinnati Arch Area	June 19–20	Carl Brett, Patrick McLaughlin
Changing Physical and Biotic Conditions on Eastern Laurussia: Evidence from Late Devonian to Middle Mississippian Basinal and Deltaic Sediments of Northeastern Kentucky, U.S.A.	June 19–20	Frank Ettensohn, Charles Mason, Thomas Lierman, Geoff Clayton, D. Brent Wilhelm
Big Bone Lick – The Premier Fossil-Vertebrate Locality in North America	June 20	Richard Davis, H. Gregory McDonald
The Richmondian Invasion (Late Ordovician) in the Laurentian Mid-Continent	June 24	Steven Holland, Mark Patzkowsky
Stratigraphy and Paleontology of the Silurian and Devonian Strata in the Central Ohio Valley: Falls of the Ohio and Quarries in Clark Co., Indiana	June 24	Alan Goldstein, Patrick McLaughlin, Carl Brett
“Stoned in Cincinnati” — Building Stones of “The Queen City”	June 24	Joseph Hannibal, Richard Davis
From the Margins of the Appalachian Basin to the Michigan Basin: Midcontinent Silurian Stratigraphy and Biotic Events	June 27–29	Patrick McLaughlin, Don Mikuolic, Joanne Kluessendorf, Carl Brett
Middle and Upper Devonian Sequence Stratigraphy, Paleoeology, and Biotic Events: Michigan and Appalachian Basin Comparisons—Sub-commission on Devonian Stratigraphy Field Trip	June 27–July 2	Alexander Bartholomew, Carl Brett, Mike DeSantis, Gordon Baird
Mississippian Paleontology of South-Central Kentucky	June 26 (eve)–28	Dave Meyer, Bill Ausich
Mississippian–Pennsylvanian Marine to Non-Marine Environments: Indiana (tentative)	TBD	TBD



Participants in an IGCP field trip to the Cincinnati, June, 2005

Travel Advice and Letters of Invitation



Billions and billions of bryozoans....

The central location of Cincinnati will make it possible for many North American participants to drive to the meeting. Parking will be available in University of Cincinnati garages.

For participants who will be flying to Cincinnati, please be aware that domestic airfares to the Cincinnati-Northern Kentucky International Airport (CVG) tend to be unusually expensive. When investigating available flights, we suggest that participants consider nearby Dayton Airport (DAY) as an alternative. On the main travel days at the start and end of NAPC, we will run shuttle vans between the University and designated loca-

tions at each airport.

Participants who require a formal letter of invitation to

participate in NAPC are asked to send a request to Arnie Miller (arnold.miller@uc.edu).

Tentative Costs, Lodging, and Student Funding

Although the organizing committee is still finalizing costs, we anticipate that the pre-registration fee for NAPC 2009 will be \$325. This fee will cover all sessions, the welcoming party, the banquet, refreshments for two breaks each day, an abstract volume, assorted swag, and other items. We are acquiring funding from NSF and, hopefully, other sources to help defray costs for students, and we expect to offer a reduced student rate and/or student

grants. Details will be provided in the next circular, in time for pre-registration.

Lodging will be available on campus in University dormitories, at ~\$30 per night, including linen service. A limited number of hotel rooms will be available in nearby venues, but we hope that the large majority of participants will take advantage of the convenient and inexpensive option of staying on campus.

Meeting Amenities and Summer Weather in Cincinnati

When the organizing committee held its first meeting in Cincinnati during the summer of 2007, the weather was beautiful: sunny skies, temperatures in the 70's (F), low humidity. Of course, anyone who has ever been to Cincinnati in the summer knows that the greater likelihood for the meeting is that it will be hot and humid, so pack accordingly, especially if you plan to go on a field trip.

The University of Cincinnati has experienced a building boom

over the past decade, with the addition of several very nice facilities that will be available for use during the meeting. For the nominal fee of \$10, meeting participants will have access for the entire week to the state-of-the-art recreational center, replete with two pools (including one with a "lazy river"), a Jacuzzi, an acre of aerobic equipment and weight machines, basketball courts, and a climbing wall.

In addition to a very nice

"station-buffet" dining hall, which will be available for an optional breakfast/lunch meal plan (~\$15 per day for both meals), there are a number of other eating and snack venues on and adjacent to campus.



For additional meeting information, or to contact members of the organizing committee, go to: <http://www.napc2009.org/>

Field Trip to the Falls of the Ohio and Quarries in Clark Co., Indiana Stratigraphy and Paleontology of the Silurian and Devonian Strata in the Central Ohio Valley

Organized by Alan GOLDSTEIN and Carlton E. BRETT

Outline of Itinerary

June 24, 2009

8:00 am Depart Cincinnati, drive I-71 to Louisville

9:30 Arrive at Falls of the Ohio State Park, visit Interpretive Center

10:30 Guided hike on fossil beds

11:30 Picnic lunch

12:15 pm Arrive at Atkins Quarry

Waldron Shale – Louisville Limestone – Wabash Limestone (Silurian exposures)

Jeffersonville Limestone (Eifelian)

North Vernon Limestone – Base of New Albany Shale (Eifelian-Givetian)

2:15 Drive to Cooper Lane Quarry

3:30 Depart

5:30 Arrive in Cincinnati

Abstract

Exposures of Middle Silurian and Middle Devonian strata will be examined in three sites in Clark Co., Indiana. The renowned Falls of the Ohio State Park fossil beds of Devonian age will be visited. A tour of the park Interpretive Center and walking on the fossil beds (dependant on the river level) will start our day. Bring your camera – no collecting here. After a picnic lunch, we will visit two quarries operated by Heidelberg – Hanson Indiana. Exposures ranging from the Waldron Shale to the basal New Albany Shale will be visited. Bring your hard hat*, collecting sacks and rock hammer if you want to get fossils or rock samples from the quarries.

*A limited number can be borrowed from the park.

Cost Information

Registration will include:

\$4 admission to state park

\$8 for lunch (take coolers or arrange a box lunch delivery in Clarksville?)

\$3 for snacks

? Vehicle rental

\$15+ per person (\$25 with rental?)

NAPC Post-Meeting Devonian Field Excursion

Organizers: C.E. BRETT, A.J. BARTHOLOMEW, G.C. BAIRD, M. DESANTIS,

- PRELIMINARY ITINERY -

Day 1: Kentucky – Ravenna, Boyle, etc. (6/27, Sat.)

Drive south from Cincinnati to KY, ~2 hr.

Stop 1-1: Boyle cuts along Rte. 52

Stop 1-2: Cuts on Rte. 52 opposite Baptist Church

Stop 1-3: Ravenna Railroad cut –(optional) LUNCH

Stop 1-4: Mountain Parkway cuts with brief (10 minutes optional stops for Boyle-Portwood and Cherokee unconformity (Brassfield Preachersville)

Stop 1-5: I-64: Silurian-Devonian unconformity (Ohio Shale-Olentangy on Estill)

-Rte. 9.driving scenery of Upper Devonian-Mississippian (?AB, GB)

Stop 1-6-AA cut at Herrin Hill; combined Silurina-Devonian trips view unconformity; Devonian Olentangy-Huron Shale (40 minutes) CB, PM, AB (trip formally part ways)

Stop 1-7-AA Vanceburg sections of Ohio Shale cut by clastic dike, (15 minutes optional)

Stop 1-8-AA Vanceburg section :high Devonian Bedford-Berea-Sunbury (30 minutes)

Stop 1-9-AA Garrison: Bedford- Berea ball and pillow beds (GB, CB, AB)

Drive back to Cincinnati, stay in dorms

Day 2: Ohio – Delaware, Marion, Sylvania (6/28, Sun.)

Leave Cincinnati in morning, drive north to Columbus, OH., ~1.5hr.

Stop 2-1: Lazarus Run, Delaware. Delaware Ls., lower and upper Olentangy Sh.

Drive to Marion, OH., 23mi., ~30 min.

Stop 2-2: Marion Quarry: Columbus Ls., Delaware Ls. - LUNCH

Drive to Sylvania, OH., ~100mi., ~1.45 hr.

Stop 2-3: Sylvania Town Park Fossil Pit: upper Delaware Ls., Blue Beds of Silica Sh.

Stop 2-4: Silica North Quarry: upper Delaware Ls., entire Silica Sh., Ten Mile Creek Dol.

Stay in night in Toledo, OH.

Day 3: Northern Michigan – (6/29, Mon) stop by Detroit Airport in morning

Drive to Detroit Airport, ~60mi., ~1hr. Potential drop from trip on.

Drive to Presque Isle, MI., ~265 mi., ~4.5 hr. – LUNCH on the way

Stop 3-1: Presque Isle Quarry: Dundee Ls., Rogers City Ls., lower Bell Sh.

Stop 3-2: Walk along lakeshore at Presque Isle

Drive S to Alpena area, ~20mi., ~30 min.

Stay the night in Alpena, MI

Day 4: Northern Michigan – Alpena (6/30, Tue.)

Stop 4-1: Rockport Quarry: upper Bell Sh. and Rockport Quarry Ls.

Stop 4-2: Alpena Quarry: Genshaw, Newton Creek Ls., Alpena Ls.

Stop 4-3: Dock St. Clay-4 Mile Dam exposure along creek

Stop 4-2: 4-Mile Dam: 4-Mile Dam bioherm and Norway Pt.

Stay the night in Alpena, MI

Day 5: (7/1) Northern Michigan

Stop 5-1: Partridge Point: Thunder Bay Ls.,

Stop 5-2: Squaw Bay Ls. - LUNCH

Drive south to Toledo for the night. (265 mi; 4.5 hr.)

Day 6: Northern Ohio – Plum Brook, Cleveland (7/2, Wed.)

head east to Sandusky, ~100 mi., ~1.45 hr.

Stop 11: Plum Brook - LUNCH

Stop 12: Prout Creek Cut

Drive east to Cleveland to ~60mi., ~1hr.

Stops 13-14: Various stops around Cleveland

Stay night in Cleveland

Day 7: Cleveland Ohio (7/3 Thurs.) – Most participants fly out from Cleveland airport

Will go directly to the CVG airport in the evening for any who need to fly out from that airport. This means vans need to leave Cleveland by noon at the latest to make 6pm flights

FIRST ESTIMATE OF COSTS

Option 1: only first two days, leave from Detroit Airport on Monday 29 th 2 days, 2 nights in dorms in Cincinnati, 1 night in Toledo hotel	ca. 350 \$
Option 2: until evening of 1 st July, leave from Detroit or Cincinnati Airport 5 days, 2 nights in dorms in Cincinnati, 1 night in Toledo hotel, 2 nights in Alpena hotel	ca. 770 \$
Option 3: full trip until 3 rd July, leave from Cleveland or Cincinnati Airport on 3 rd	ca. 940 \$

To the officers of the ICS and all ICS subcommission chairs**The Third International Palaeontological Congress: London 2010**

Dear Colleagues,

Following the highly successful meetings in Sydney and Beijing, the Third International Palaeontological Congress (www.ipc3.org) will be held in London in 2010, based in venues in and around Imperial College and the Natural History Museum. The meeting will be hosted by The Palaeontological Association and partner organizations from the 28th June - 3rd July 2010. As in Sydney and Beijing, we plan to showcase contemporary palaeontology through a diversified and exciting scientific programme.

We would like to invite your organization to offer a symposium or workshop for IPC3. As symposium organizers you would offer a symposium title and organize chairs and key speakers. The remainder of each symposium will be filled by contributions offered by conference delegates; we aim to have a balance of talks and posters for all formal sessions. All delegates to the conference will have the opportunity to submit abstracts, and the Science Committee will allocate these to appropriate symposia. The symposium organizers will then have the responsibility to accept these submissions as talks or as posters or to recommend to the Science Committee that they be rejected on objective scientific grounds.

For workshops, we anticipate a more informal structure, which can be largely decided by the organizers. If you wish to offer a symposium or workshop, please complete the attached form and return it electronically, preferably as a pdf, to ipc2010@le.ac.uk.

The deadline for proposals is 30 April 2009. The Science Committee reserves the right to suggest modifications to titles/themes and to combine offers that overlap scientifically.

We look forward to your response hope to see you in London in 2010.

Dick ALDRIDGE and Dave HARPER
Co-chairs, Science Committee
IPC3

David A.T. HARPER D.Sc.
Professor of Palaeontology
Head of Geology
Natural History Museum of Denmark (Geological
Museum)
University of Copenhagen
Øster Voldgade 5-7

DK-1350 Copenhagen K
Denmark

Work 0045 35322371
Fax 0045 35322325
Mobile 0045 40598867

SDS FIELD MEETING, KUZNETSK BASIN REGION (SW SIBERIA, RUSSIA), 2011

12-14 days between 20 July – 10 August, 2011. One-two days indoor session at Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of RAS

PUBLICATIONS

Thematic issue:

Palaeogeography, Palaeoclimatology, Palaeoecology, 269 (2008), no. 3–4 “A major perturbation of the global carbon budget in the Early-Middle Frasnian transition (Late Devonian)“

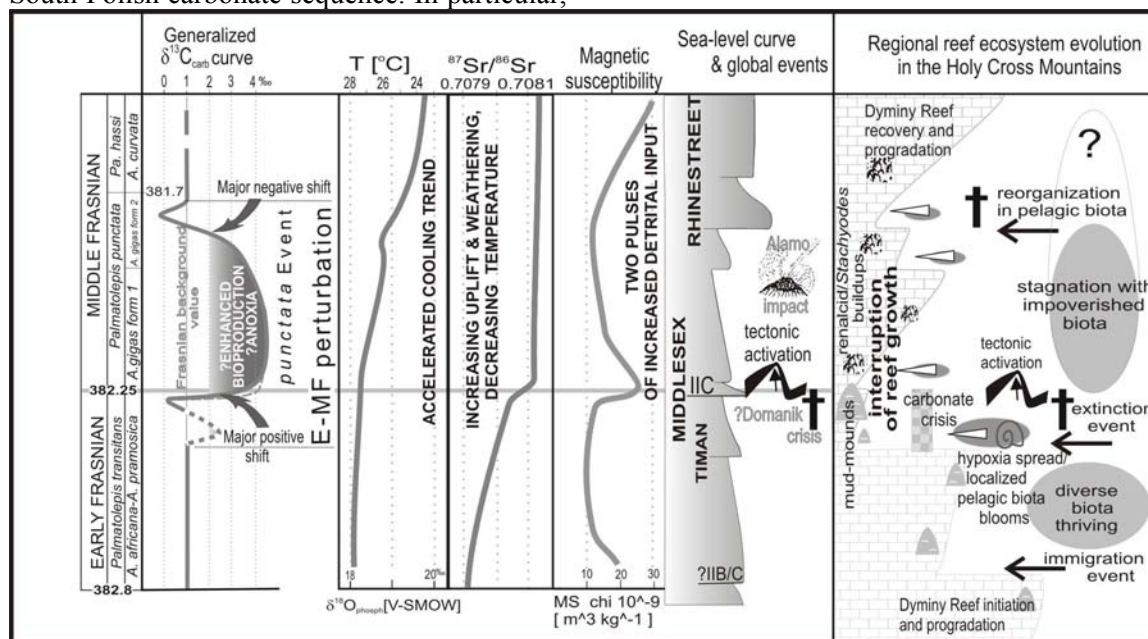
G. Racki

The main aim of this thematic issue is to highlight the diversity of geochemical results and additional approaches included within the framework of an international project “Ecosystem aspects of major carbon isotope anomaly in the Lower-Middle Frasnian transition” (Polish grant for G. Racki). Further, this is a supplement to the thematic issue of *Acta Palaeontologica Polonica* (2006; vol. 51, no. 4), presenting diverse biotic responses to the newly discovered large-scale perturbation of the carbon cycle in the Early-Middle Frasnian (E-MF) boundary interval in several Laurussian and South China epeiric domains, with emphasis on bio- and chemostratigraphic correlations (see also Yans et al., 2007, *Geol. Mag.* 144, 263–270).

This five-article set by authors from Poland, China, England and Belgium is the latest insight into the poorly known Frasnian interval. The starting point of this multidisciplinary documentation is the regional record of biogeochemical changes, whereas the main suite of papers is devoted to the reference South Polish carbonate sequence. In particular,

the comprehensive article by Ma et al. gives a diversity of facies and geochemical data from the carbonate platform of Guangxi (southern South China), and a global extent for the coeval carbon isotopic positive-negative excursions is clear from the analogous biogeochemical signals recognized in the distantly separated Laurussian and South China epeiric seas. Three next papers contain an integrated biomarker and palynological study (Marynowski et al.), a refined seawater ⁸⁷Sr/⁸⁶Sr record based on analysis of conodont apatite (John et al.) and the advanced geophysical magnetic susceptibility study (Nawrocki et al.) of Holy Cross E-MF sections. The article of da Silva and Boulvain shows that lateral variations of carbon isotopes reflect the influence of sea level and water circulation over the Middle Frasnian carbonate platform in the Ardennes.

In summary, significant geochemical anomalies can be still found during “background” Devonian intervals. The documentation and refinement of the complex, large-scale, ~6-7‰ change in the $\delta^{13}C$ reservoir over an at least 0.5-m.y.-long (see Figure) in the context of the Frasnian ocean-climate-biosphere system leads to several additional key stratigraphical, geochemical and biotic issues that should be addressed by future research. Especially additional data are needed from high-latitude successions and from Gondwanan and western Laurussian basins (also in the causal context of the Alamo Impact Event).



Stratigraphie von Deutschland VIII

Devon

Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften, 52, 2008

[ISBN 978-3-510-49200-8]

Content

Vorwort

KARSTEN WEDDIGE	7
1. Einführung	
1.1 Rückblick auf die Geschichte der Devon-Stratigraphie	11
WILLI ZIEGLER (†) & OTTO H. WALLISER	
1.2 Paläogeographie und Fazies des Devons in Deutschlands	17
OTTO H. WALLISER & WILLI ZIEGLER (†)	
2 Moldanubikum	
2.1 Schwarzwald (mit Hinweisen auf Vogesen)	22
EBERHARD SITTIG	
3. Saxothuringikum	
3.1 Sächsisches Devon	
3.1.1 Lausitzer Devon (Görlitzer Schiefergebirge)	27
HERMANN BRAUSE	
3.1.2 Mittelsächsisches Devon	33
MANFED KURZE, GÜNTER FREYER & KARL-ARNIM TRÖGER	
3.1.3 Raum Zwickau – Aue, insbesondere Wildenfesler Zwischengebirge	41
ALOIS SCHREIBER	
3.2 Thüringisches Devon	
3.2.1 Sächsisches Vogtland	44
GÜNTHER FREYER	
3.2.2 Unter- und Mitteldevon im Thüringischen Schiefergebirge	51
KARL ZAGORA, DIETER WEYER & INGRID ZAGORA	
3.2.3 Oberdevon des Thüringischen Schiefergebirges	59
KONRAD BARTZSCH, HORST BLUMENSTENGEL & DIETER WEYER	
3.3 Fränkisches Devon	
3.3.1 Unter- und Mitteldevon im Frankenwald und in angrenzenden Gebieten	88
GERHARD K.B. ALBERTI & LORE ALBERTI (†)	
3.3.2 Oberdevon im Frankenwald und in angrenzenden Gebieten	106
GERHARD K.B. ALBERTI & LORE ALBERTI (†)	
3.3.3 Faziesausbildung der obersilurisch-unterdevonischen Karbonate des Frankenwaldes (Saxothuringikum; NO-Bayern)	111
THOMAS CHRISTIAN HÜSKEN	
4. Rhenohertzynikum	
4.1 Rheinisches Schiefergebirge	116
4.1.1 Südtanus	118
HANS JÜRGEN ANDERLE	
4.1.2 Südhunsrück-Trog	131
DIETER E. MEYER & JOACHIM NAGEL	
4.1.3 Unterdevon der Mittelrheinischen und Eifeler Typ-Gebiete (Teile von Eifel, Westerwald, Hunsrück und Taunus)	139
HANS G. MITTMEYER	
4.1.4 Südwestliche Lahnmulde (Rheinland-Pfalz)	204
HERMANN REQUADT	
4.1.5 Lahn- und Dill-Mulde	221
PETER BENDER	
4.1.6 Bimodaler Vulkanismus im Devon des Lahn- und Dill-Beckens	247
HEINZ-DIETER NESSBOR	

4.1.7	Unterdevon im Siegerland MICHAEL THÜNKER	252
4.1.8	Aachen – Hohes Venn WERNER KASIG & BURKHARD REISSNER	267
4.1.9	Unterdevon zwischen der Venn-Antiklinale und dem Westrand der Eifeler Kalkmuldenzone KARL-HEINZ RIBBERT	287
4.1.10	Prädevon, Ober-Emsium und Mitteldevon der Eifeler Kalkmulden-Zone WOLFGANG STRUWE (†), MARTIN BASSE & KARSTEN WEDDIGE	297
4.1.11	Höheres Mitteldevon und Oberdevon der Prümer Mulde (Givetium bis tiefes Famennium/Eifel) MATTHIAS C. GRIMM, MATTHIAS PIECHA, RÜDIGER PRICK & MICHAEL M. JOACHIMSKI	375
4.1.12	Südliches Bergisches Land und Oberbergisches Muldenvorland HANNS D. HILDEN	392
4.1.13	Bergisch-Gladbach-Paffrather Mulde ULRICH JUX	402
4.1.14	Unter- und Mitteldevon im Sauerland FRANK LANGENSTRASSEN	417
4.1.15	Höheres Mitteldevon und Oberdevon des nördlichen Rheinischen Schiefergebirges (mit Velberter Sattel und Kellerwald) CLAUS DIETER CLAUSEN (†) & DIETER KORN	439
4.1.16	Kellerwald MANFRED HORN (†)	482
4.2	Unterrerra-Grundgebirge	
4.2.1	Unterrerra-Grundgebirge PETER BUCHHOLZ, MARTIN SCHMID & HORST WACHENDORF	490
4.3	Harz	
4.3.1	Unterdevon in der Harzgeröder Zone des Unterharzes GERHARD K. B. ALBERTI & LORE ALBERTI (†)	495
4.3.2	Westliche Harzgeröder und Blankenburger Zone sowie die Südharz-„Mulde“ PETER BUCHHOLZ, FRIEDRICH W. LUPPOLD, HORST WACHENDORF & HENNING ZELLMER	507
4.3.3	Herzynkalke der östlichen Harzgeröder und Blankenburger Zone HEIKO HÜNEKE	518
4.3.4	Elbingeröder Komplex HELMUT WELLER	525
4.3.5	Nordwestlicher Oberharz und der Acker-Bruchberg-Zug PETER BUCHHOLZ, ENDRES TRAPP & HORST WACHENDORF	532
5	Untertage-Devon	
5.1	Ehemalige Schwerspatgrube „Korb“ bei Eisen/Saarland GERHARD MÜLLER	547
5.2	Bohrung Saar 1 CLAUS-DIETER CLAUSEN (†)	550
5.3	Grube Meggen Sauerland CLAUS-DIETER CLAUSEN (†)	553
5.4	Untergrund der Niederrheinischen Bucht und des Velberter Sattel KARL-HEINZ RIBBERT	555
5.5	Bohrungen im Lippstädter Gewölbe CLAUS-DIETER CLAUSEN (†)	564
5.6	Bohrung Münsterland 1 CLAUS-DIETER CLAUSEN (†)	569
5.7	Bohrung Versmold 1 CLAUS-DIETER CLAUSEN (†)	571
5.8	Rügen/Hiddensee (und Usedom) KARL ZAGORA	574

4. Bulletin of Geosciences • Volume 83 • Number 4 • 2008

Guest editors: Peter KÖNIGSHOF, Olga OBUT & Nadezhda Izokh

- KÖNIGSHOF, P., OBUT, O. & IZOKH, N. Devonian land-sea interactions: evolution of ecosystems and climate (Editorial of the Special Volume) 355–356.
- BAIRD, G.C. & BRETT, C.E. Late Givetian Taghanic bioevents in New York State: New discoveries and questions. 357–370.
- OBUT, O.T. & SHCHERBANENKO, T.A. Late Devonian radiolarians from the Rudny Altai (SW Siberia). 371–382.
- CARLS, P., SLAVÍK, L. & VALENZUELA-RÍOS, J.I.. Comments on the GSSP for the basal Emsian stage boundary: the need for its redefinition. 383–390.
- ARTYUSZKOVA, O.V. & MASLOV, V.A. Detailed correlation of the Devonian deposits in the South Urals and some aspects of their formation. 391–399.
- SCHEMM-GREGORY, M. New interpretations of the phylogeny and taxonomy of delthyridoid spiriferids (Brachiopoda, Lower and Middle Devonian). 401–448.
- MESENTSEVA, O.P. Trepostomids (Bryozoa) from the Devonian of Salair, Kuznetsky Basin, Gorny and Rudny Altai, Russia. 449–460
- KURILENKO, A.V. & KULKOV, N.P. A proposed crinoid zonation of the Devonian deposits of eastern Transbaikal. 461–472.
- FEDOSEEV, G.S. The role of mafic magmatism in age specification of Devonian continental trough deposits: evidence from the Minusa Basin, western Siberia, Russia. 473–480.
- LIAO, J.-C., KÖNIGSHOF, P., VALENZUELA-RÍOS, J.I. & SCHINDLER, E. Depositional environment interpretation and development of the Renanué section (Upper Eifelian-Lower Frasnian; Pyrenees, N. Spain. 481–490
- FRÝDA, J., RACHEBOEUF, P.R. & FRÝDOVÁ, B. Mode of life of Early Devonian *Orthonychia protei* (Neritimorpha, Gastropoda) inferred from its post-larval shell ontogeny and muscle scars. 491–502.
- VALENT, M. & MALINKY, J.M. 2008. Early Devonian (Emsian) hyolith *Ottomarites discors* (Barrande, 1867) with colour pattern. 503–506.

CONTRIBUTIONS TO THE FINAL MEETING OF IGCP 497 AND IGCP 499:

- KÖNIGSHOF P & LINNEMANN U [eds] (2008) From Gondwana to Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg-Conference and 2nd Geinitz-Conference. Final Meeting of IGCP 497 and 499. Abstracts and Programme, Frankfurt am Main, Dresden, 1-241.
- KÖNIGSHOF P & LINNEMANN U. [eds] (2008) The Rheno-Hercynian, Mid-German Crystalline – and Saxo-Thuringian Zones (Central European Variscides), Excursion Guide, 20th International Senckenberg-Conference and 2nd Geinitz-Conference: From Gondwana to Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. Final Meeting of IGCP 497 and 499. Abstracts and Programme, Frankfurt am Main, Dresden, 1-159.

The Geological Society, London, Special Publications, 314, P. KÖNIGSHOF (Ed.)**Forthcoming volume of IGCP 499**

- KÖNIGSHOF, P. (ed.) *Devonian Chance: Case Studies in Palaeogeography and Palaeoecology*, 1-6
- BRETT, C.E., IVANY, L.C., BARTHOLOMEW, A.J., DESANTIS, M.K. & BAIRD, G.C. Devonian ecological-evolutionary subunits in the Appalachian basin: a revision and a test of persistence and discreteness., 7-34.
- STETS, J. & SCHÄFER, A.. The Siegenian delta land-sea transitions at the northern margin of the Rhenohercynian Basin. 35-70.

- GEORGE, A.D., TRINAJSTIC, K.M. & CHOW, N. Frasnian reef evolution and palaeogeography, SE Lennard Shelf, Canning Basin, Australia. 71-105.
- COPPER, P. & EDINGER, E. Distribution, geometry and palaeogeography of the Frasnian (Late Devonian) reef complex of the Banks Island, NWT, Western Arctic, Canada. 107-122.
- ZAPALSKI, M.K.. Parasites in Emsian-Eifelian *Favosites* (Anthozoa, Tabulata) from the Holy Cross Mountains (Poland): changes of distribution within colony. 123-127.
- WEBSTER, G.D. & BECKER, R.T. Devonian (Emsian to Frasnian) crinoids of the Dra Valley, western Anti-Atlas Mountains, Morocco. 129-146.
- WATERS, J.A. & WEBSTER, G.D. A re-evaluation of Famennian echinoderm diversity: implications for patterns of extinction and rebound in the Late Devonian. 147-159.
- STREEL, M. Upper Devonian miospore and conodont zone correlation in western Europe. 161-174.
- AMENABAR, C.R. Middle Devonian microfloras from the Chigua Formation, Precordillera region, northwestern Argentina. 175-190.
- DI PASQUO, M., AMENABAR, C. R. & NOETINGER, S. Middle Devonian microfloras and megaflores from western Argentina and southern Bolivia: their importance in the palaeobiogeographical and palaeoclimatic evolution of western Gondwana. 191-211.
- MANASSERO, M.J., CINGOLANI, C.A. & ABRE, P. A Silurian-Devonian marine platform-deltaic system in the San rafael Block, Argentine Precordillera-Cuyania terrane: lithofacies and provenance. 213-238.
- MA, X., LIAO, W. & WANG, D. The Devonian system of China, with a discussion on sea-level change in South China. 239-260.
- WEBSTER, G. D. & WATERS, J. Late Devonian echinoderms from the Hongguleleng Formation of northwestern China. 261-285.

IGCP 499 Special Volume in “Palaeogeography, Palaeoclimatology, Palaeoecology” on:

SEA-LEVEL AND CLIMATIC CYCLICITY AND BIOEVENTS IN MIDDLE DEVONIAN MARINE AND TERRESTRIAL ENVIRONMENTS

Guest co-editors: Carlton E. BRETT, Eberhard SCHINDLER and Peter KÖNIGSHOF

PRELIMINARY (submitted) TABLE OF CONTENT:

1. Carlton E. BRETT, Eberhard SCHINDLER and Peter KÖNIGSHOF: Introduction: Goals and Perspective of the Devonian Lands and Seas Project.
2. Brooks B. ELLWOOD, Jonathan H. TOMKIN, Ahmed EL HASSANI, Pierre BULTYNCK, Carlton E. BRETT, Eberhard SCHINDLER, Raimund FEIST and Alex J. BARTHOLOMEW: A Climate-Driven Model and Development of a Floating Point Time Scale for the Entire Middle Devonian Givetian Stage: A Test Using Magnetostratigraphy Susceptibility as a Climate Proxy.
3. Carlton E. BRETT, Gordon C. BAIRD, Alex J. BARTHOLOMEW, Michael K. DESANTIS and Charles A. VER STRAETEN: Sequence Stratigraphy and Revised Sea Level Curve for the Middle Devonian of Eastern North America.
4. Charles A. VER STRAETEN, Carlton E. BRETT and Bradley B. SAGEMAN: Mudrock Sequence Stratigraphy: A Multi-proxy (sedimentologic, paleobiologic, geochemical), Devonian Appalachian Basin.
5. Leona KOPTIKOVA: Precise Position of the Basal Choteč Event and Evolution of Sedimentary Environment Close above the Lower-Middle Devonian Boundary: Magnetic Susceptibility, Gamma-ray Spectrometric, Lithological and Geochemical Record in the Prague Synform (Czech Republic).

6. Michael K. DESANTIS, Carlton E. BRETT and R. Thomas BECKER: Late Eifelian Biocrises: Timing and Signature of the Bakoven and Stony Hollow Events.
7. Ian TROTH, John E.A. MARSHALL, A. RACEY and R. Thomas BECKER: Mid Devonian Sea-level Change at High Paleolatitude: Testing the Global Sea-level Curve.
8. Z. Sarah ABOUSSALAM and R. Thomas BECKER: The global Taghanic Biocrisis (Givetian) in the Eastern Anti-Atlas, Morocco.
9. John E.A. MARSHALL, J.F. BROWN and T.R. ASTIN: Recognising the Taghanic Event in the Devonian Terrestrial Environment and its Implications for Understanding Land-Sea Interactions.

Additional manuscripts have been promised but not yet submitted.

**STUDIES IN DEVONIAN STRATIGRAPHY:
PROCEEDINGS OF THE 2007 INTERNATIONAL MEETING OF THE
SUBCOMMISSION ON DEVONIAN STRATIGRAPHY,**

to be published in **PALAEONTOGRAPHICA AMERICANA**

DOJEN, VALENZUELA-RIOS, AND CARLS – Ostracocodes of Spain (Pyrénées, Celtiberia) and early Devonian Biostratigraphy

HARTENFELS AND BECKER – Timing of the global Dasberg Event – Implications for Famennian Eustasy and chronostratigraphy.

JACOBI, BARRICK, KLEFFNER, AND KARLSSON – Stable isotope chemostratigraphy and conodont biostratigraphy across the silurian-devonian boundary in southwestern Laurentia.

KAISER, BECKER, SPALLETTA AND STEUBER – High-Resolution conodont stratigraphy, biofacies and extinctions around the Hangenberg event in the pelagic successions from Austria, Italy and France

NAGEL-MYERS, AMLER, AND BECKER – The Loxopterinae nov. Subfam. (Dualindae, Bivalvia), review of a common bivalve taxon from the Late Devonian pelagic facies.

SHEMM-GREGORY AND JANSEN – New implications on the upper Givetian “*Stringocephalus bed*” in central Nevada (Brachiopoda, Middle Devonian).

VER STRAETEN – Devonian T-R Cycle IB: The „Lumping“ of Emsian Sea Level History.

ZAMBITO, BAIRD, BRETT AND BARTHOLOMEW – Depositional sequences within the type Ithaca Formation (Frasnian) of New York state: interpretation using a sequence stratigraphic approach and relationships to faunal changes and biostratigraphic boundaries
90 page guidebook to Devonian stratigraphy of Nevada

DEVONIAN VOLUME IN THE MEMOIRS SERIES OF THE ASSOCIATION OF AUSTRALIAN PALAEOONTOLOGISTS

Dear Colleagues,

The Memoirs series of the Association of Australasian Palaeontologists (AAP) is a monographic series which publishes, among other volumes, thematic sets of papers. The runaway success of the 'Cambro-Ordovician Studies' volumes (see below*) seemed to indicate there was a place for such publications in which the latest research on particular geological systems is published together. The logical conclusion reached was that other parts of the column should not be left out. As a consequence a volume covering the Silurian and Devonian has been proposed and accepted with enthusiasm. This message, to which we hope you will respond, is an invitation to submit a paper to this volume. Papers dealing with any aspect of Silurian or Devonian invertebrate palaeontology anywhere in the world will be considered for publication, subject to the usual peer review process.

The Memoirs series prides itself on its quick turnaround time, with Cambro-Ordovician Studies I being published within 10 months from submission of the first paper, while the larger Cambro-Ordovician Studies II was published 12 months after submission of the first paper.

If you wish to submit a paper to the proposed Siluro-Devonian Studies volume, please let me know as soon as you are able. When doing so, please give me the probable authorship and preliminary title to assist us in tracking proposed submissions. Title and authorship can subsequently be changed at any time up to submission. The submission deadline is 1 October 2009.

Regards

David HOLLOWAY
museumvictoria.com.au

OVNATANOVA N.S. & KONONOVA L.I. **Frasnian Conodonts of the Eastern of the Russian Platform. Paleontological Journal, 2008, vol. 42, (10) .997-1166, Pleiades Publishing, Inc., ISSN 0031-0301**

The Frasnian conodonts of the eastern Russian Platform from the Timan in the north to the Orenburg Region in the south are characterized in detail both paleontologically and stratigraphically. This paper is a continuation of a previously published monograph (OVNATANOVA and KONONOVA, 2001) on the Frasnian conodonts of the shallow water deposits of the central Russian Platform, where polygnathids prevail. The conodont assemblages from the shallow - water and basin sections of the Volga--Ural province and Southern Timan are analyzed. Problems and difficulties associated with the correlation of the shallow -water and deep water Frasnian sections of the eastern Russian Platform and their correlation with the existing zonal conodont scales are discussed. The correlation between the deep-water Mendym deposits and the shallow-water Rechitsa and Voronezh strata of the Volga--Ural province and with the Vetlasyan and Sirachoy deposits of the Southern Timan is substantiated. The stratotype of the Semiluki Regional Stage of the Central Devonian Field contains equivalents of the lowermost beds of the Domanik Formation (unit 1), based entirely on polygnathids. Phylogenetic reconstructions for *Palmatolepis* and *Polygnathus* are suggested based on the ontogenetic series for some species of these two genera and the presence of transitional forms between some of the species. Based on these phylogenetic reconstructions, conodont zonal scales for the shallow-water and deep-water sections of the Frasnian Stage of the Russian Platform are proposed and their correlation with the existing conodont zonal scales is also adduced. Some aspects of biofacies control are considered based on the distribution of conodonts in the sections studied. In Systematic Paleontology, 91 conodont species of the genera *Ancyrodella*, *Mesotaxis*, *Palmatolepis*, and *Polygnathus* are described, including the new species *Palmatolepis menneri*, *P. kaledai*, *P. acutangularis*, and *Polygnathus reitlingeræ*.

<http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1134/S0031030108100018>

Springer Heidelberg

Tiergartenstr. 17

69121 Heidelberg

Germany

Phone: +49 6221 487 0

Fax: + 496221 487 8366

Springer Heidelberg

233 Spring Street, New York, NY 10013, phone: 212 460 1500

1500 or 800-SPRINGER (Weekdays 8:30am-5:30pm ET), fax: 201 348 4505

IMPORTANT PUBLICATIONS PRESENTED DURING THE SDS/IGCP 499 FIELD MEETING IN THE KITAB RESERVE, AUGUST/SEPTEMBER 2008

YOLKIN, E.A., KIM, A.I. & TALENT, J.A. (Eds.) 2008. Devonian Sequences of the Kitab Reserve Area.- Field Excursion Guidebook, International Conference “Global Alignments of Lower Devonian Carbonate and Clastic Sequences” (SDS/IGCP 499 Project joint field meeting), Kitab State Geological Reserve, Uzbekistan, August 25 – September 3, 2008, 97 pp., Novosibirsk Publishing House of SB RAS.

KIM, A.I., SALIMOVA, F.A. & MESHCHANKINA, N.A. (Eds.) 2008. Contributions. - International Conference “Global Alignments of Lower Devonian Carbonate and Clastic Sequences” (SDS/IGCP 499 Project joint field meeting), Kitab State Geological Reserve, Uzbekistan, August 25 – September 3, 2008, 123 pp., SealMagh Press, Tashkent.

KIM, A.I., ERINA, M.V. & KIM, I.A. (Eds.) 2008. Atlas of the Paleontological Plates. Supplement to a Guidebook of the Field Excursion. - International Conference “Global Alignments of Lower Devonian Carbonate and Clastic Sequences” (SDS/IGCP 499 Project joint field meeting), Kitab State Geological Reserve, Uzbekistan, August 25 – September 3, 2008, 34 pls, Novosibirsk Publishing House of SB RAS.

[illustrates new species of *Barabarothyris*, *Eoreticularia*, *Ancyrodelloides*, *Eognathodus*, *Polygnathus*, and *Siphonodella*]

KIM, A.I., SALIMOVA, F.A., KIM, A.I. & MESHCHANKINA, N.A. (Eds.) 2007. Palaeontological Atlas of Phanerozoic faunas and floras of Uzbekistan, Vol. 1. – 707 pp., Republic of Uzbekistan State Committee on Geology and Mineral Resources.

[English edition; includes the following new Devonian taxa: (stromatoporoids) *Pennastroma muruntaica* n.sp., *Gerronostroma perangustum* n.sp., *Atelodictyum astrictum* n.sp., *Actinostroma effecta* n.sp., *Idiostroma marius* n.sp., (tabulate corals) *Emmonsia socialis* n.sp., *Natallophyllum sangitovarica* n.sp., *Tyrganolites walliseri* n.sp., (rugose corals) *Calossoplasma concinna* n.gen. n.sp., *Pseudamplexus flammeus* n.sp., *Nurataphyllum ascus* n.gen. n.sp., *Martinophyllum planofundalis* n.sp., *Radiastrea zinzilbanica* n.sp., *R. ampla* n.sp., *Staromatidium pedderi* n.sp., *St. spasskyi* n.sp., *Radiophyllum solaris* n.sp., (tentaculitoids) *Nowakia (Nowakia) acuaria irregularis* n.sp., *Valeryilites klishevichi* n.gen. n.sp., *Albertiella gerhardi* n.gen. n.sp., (brachiopods) *Retziella mattschensis* n.sp., *Hemistringocephalus planus* n.sp., (trilobites) *Pragoproetus recavus* n.sp., *Ranunculoproetus pharangus* n.sp., *Denemarkia? conica* n.sp., *Scharyia zeravshanica* n.sp., *Crotalocephalus zinzilbanicus* n.sp., (crinoids) *Tetrastaurus protenus* n.sp., *Tettaroporocrinus obiensis* n.sp., *Rhombicrinus mirakiensis* n.gen. n.sp., *Polyporocrinus mundus* n.sp., *Anthinocrinus orientalis* n.sp., *An. minimus* n.sp., *Magianicrinus xiphobolus* n.gen. n.sp., *Keshicrinus obisafitensis* n.gen. n.sp., *Kainarocrinus karatagensis* n.gen. n.sp., (chitinozoans) *Angochitina guttiformis* n.sp., *Ang. madmonica* n.sp.]

MEMBERSHIP NEWS

CM Gordon C. BAIRD

Research initiatives:

Late Givetian-earliest Frasnian stratigraphy paleoenvironments in western New York:

Ongoing collaborative projects with Carlton Brett and Jay Zambito (Univ. Cincinnati), Jeff Over (S.U.N.Y. Geneseo), Alex Bartholomew (S.U.N.Y. New Paltz), and Bill Kirchgasser (S.U.N.Y. Potsdam) are directed to refining the chronostratigraphy and facies relationships of the post-Tully succession (lower and medial Genesee Group interval) from Lake Erie eastward to the Oneonta region in eastern New York. During the past three years, I have focused mainly on refining the microstratigraphy of the Genesee Group between Hamburg, NY and the Bristol Valley with chronostratigraphic support from Jeff Over and Bill Kirchgasser. This past year has seen completion of field work in the Wyoming, Genesee, Conesus, Hemlock, and Honeoye valleys.

During portions of the past two summers, I briefly assisted Jay Zambito and Carlton Brett with Jay's ongoing dissertation work on the Sherburne Formation-Ithaca Formation succession in the Ithaca-Cortland region of central New York. As these deposits are coeval with the thinner, more basinal Genesee Formation-Genundewa Member succession that I am mapping in western New York, Jay's discoveries provide provide correlational clues useful to my work.

End-Devonian chronostratigraphy in northwestern Pennsylvania:

This past year has seen the beginning of my involvement with end-Devonian issues. With the collaborative help of Jeff Over (S.U.N.Y. Geneseo, Geneseo, NY), Joseph Sullivan (Buffalo Geological Society, Buffalo, NY), and Scott McKenzie (Murcyhurst College, Erie, PA), I am reexamining Latest Famennian strata in northwestern Pennsylvania, mainly in Crawford County and adjacent areas east of the Ohio border. Although this area has been the target of continuous oil and gas exploration for 150 years, the stratigraphy of Devonian units at the surface has been contentious and slow to develop. Recent upward chronostratigraphic revision of the Devonian-Mississippian contact to the praesulcata/sulcata zonal boundary,

places a number of rock units (Bedford Shale, Berea Sandstone in Ohio; Bedford-Berea equivalents in Pennsylvania), into this expanded latest Devonian succession. Although the Ohio end-Devonian succession is stratigraphically well known and represented by good outcrops, equivalent sections are poorer and less well distributed in northwestern Pennsylvania. As a result, most prior stratigraphic work has focused on the correlation of prominent sandstone units in sections and on matching of subsurface logs. This work is best illustrated by the classic report of Pepper, et al. (1954) who argued that various coarse units (Cussewago Sandstone, Corry Formation, Berea Sandstone, Hungry Run Sandstone), appeared to be laterally separated by belts of shale; these divisions were spatially reconstructed as independent deltas converging into the Crawford County study area.

Although this picture may be partially correct, modern sequence stratigraphy and event-stratigraphy suggest that marginal marine pebbly sandstone units, characterized by sharp basal contacts, often mark widespread sequence/subsequence boundaries recording lowstand events. Our identification of apparent regional erosive contacts flooring the Corry Formation and Cussewago Sandstone, backed up by tentative conodont and macrofossil work, suggest that earlier, lithostratigraphy-based, ("mosaic") correlation schemes are in need of some revision. Key end-Devonian events (Hangenberg global mass-extinction, major end-Devonian glacioeustatic drawdown) make it imperative to establish a stable lithostratigraphic and chronostratigraphic framework in this study area since part of this succession displays a good macrofossil record. Recent study of enigmatic, and possibly correlative-, regional features (Spechty Kopf diamictites, "Haystacks Sandstone" in eastern Pennsylvania; large-scale chaotic stratigraphy in Berea Sandstone in Ohio) by others, offers the possibility that a signature of one or more of these events, possibly present in our succession, could be constrained chronostratigraphically.

Our project, which started this past spring, has led to the redescription of outcrops

identified by earlier workers, particularly, White (1881), Caster (1934), and Pepper, et al. (1954), as well as the discovery of many new sections. We have discovered that key Upper Devonian units (Cleveland Member-, Bedford Member-equivalent succession), known to be absent near the Ohio/PA state line due to beveling below the sub-Cussewago (lower Berea) basal disconformity, reappear progressively eastward below the Cussewago basal contact from the French Creek Valley (Meadville area) eastward to the meridian of Union City. A condensed unit, probably equivalent to the black Cleveland Shale of the Ohio succession marks the base of this succession. It is characterized by dark, bioturbated siltstone and black shale partings and is floored by a detrital pyrite/bone lag

which probably corresponds to the Skinner Run Bed in Ohio. This unit is succeeded by a higher, discontinuity-related lag deposit ("Syringothyris Bed"), which Caster (1934) interpreted as the base of the Bedford succession in Pennsylvania. Succeeding units ("Drake Well Formation", "Tidioute Shale" sensu Harper, 1998), up to the Corry Sandstone, are herein believed to be Bedford Shale equivalents. These interpretations await confirmation pending conodont analysis and possible future discovery of key ammonoid taxa. Strata yielding echinoids, the enigmatic taxon *Titusvillia*, glass sponges, and bone/conodont lags provide markers potentially useful in this correlation work.

References:

- Caster, K. E., 1934, The stratigraphy and paleontology of northwestern Pennsylvania, part 1, *Stratigraphy. Bull. American Paleontology*, v. 21 (71) 4-185.
- Harper, J. A., 1998, Stop 6: Drake Well Memorial Park. 61-74, In: Harper, J. A. (ed.), *Field Trip Guidebook, 63rd Annual Field Conference of Pennsylvania Geologists*, Erie, PA.
- Pepper, J. F., deWitt, W. Jr., and Demarest, D. F., 1954, *Geology of the Bedford Shale and Berea Sandstone of the Appalachian Basin*. U.S. Geol. Survey Professional Paper 259, 111 p.
- White, I. C., 1881, *The geology of Erie and Crawford Counties*. Second Geological Survey of Pennsylvania, V. Q4, 410 p.

Baird publications (2008):

- Baird, G.C. and Brett, C.E., 2008 (available presently on line), Late Givetian bioevents in New York State: new discoveries and questions. *Czech Bulletin of Geosciences* (hard copy still in press).
- Martin, J., Bartholomew, A., Brett, C., and Baird, G., 2008, Biofacies analysis along a Middle Devonian paleogradient: water depth as a primary control on biofacies formation in the Staghorn Point coral biostrome, Geological Society of America, Abstracts with Programs, Buffalo, p. 79.
- Brett, C.E., DeSantis, M.K., Bartholomew, A.J., Baird, G.C., Schindler, E., and Konigshof, P. 2008. Middle Devonian eustasy, paleoclimate, and bioevents: toward an integrated model. Abstracts, Proceedings of the 20th International Senckenberg Conference, p. 5-6.

CM Alex BARTHOLOMEW

This past year has seen research progress with students Thomas Schramm and C.J. Hartwell at S.U.N.Y. New Paltz on the upper Eifelian and lower Givetian of the mid-Hudson Valley. Continuing investigation of the Dave Elliot Bed of the East Berne Member of the Mt. Marion Formation between Kingston and Albany, N.Y., has yielded new information about the stratigraphic position of the Eifelian-Givetian boundary in the Hudson Valley. Tom and I collected multiple specimens of the goniatite *Tornoceras* aff. *mesopleuron*, kindly identified by Dr. Thomas Becker, from the Dave Elliot Bed at a stream cut just southwest of Albany. These goniatites help date the Dave Elliot Bed as occurring just above the

base of the Givetian Stage. As the Dave Elliot Bed contains the oldest preserved diverse suite of Hamilton-type biofaces within the Appalachian Basin, this also helps to further resolve the timing of faunal turnover associated with the end of the Kacak Bioevent in this area. Additionally, Dr. Becker also helped us with the identification of several goniatites from the Cherry Valley Member of the Mt. Marion Fm., collected at Kingston, N.Y., including *Parodiceras* from the Chestnut Street Bed and the first occurrence in North America of the goniatite *Diallagites* from the same interval. Tom and I are currently in the process of preparing a manuscript detailing the array of biofacies preserved within the Dave

Elliot Bed between Kingston and Albany, as well as a locality from the mid-Finger Lakes area shown to us by Dr. Jeff Over of S.U.N.Y. Geneseo.

C.J. Hartwell and I have been collecting from exposures of the upper Eifelian Stony Hollow Member of the Union Springs Fm. from all along the Hudson Valley and plan on working with Dr. Art Boucot in hopes of combining collections and fully describing the fauna of this key interval. In the meantime, we are working with Mike DeSantis at the University of Cincinnati on paleoecological comparisons between the fauna of the Stony Hollow interval in many areas of Eastern North American and the Onondaga Fauna below and the Hamilton Fauna above in all

TM R. T. BECKER and the Münster Devonian Group

As always, 2008 has been a busy year but in the autumn I finally got rid of some administration (the vice-director position of our institute). The Uzbekistan Field Symposium was certainly the highlight of the year. I was overwhelmed by the friendliness of our Uzbek hosts, by the superb geology and landscape, by the pleasant meeting conditions in the Kitab Reserve, and by the high quality of most presentations. It will be nice to return and to see other Devonian regions of Uzbekistan. I have started to identify the lower Emsian ammonoids of the Dzhaus Beds and I am pleased to report that the new samples include most previously recorded species and probably one or two openly coiled additional forms. There are even two fragments of the rare and oxyconic *Kimoceras lentiforme*. A full identification list will be provided in the next Newsletter, hopefully together with Kenneth DEBAETS and Svetlana NIKOLAEVA who collected in parallel from the same beds.

Moroccan fieldwork in spring 2008, accompanied by Sven HARTENFELS, concentrated on the Upper Givetian to Middle Frasnian, including a very detailed record of successions around the Lower Rhinestreet Events at Mdoura-East and Seheb-el-Rhassal. A biogeographic mystery was finally solved by the unexpected discovery of the first Tafilalt *Prochorites* (Gephuroceratina), previously only known from New York State and the Canning Basin, ca. 15.000 km apart. However, the two new specimens are somewhat younger than the American and Australian ones. In

areas to determine what kinds of niche space reorganizations took place across the two periods of faunal turnover.

Finally, Tom and I are beginning to work on a new project in the Devonian of Skunnemunk Mountain outlier in southeasternmost N.Y. Skunnemunk Mt. is a large syncline formed of Silurian and Devonian strata thrust from the east and separated from the main Siluro-Devonian outcrop belt by nearly 30km. This area preserves a suite of lower Hamilton, near-shore facies otherwise not seen within the basin. Our hope are to delineate stratigraphic packages within the syncline, and then make comparisons between lower and upper Hamilton near-shore biofacies.

2009 two papers on Upper Givetian phaceloceratids shall be completed, one on the terminal Givetian petteroceratid faunas, one, jointly with J. BOCKWINKEL and V. EBBIGHAUSEN, on the highly diverse and well preserved goniatite fauna from the Lower Marker Bed (*disparilis* Zone) of Dar Kaoua. A presentation on the strange Upper Givetian ammonoid world is planned for Cincinnati. The Tafilalt Devonian/Carboniferous boundary succession will be dealt with in detail in a forthcoming paper in *Palaeo x 3* (KAISER et al. 2009, submitted). Lower Carboniferous trilobites from the Tafilalt and Maider have been given to the G. & H. HAHN (Marburg) for joint publication; these include the first Gondwana *Pudoproetus* from beds just below or above the D/C boundary.

Previous work in the Dra Valley led to several manuscripts, which have been submitted or which will be completed within the next few weeks. The Frasnian crinoids from Oued Mzerreb (Tata region) will be described in the IGCP 499 volume of the Special Publications series of the Geological Society of London (WEBSTER & BECKER 2009 in press.). The upper Emsian and lower Eifelian ammonoids from Oufrane (also Tata region) will be documented in detail by EBBIGHAUSEN et al. (2009 in prep.). We employ very detailed morphometry to allow comparisons with European and Tafilalt material and have to conclude that many contemporaneous ammonoids from Russia and China are different and, in many cases, need to

be revised. The Assa/Torkoz-Emsian data were presented in Uzbekistan (BECKER et al. 2008) and the Eifelian goniatites, first presented at the Nevada meeting, will be described together with the conodonts. Ammonoids from the Amguid region of the southern Illizi Basin of Algeria have been sent several years ago by CM G.H.K. ALBERTI. A list of identifications was given to J. WENDT (TÜBINGEN), who is currently preparing a manuscript on the stratigraphy of the basin. The goniatites suggest an Eifelian age whilst the dacryoconarids of the locality were previously assigned to the Givetian.

The big new monograph on the Canning Basin (Bulletin of the Geological Survey of Western Australia 145) is finally in the latest stage of editing and will appear soon. It includes the new and detailed Upper Devonian ammonoid zonation of the region (BECKER & HOUSE 2009 in press). If time allows, the Canning Basin Lower Frasnian goniatites will soon be described in detail, perhaps together with the associated brachiopods that MA Xueping has already identified during his Münster stay. Joint work on the *Manticoceras* faunas from Hunan is also still pending. A joint revision of Lower Frasnian atrypids from the Bergisch Gladbach area of the Rhenish Massif (MA et al. 2008) appeared in the recent volume in honor of Paul COPPER. Australian colleagues sent interesting photos of new (and the first) Eifelian goniatites of Victoria; Bulgarian colleagues sent photos of their first clymenids, probably from the *Annulata* Event beds. Based on photos by CM AUNG, there is now evidence for early Middle Frasnian goniatites from Myanmar. It is hoped that it will become possible to work on these with him. A very important new Eifelian goniatite from Bolivia and its stratigraphic implications will be discussed in a joint contribution to the Middle Devonian Palaeo x 3 volume (TROTH et al. 2009 in press). Together with a revision of its type, it shows that the supposed Givetian *Tornoceras bolivianum* in fact is a homoemorphic form of the Anarcestina, probably distantly related to the North African *Mimotornoceras*. Also, it seems that the single Bolivian *Sporadoceras* is in fact a new genus of the Givetian Maeniceratidae, wiping out the South American Famennian ammonoid record. Homoemorphism between the Famennian sporadoceratid *Maeneceras* and the Givetian *Maenioceras* is long known and led O.H.

SCHINDEWOLF (1933) to the confusingly similar naming of genera.

A large project on the stratigraphy, facies evolution and synsedimentary tectonics of Hercynian Morocco, in co-operation of the Münster Group with Ahmed EL HASSANI and his collaborators, Heiko HÜNEKE (Greifswald), and others has been applied for. Unfortunately, there is not yet a decision on funding. We plan to revolutionize the Meseta biostratigraphy from the Middle Devonian to the Tournaisian.

Another important task for 2009 will be to update the Devonian chapter for the 2010 new edition of the Geological Time Scale (GRADSTEIN et al.). Also, the formal substage proposal for the Upper Givetian will need to be finished. Similarly, I hope to contribute to the Middle and Upper Frasnian substage proposals.

Sven HARTENFELS is busily working on the completion of his Ph.D. on the *Annulata* Events and Dasberg Crisis in central Europe (Rhenish Massif, Franconia, Thuringia, Saxony, Holy Cross Mts.) and southern Morocco. The important data on the stratigraphical position of the initial Dasberg Transgression, which is late Lower *expansa* Zone in Germany, but basal Middle *expansa* Zone in Morocco, have been submitted to the proceedings volume of the Nevada Meeting (HARTENFELS & BECKER, 2009 in press). The high-resolution biostratigraphy of the Effenberg Quarry in the northern Rhenish Massif was presented at the Frankfurt IGCP 499 meeting (HARTENFELS & BECKER 2008). Agglutinating foraminifera from conodont residues of the Effenberg were given to Tim GREIFFELT (see below). The important Oese section was continued upwards and until the Hangenberg Event by Hendrik NOWAK (see below). Apart from writing up his thesis, there is currently a strong focus on changes in conodont faunas around the *Annulata* Events, with special emphasis on the base of the *styriacus* or *postera* Zone, a possible level for the future definition of the Upper Famennian substage. Results will be presented at the Cincinnati NAPC. Unfortunately (see our Document in this issue), there is no outstanding conodont level close to the *Annulata* Events for international correlation. But an ancestor of *Polygnathus styriacus* has been identified, which improves its correlation significance. Some joint future

work will deal with the rare Famennian “belodelloid” (“Caenodontus”) conodonts of southern Morocco. The voluminous joint monograph with Harald TRAGELEHN on the Famennian of the Köstenhof (= Schübelhammer) still is not complete but hopefully will be finished and published late in 2009. It will include a very large number of conodont plates, as will his Ph.D.

Sarah Z. ABOUSSALAM completed the conodont and facies studies for a new manuscript, with updates and new data, on the Taghanic Crisis in the Tafilalt, in comparison with the previously published Dra Valley, Tafilalt and Rhenish Massif record (ABOUSSALAM & BECKER 2009 in press). It has been submitted to the forthcoming Middle Devonian “Palaeo x 3” volume. A subdivision of the eustatic depophases If and Ila will be proposed. Tafilalt conodont work is currently continued, with a focus on the Lower and Middle Frasnian and the ammonoid-conodont correlation. But a single new sample from Seheb-el-Rhassal, surprisingly, yielded new and rather strange polygnathids from the *cristatus ectypus* Zone that we did not encounter in our recent ABOUSSALAM & BECKER (2007) paper. The section will be further re-sampled this March.

Another continuing project concerns the Eifelian of the western Dra Valley (Assa to Torkoz); new Emsian conodont data for the region have been presented at the Kitab meeting (BECKER, ABOUSSALAM & BRETT 2008) and still need to be published regularly. At the Cincinnati meeting new conodont faunas from transgressive units around the Middle/Upper Devonian boundary of the Montagne Noire (sections at Col de Tribes, Col de Puech de la Suque and La Serre) will be presented. These contain several new taxa, for example a rare homoemorph to Famennian double-rowed bispathodids. It will be interesting to compare these assemblages with new contemporaneous faunas from the reef-detrital Flinz Facies of the Rhenish Massif. Of special importance is the planned first detailed documentation of the Giebringhausen section. If the DFG will fund our large joint project with A. EL HASSANI and his collaborators, future work will concentrate on the conodonts, biofacies and isotope stratigraphy of the Eifelian to Tournaisian of the Moroccan Meseta. On the side, there are plans to revise the Middle and

Upper Givetian of the important Blauer Bruch section in the Kellerwald. Available conodont data will be contributed to the substage proposals for the definition of the base of the Middle Givetian, Upper Givetian, and Middle Frasnian.

Claudia DOJEN joined the Münster group in February 2008. Since, her studies extended to late Early and Middle Devonian ostracodes from Morocco (Dra Valley), which are well dated by conodonts studied by Sarah ABOUSSALAM. Besides, Claudia’s research in 2008 has been focused on two projects:

In cooperation with Ulrich MANN (Forschungszentrum Jülich) and Friedrich LUPPOLD (LBEG Hannover), late Silurian ostracodes from Turkey have been studied. The benthic fauna is very well preserved and reveals unexpected relations to Laurussian faunas, thus, questioning the existence of a wide Rheic Ocean at this time. First results have been presented at the 20th International Senckenberg-Conference in Frankfurt, Germany. The second project is in cooperation with Mike MURPHY from the University of California in Riverside. Mike dissolved hundreds of conodont samples from various sections in Nevada in the last decades. However, few ostracodes from there have been described and published, although they are abundant and well preserved. They expose relations not only to those from the Northern American Platform but also to European and Russian faunas. These first results have been presented at the SDS field meeting in the Kitab State Geological Reserve in Uzbekistan. Manuscripts on both topics are in preparation.

In collaboration with Corinna AHLERS, Claudia has finished and published (DOJEN & AHLERS 2008) the refined stratigraphical subdivision of the Glockenberg Syncline (Middle and Upper Devonian) in the Harz Mountains, Germany. The syncline has been mapped in detail according to micropalaeontological age assignments of conodonts, ostracodes, dacryoconarids, and homoctenids. Accordingly, the structure of the syncline is revised and new thrust faults were located.

Several **B.Sc. Students** completed their thesis in 2008 and some of their results were presented as posters at the Frankfurt IGCP 499 meeting. Tim GREIFFELT showed the strong palaeoecological impact of both the *Annulata*

and Dasberg Events on the fine succession of agglutinating foraminifere assemblages at Effenberg (GREIFFELT et al. 2008). The transgressive and hypoxic pulses led to a crash of populations and variably to briefly or strongly delayed recoveries, but not to any extinctions. Interestingly, the forams started to decline slightly before the onset of black shale sedimentation. Distinctive species of *Tolypammina* were more robust to environmental changes than other taxa (genera). The always long-ranging forams provide an event and ecostratigraphy to be tested elsewhere. Tim, unfortunately, will leave the Devonian and continue with studies on isotope geochemistry of ostracod shells. Britta HUMBERG proved with the help of sublethal injury rates that the unique biconvex varices of the strange Middle/Upper Devonian orthoceratid *Hastula* were an adaptive measure against shell-breaking predators (HUMBERG & BECKER 2008). The first record of the genus from Germany and Morocco is based on still to be named new species of the genus that was established in Russia. Britta plans to continue in 2009 with a M.Sc. on the morphometry, taxonomy and palaeopathology of Frasnian and Famennian bactritids. Stephan HELING found that three different Upper Givetian scutelluids of the Maider (Morocco), regionally the youngest representatives of the group, can not be assigned precisely to European taxa (HELLING & BECKER 2008). But the available material is too incomplete to establish new forms. Hendrik NOWAK

continued by bed-by-bed logging the famous Oese section of the northern Rhenish Massif from the middle Dasbergian to the Hangenberg Black Shale. He narrowed the interval, where the base of the Upper *expansa* Zone and the base of the Uppermost Famennian should be found. This will put us in a position to count the number of carbonate cycles from the Upper *trachytera* Zone to the top of the *praesulcata* Zone and to compare the number of nodular cycles within conodont zones. With respect to the rather uniform micritic facies, this will allow to estimate zonal durations much better than in the last KAUFMANN time scale. Joscha NAWRATH compared the early ontogeny and biometry of supposed *Prionoceras divisum* (Goniatitida) from Upper Devonian IV-A (Lower *Annulata* Shale) to V-A (Dasberg Event level) from the Rhenish Massif, Franconia, Iran, Tafilalet and Maider. He found that the Moroccan material includes partly so far unrecognized different species with evolute inner whorls, as in acutimitoceratids around the D/C boundary. Cornelia SCHOLONEK studied some rare porcelliid gastropods from the Frasnian and Famennian of the Shotori Range (Iran) and the Canning Basin. The last Diplom Thesis of our institute by Carsten SPELLBRINK will deal with ostracods from around the Frasnian-Famennian boundary of the basinal Winsenberg section just N of Adorf.

Papers

- MA, X.-P., EBBIGHAUSEN, V., BECKER, R. T. (2008): Desquamata and related atrypid brachiopods from the Frasnian (Upper Devonian) of Bergisches Land, Germany. – Canadian Journal of Earth Sciences, **45**: 121-134.
- BECKER, R. T. (2008). Eine kurze Geschichte der Erdzeitalter. – In: JÜTTEMANN, V. (Ed.), Ewige Augenblicke. Eine interdisziplinäre Annäherung an das Phänomen Zeit. Studium im Alter, Forschungen und Dokumentationen, **11**: 46-68, Münster (Waxmann).
- KAISER, S. I., STEUBER, T. & BECKER, R. T. (2008): Environmental change during the Late Famennian and Early Tournaisian (Late Devonian – Early Carboniferous): implications from stable isotope and conodont biofacies in southern Europe. Geological Journal., **43** (2/3): 241-260.
- BECKER, R. T. (2008): Referat über „OVER, D.J., MORROW, J.R. & WIGNALL, P.B. (Hrsg.) (2005): Understanding Late Devonian and Permian-Triassic biotic and climatic events. Towards an integrated approach“. – Zentralblatt für Geologie und Paläontologie, Teil II, **2008** (3/4): 558-563.
- NAGEL, J., AMLER, M. W. & BECKER, R. T. (2008): *Vetupraeca* n. gen. and *Mucopraeca* n. gen. (Cryptodonta, Bivalvia): a re-appraisal of Late Devonian bivalves from the Hercynian Facies. – Journal of Paleontology, **82** (6): 1150-1160.
- DOJEN, C. & AHLERS, C. (2008): Feinstratigraphische Gliederung der Glockenberg-Mulde (Harz; Mittel- und Oberdevon) mit Hilfe von Mikrofossilien. Zeitschrift der deutschen Gesellschaft für Geowissenschaften, **159**/4: 607-621.

Papers in press/expected in 2009

- BECKER, R. T. & HOUSE, M. R. (2009 in press): Devonian ammonoid biostratigraphy of the Canning Basin. – Geological Survey of Western Australia, Bulletin, **145**.
- HARTENFELS, S. & BECKER, R. T. (2009 in press): The Global Dasberg Event – Implications for Famennian Eustasy And Chronostratigraphy. – *Palaeontographica Americana*.
- KAISER, S. I., BECKER, R. T., SPALLETTA, C. & STEUBER, T. (2009 in press): High-resolution conodont stratigraphy, biofacies and extinctions around the Hangenberg Event in pelagic successions from Austria, Italy, and France. – *Palaeontographica Americana*.
- DOJEN, C., VALENZUELA-RÍOS, J.I. & CARLS, P. (2009 in press): Biostratigraphy of Early Devonian ostracodes from Celtiberia and Pyrenees (Spain). - *Palaeontographica Americana*.
- TROTH, I., MARSHALL, J. E. A., RACEY, A. R. & BECKER, R. T. (2009 in press). Mid Devonian sea-level change at high palaeolatitude: testing the global sea-level curve. – *Palaeogeography, Palaeoclimatology, Palaeoecology*.
- ABOUSSALAM, Z.S. & BECKER, R.T. (2009 in prep.). The global Taghanic Biocrisis (Givetian) in the eastern Anti-Atlas, Morocco. - *Palaeogeography, Palaeoclimatology, Palaeoecology*.
- WEBSTER, G. & BECKER, R.T. (2009 in press): Devonian (Emsian to Frasnian) Crinoids of the Dra Valley, western Anti-Atlas Mountains, Morocco. – Geological Society, Special Publication.
- EBBIGHAUSEN, V., BECKER, R.T. & BOCKWINKEL, J. (2009 in prep.): Emsian and Eifelian ammonoids from Oufrane, eastern Dra Valley (Anti-Atlas, Morocco) – Taxonomy, Stratigraphy and Correlation. – *Neues Jahrbuch für Geologie und Paläontologie*.
- BECKER, R.T. & MAPES, R.H. (2009 in prep.): Latest Devonian ammonoids from Oklahoma and their palaeobiogeographic significance. – *Acta Geologica Polonica*.
- KAISER, S.I., BECKER, R.T., STEUBER, T. & ABOUSSALAM, Z.S. (2009 submitted): Climate-controlled mass extinctions, facies, and sea-level changes around the Devonian–Carboniferous boundary in the eastern Anti-Atlas (SE Morocco). - *Palaeogeography, Palaeoclimatology, Palaeoecology*.
- DOJEN, C. (2009 in press): Late Silurian and Early Devonian Beyrichioidea from Gondwana and Perigondwanan Terranes and their Palaeobiogeographical Implications. - *Bulletin de la Société géologique de France*, Special Issue. Contributions to the First International Palaeobiogeography Symposium, Paris, July 2007.

Published Abstracts

- BECKER, R. T., ABOUSSALAM, Z. S. & BRETT, C.E. (2008): High-resolution biostratigraphy of Emsian mixed siliciclastic-carbonate successions of the western Dra Valley (Anti-Atlas, SW-Morocco). – In: KIM, A.I., SALIMOVA, F.A. & MESHCHANKINA, N.A. (Eds.), International Conference „Global Alignments of Lower Devonian Carbonate and Clastic Sequences“ (IGCP 499 Project/SDS joint field meeting), Kitab State Geological Reserve, Uzbekistan, August 25 – September 3, 2008, Contributions: 14-18 (SealMag Press, Tashkent).
- DOJEN, C., EVOLA, G., & MURPHY, M.A. (2008): Some Lochkovian (Early Devonian) ostracodes From Nevada. - In: Kim, A.I., Salimova, F.A., Meshchankina, N.A. (eds.): Global Alignments of Lower Devonian Carbonate and Clastic Sediments (IGCP 400 project /SDS joint field meeting): Contributions of International Conference, August 25 – September 3, 2008, Kitab State Geological Reserve, Uzbekistan: 27-28.
- BECKER, R. T. (2008): Frasnian ammonoids in neritic facies – implications for correlations and the Kellwasser mass extinction. – The 33rd International Geological Congress, Oslo 2008, 6-14 August, Abstracts (only on CD).
- DOJEN, C. & LUPPOLD, F.W. (2008): Ostrakoden- und Conodonten-Stratigraphie an der Silur/Devon Grenze in Südost-Anatolien (Türkei). - *Erlanger geol. Abh., Sonderband 6, Jahrestagung der Paläontologischen Gesellschaft*, 8.-10. September 2008: 25.
- BECKER, R. T. (2008): Devonian neritic-pelagic correlations – methods, case studies and problems. - In: KÖNIGSHOF, P. & LINNEMANN, U. (Eds.), Final Meeting og IGCP 497 and IGCP 499, 20th International Senckenberg Conference & 2nd Geinitz Conference “From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents”, Abstracts and Programme: 25-28, Frankfurt a. M., Dresden.
- GREIFELT, T., BECKER, R. T. & HARTENFELS, S. (2008): Impact of the *Annulata* and Dasberg Events (upper Famennian) on agglutinating foraminifere assemblages in the northern Rhenish Massif (Germany). - In: KÖNIGSHOF, P. & LINNEMANN, U. (Eds.), Final Meeting og IGCP 497 and IGCP 499, 20th International Senckenberg Conference & 2nd Geinitz Conference “From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents”, Abstracts and Programme: 173-175, Frankfurt a. M., Dresden.
- HARTENFELS, S. & BECKER, R. T. (2008): Timing of sea-level changes in the Upper Famennian (Devonian) Effenberg Quarry, northern Rhenish Massif, Germany. - In: KÖNIGSHOF, P. & LINNEMANN, U. (Eds.), Final Meeting og IGCP 497 and IGCP 499, 20th International Senckenberg Conference & 2nd Geinitz Conference “From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents”, Abstracts and Programme: 179-181, Frankfurt a. M., Dresden.
- HELLING, S. & BECKER, R. T. (2008): The youngest known Scutelluidae (Trilobita) of the Anti-Atlas (Upper Givetian, southern Morocco). - In: KÖNIGSHOF, P. & LINNEMANN, U. (Eds.), Final Meeting og IGCP 497 and IGCP 499, 20th International Senckenberg Conference & 2nd Geinitz Conference “From Gondwana and

Laurussia to Pangea: Dynamics of Oceans and Supercontinents”, Abstracts and Programme: 182-183, Frankfurt a. M., Dresden.

HUMBERG, B. & BECKER, R. T. (2008): Palaeopathology and Palaeoecology of Orthoceratida (Nautiloidea) from the Middle and Upper Devonian of the Dra Valley (Anti-Atlas, Morocco). - In: KÖNIGSHOF, P. & LINNEMANN, U. (Eds.), Final Meeting of IGCP 497 and IGCP 499, 20th International Senckenberg Conference & 2nd Geinitz Conference “From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents”, Abstracts and Programme: 184-185, Frankfurt a. M., Dresden.

DOJEN, C. (2008): Beyrichoid ostracodes around the Silurian-Devonian boundary of the Hazro Anticline in SE Turkey and palaeogeographical conclusions. - In: Königshof, P. & Linnemann, U. (eds.): From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg-Conference and 2nd Geinitz-Conference. Final Meeting of IGCP 497 and IGCP 499. Abstract and Programme: 39-40.

TM Carlton E. BRETT

My research on Devonian sequence and event stratigraphy during 2008 was focused in three distinct areas. Studies of the Givetain Müllert-Wotan-Feldsbach succession in the Eifel area of Germany with Senckenberg colleagues, Eberhard Schindler, Rainer Brocke, and Peter Königshof. We have continued field study of the sedimentology, paleoecology, and palynology of meter-scale peritidal cycles. We have identified recurring facies that include biostromal wackestones, fenestral lime mudstones and leperditian rich micrites and dark, organic-rich shales. The latter are particularly rich in non-marine plant spores, whereas offshore micrites are rich in leiospheres. Regular alternations of these facies may represent high frequency sea level oscillations in the Milankovitch band. The overall Wotan cycle records a larger scale transgressive-regressive cycle, probably equivalent to the early TR cycle Giv-1 recently in the Appalachian basin. We hope to publish results of these studies in forthcoming papers in *Palaeo-3*.

I also participated in the final meeting of IGCP 499 Devonian Land-Sea Interactions and 20th International Senckenberg Conference in Frankfurt and the post-meeting fieldtrip on the terranes adjacent to the Rheic Ocean suture in central Germany: a highly interesting and informative trip.

A second project with University of Cincinnati PhD student James Zambito and Gordon Baird (SUNY College, Fredonia) is examining the aftermath of the Taghanic bioevents in the latest Givetian-early Frasnian Genesee Group in central New York. Fieldwork during summer of 2008 extended correlations from the central Finger Lakes area eastward into the Tioughnioga Valley in the vicinity of Cortland and Homer New York; Jay was able to correlate major cycles into this region. Moreover, his work on collections of

Charles Thayer at Yale Peabody Museum has established that a number of taxa, previously thought to be extinct during the Taghanic events in considerably younger strata into the early Frasnian.

The third research program involved further analysis of material gathered during our 2007 fieldwork on the Hollardops beds in SW Morocco. Chemical and magnetic susceptibility time-series have been assembled and these suggest periodicity to the carbonate-shale cycles that enclose the well-preserved trilobites. Polished sections of slabs containing the exceptionally preserved trilobites further reveal heavily bioturbated fabrics. This astonishing result indicates that sediment packages were subjected to colonization by burrowing infauna following their near instantaneous deposition. Remarkably the burrowing organisms managed to avoid the entombed trilobites and did not produce significant dissociation of sclerites. The prolonged residence time of the sediment together with bacterial decay in the zone of sulfate reduction may have led to supersaturation of carbonates and precipitation of cements following bioturbation, which helped to seal in and protect trilobite carcasses from compaction. In conjunction with this study, I also examined sections of the Lower Devonian (Lochkovian) Birdsong Shale Member (Ross Formation) near Paris Landing, Tennessee and sampled trilobite beds with taphonomic and sedimentologic features closely analogous to the Moroccan *Hollardops* beds. I am planning to collaborate with Joe Devera (Illinois Geological Survey) and Michael Gibson (University of Tennessee, Martin) in documenting these beds.

Eberhard Schindler, Peter Königshof and I are compiling and editing a special volume of Palaeogeography, Palaeoecology, Palaeoclimatology dealing with level, climatic

and biotic events in the Middle Devonian. As of this writing, most papers are in hand and are being reviewed or revised. We hope to have the volume ready for submission early in 2009.

I am coordinating field trips for the North American Paleontological Convention here in Cincinnati in June, 2009. I intend to run a pre-meeting fieldtrip, with Patrick McLaughlin on the Upper Ordovician of the Cincinnati Arch, a mid-meeting trip on the Silurian and Devonian

of the Falls of the Ohio area in northern Kentucky and Indiana, June 14th, and Alex Bartholomew, Mike DeSantis, Jay Zambito, and I plan a post-meeting three-four day field trip on the Devonian of Ohio and adjacent areas on June 27 to June 30, 2009. More details will be forthcoming on the NAPC website in January.

Publications

- Baird, G.C., Brett, C.E., 2008. Late Givetian Taghanic bioevents in New York: New discoveries and questions. *Bulletin of Geosciences* 83 (4), 357-370.
- Brett, C.E., DeSantis, M.K., Bartholomew, A.J., Baird, G.C., Schindler, E. Königshof, P. 2008. Middle Devonian eustasy, paleoclimate, and bioevents: toward an integrated model. Abstracts Proceedings of 20th International Senckenberg Conference, p. 5-6.
- McLaughlin, P.I., Brett, C.E., and Wilson, M.A. 2008. Hierarchy of sedimentary surfaces and condensed beds from the middle Paleozoic of eastern North America: Implications for cratonic sequence stratigraphy. In Pratt, B.R. and Holmden, C., (eds.) *Dynamics of Epeiric Seas*. Geological Association of Canada, Special Paper 48: 175-200.

CM Rainer BROCKE

Main activities in 2008 were within the framework of the IGCP Project 499 "Devonian land-sea interaction: Evolution of ecosystems and climate" (DEVEC) resulting in the final meeting in Frankfurt in October 2008 (in conjunction with the IGCP Project 497 on the Rheic Ocean) where I was involved in the organisation and realisation of this meeting. A talk on palynological results from the Turkish Taurides (ERTUG et al.) has been presented at this meeting as well as a poster enclosing palynology from the Pontides (Königshof et al., see list below). Both topics are part of a Turkish-German cooperation project (DEVEC-TR) under the guidance of M.N. YALCIN from the Istanbul University. Progress of our studies on Middle Devonian sequences in the Eifel Hills (Senckenberg group in cooperation with TM C. BRETT, Cincinnati, USA) were given during the International Congress on Palaeobotany and Palynology held in Bonn in

September 2008 (BROCKE et al., see below). The other one was presented at the annual meeting of the German SDS (BROCKE, R., RIEGEL, W., HARTKOPF-FRÖDER, C., BRETT, C.E., KÖNIGSHOF, P., SCHINDLER, E. & WILDE, V. entitled "Palynology and facies of the Eifelian-Givetian transition in its type area (Eifel Hills, Germany)".

Together with S. SCHULTKA (Humboldt University Berlin) a project has been initiated dealing with Lower Devonian macro plants and palynomorphs (mainly spores) from marine-terrestrial-transitions in the Rheinisches Schiefergebirge. A group of palaeobotanists and palynologists were guided by us to certain Lower Devonian localities during a pre-Excursion of the International Congress on Palaeobotany and Palynology (Schultka, Brocke, Goßmann, see list below).

Publications 2008

- Brocke, R.; Fatka, O. & Wilde, V. (2008). Palaeozoic organic-walled microfossils: Aspects of their palaeoenvironmental and biostratigraphical potential. *Review of Palaeobotany and Palynology*, 148 71-72; Amsterdam.
- Brocke, R., Riegel, W., Hartkopf-Fröder, C., Brett, C.E., Königshof, P., Schindler, E. & Wilde, V (2008). Palynology and facies of the Eifelian-Givetian transition in its type area (Eifel Hills, Germany). – *Terra Nostra*, 2008/2: 39; Bonn.
- Ertuğ, K., Brocke, R., Bozdoğan, N. (2008). Devonian palynomorph assemblages from the eastern Taurides, Turkey. In: Königshof, P., Linnemann, U. [Eds.]: *From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents*. 20th International Senckenberg-Conference and 2nd Geinitz-Conference. Final Meeting of IGCP 497 and IGCP 499. Abstracts and Programme: 38; Frankfurt am Main, Dresden.

- Fatka, O., Brocke, R. (2008). Morphological variability and method of opening of the Devonian acritarch *Navifusa bacilla* (Deunff, 1955) Playford, 1977. *Review of Palaeobotany and Palynology*, 148 108-123.
- Königshof, P., Yalçın, M.N., Bozdoğan, N., Brocke, R., Gedik, I., Jansen, U., Karşlıoğlu, Ö., Nazik, A., Nalcioglu, G., Saydam, G., Yılmaz, İ. (2008). Stratigraphy, Sedimentology and Facies Development of the Devonian of Northwestern Turkey. In: Königshof, P., Linnemann, U. [Eds.]: *From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents*. 20th International Senckenberg-Conference and 2nd Geinitz-Conference. Final Meeting of IGCP 497 and IGCP 499. Abstracts and Programme: 192-194; Frankfurt am Main, Dresden.
- Schindler, E., Brocke, R. & Königshof, P. (2008): Cephalopod limestones in the Dill Syncline, abandoned quarry Benner (Bicken). – In: Königshof, P. & Linnemann, U. (Eds.): *The Rheno-Hercynian, Mid-German Crystalline and Saxo-Thuringian Zones (Central European Variscides)*. – 20th International Senckenberg Conference and 2nd Geinitz Conference: “From Gondwana and Laurussia to Pangaea: Dynamics of oceans and supercontinents”, Final Meeting of IGCP 497 and IGCP 499, Excursion Guide: 86-88; Frankfurt am Main, Dresden.
- Schultka, S., Brocke, R., Goßmann, R. (2008). The Lower Devonian of the Rheinisches Schiefergebirge. Field Guide, Pre-Conference excursion, 12th International Palynological Congress IPC-XII, 8th International Organisation of Palaeobotany Conference IOPC-VIII, Bonn (August, 28-29), 1-25.
- Yalçın, M.N., Yılmaz, I., Wilde, V., Wehrmann, A., Schindler, E., Özkan, R., Nazik, A., Nalcioglu, G., Königshof, P., Jansen, U. & Brocke, R. (2008). Palaeogeographical setting of Devonian successions of Turkey – A Gondwanan vs. Laurasian comparison. – In: Königshof, P. & Linnemann, U. (Eds.): *From Gondwana and Laurussia to Pangaea: Dynamics of oceans and supercontinents*. – 20th International Senckenberg Conference and 2nd Geinitz Conference, Final Meeting of IGCP 497 and IGCP 499, Abstracts and Programme: 141-142; Frankfurt am Main, Dresden.
- Wehrmann, A., Yılmaz, I., Schindler, E., Kozlu, H., Bozdoğan, N., Brocke, R., Ertug, K., Gedik, I., Jansen, U., Karşlıoğlu, Ö., Nalcioglu, G., Nazik, A., Özkan, Ö., Saydam Demiray, D.G., Weddige, K., Wilde, V. & Yalçın, M.N. (2008). Key sections from the Devonian of the Central and Eastern Taurides (Turkey). – In: Königshof, P. & Linnemann, U. (Eds.): *From Gondwana and Laurussia to Pangaea: Dynamics of oceans and supercontinents*. – 20th International Senckenberg Conference and 2nd Geinitz Conference, Final Meeting of IGCP 497 and IGCP 499, Abstracts and Programme: 239; Frankfurt am Main, Dresden.

CM Pierre BULTYNCK

Present research deals with three topics.

1. At the final IGCP 499 meeting in Frankfurt/Main K. Narkiewicz and P. Bultynck presented a talk on “Late Givetian – early Frasnian conodont communities with *Icriodus subterminus* from North America, Europe and NW Africa “. The manuscript will be submitted for publication early 2009.
2. A paper, in collaboration with Y. Plusquellec, P. Racheboeuf and M. Weyant, on Lochkovian – Pragian conodonts from the top of the Landevennec Fm and the l’Armorique Fm in the Rade de Brest (NW France) will be submitted soon for publication. Most of the conodont taxa are endemic to the

Armorican Massif and different areas in Spain. But the presence of the geographically widespread *Masaraella pandora* morphotypes allows to position approximately the Lochkovian – Pragian boundary.

3. O.H. Walliser, K. Weddige and P. Bultynck study the variability of different conodont groups (*Icriodus*, *Linguipolygnathus*, *Polygnathus pseudofoliatus-eiflius-ensensis-hemiansatus-timorensis*). The study is mainly based on the conodont material collected by O.H. Walliser in the Moroccan GSSP for the base of the Givetian. But also identifications of conodonts from other relevant sections will be updated.

CM Carole BURROW

Carole Burrow (Brisbane, Australia) continues collaborating with Sylvain Desbiens (Quebec) on the Early Devonian fish faunas of the Gaspé Peninsula, Canada, with Mike Newman (Wales), Bob Davidson (Scotland) and Jan den Blaauwen (the Netherlands) on Scottish Early-Middle Devonian acanthodians, with Sue Turner (Brisbane) on Canadian Early

Devonian acanthodians and sharks, and conodont affinities (with a long cast of co-authors), with John Long (Melbourne), Mike Coates (Chicago) and Michal Ginter (Warsaw) on the Gogo shark, and with Kate Trinajstić (Perth) on soft tissues and mineralization in Gogo fish nodules. She continues to work on the histology and morphology of rich Early

Devonian microvertebrate assemblages from oft collected sites in central west NSW, as well as on collections by the GSNSW from new sites, and on Mike Murphy's collection of Late Silurian-Early Devonian acanthodians of the western USA. Carole also undertook a description of the vertebrate microremains in a comprehensive faunal analysis of samples from Roderath, Germany, coordinated by Christoph Hartkopf-Fröder (Krefeld), and collaborated with Alexander Ivanov (St Petersburg) and Olga Rodina (Novosibirsk) on

a description of the vertebrate microremains from the basal Emsian of Zinzilban, Uzbekistan for the IGCP491 final volume. She has co-authored several other submissions with fellow Australian workers on updating the East Gondwanan vertebrate record for this volume as well. She is also working with Pavel Beznosov (Syktyvkar, Russia) and Vachik Hairapetian (Esfahan, Iran) on ischnacanthiform dentigerous jaw bones from Iran and Russia.

Publications 2008

Refereed papers

- Burrow CJ, Hovestadt DC, Hovestadt-Euler M, Turner S, Young GC (2008) New information on the Devonian shark *McMurdodus*, based on material from western Queensland, Australia. *Acta Geologica Polonica* **58**: 155-163.
- Burrow CJ, Turner S, Desbiens S, Miller RF (2008) Early Devonian putative gyrocantid acanthodians from eastern Canada. *Canadian Journal of Earth Sciences* **45**: 897-908
- Burrow CJ, Long JA, Trinajstić K (2008) Disarticulated acanthodian and chondrichthyan remains from the upper Middle Devonian Aztec Siltstone, southern Victoria Land, Antarctica. *Antarctic Science*. doi: 10.1017/S0954102008001521

Papers in press

- Burrow CJ, Desbiens S, Ekrt B, Stöckamp, W (in press) A new look at *Machaeracanthus*. In: Elliott DK, Yu X-B, Maisey J, Maio D (eds) *Fossil fishes and related biota: morphology, phylogeny and paleobiogeography – in honour of Chang Meeman*. Verlag Pfeil, München.
- Burrow CJ, Ivanov A, Rodina O (in press) Emsian vertebrate microremains from the Zinzilban section, Uzbekistan. *Palaeoworld*
- Burrow CJ, Turner S (in press) Reassessment of "Protodus" *scoticus* from the Early Devonian of Scotland. In: Elliott DK, Yu X-B, Maisey J, Maio D (eds) *Fossil fishes and related biota: morphology, phylogeny and paleobiogeography – in honour of Chang Meeman*. Verlag F. Pfeil, München.

Papers in review

- Burrow CJ, Turner S, Young GC (subm.) Middle Palaeozoic microvertebrate assemblages and biogeography of East Gondwana (Australasia, Antarctica). *Palaeoworld*
- Turner S, Burrow CJ, Schultze H-P, Blicek A, Reif W-E, Rexroad CB (subm.) False teeth! Why conodonts are not vertebrates. *Geodiversitas*
- Young GC, Burrow CJ, Long JA, Turner S, Choo B (subm.) Devonian macrovertebrate assemblages and biogeography of East Gondwana (Australasia, Antarctica). *Palaeoworld*

Conference proceedings

- Burrow CJ, Ivanov A, Rodina O (2008) Emsian vertebrate microremains from the Zinzilban section, Uzbekistan. In: Kim AI, Salimova FA, Meshchankina MA (eds) *Global Alignments of the Lower Devonian Carbonate and Clastic Sequences, SDS/IGCP Project 499 Joint Field Meeting, Kitab State Geological Reserve, Uzbekistan, August 25 - September 3, 2008*. Abstracts: 19-21
- Burrow CJ, Hovestadt DC, Hovestadt-Euler M, Turner S, Young GC (2008) New information on the Devonian shark *McMurdodus*, based on material from western Queensland, Australia. In: Ginter M (ed) *Evolution and diversity of chondrichthyans*. Warsaw, 28 July-2 August 2008. Conference abstracts and field-trip guide book, *Ichthyolith Issues Special Publication* 11: 2

TM Jean-Georges CASIER

During 2008, and in collaboration with Ewa Olempska (Polish Academy of Sciences), J.-G. Casier (Belgian royal Institute of natural Sciences) has finished and published in *Acta Paleontologica Polonica* the study of a rich and

well preserved ostracod fauna collected in the Arche quarry, a classic reference section in the type region for the definition of the Frasnian stage. The comparison with faunas from the Frasnian railway section (CASIER, J.-G. &

OLEMPSKA, 2007) and from the access path to the Lion quarry (BECKER, 1971) in the same region, shows that ostracods did not suffer a crisis in relation with the abrupt and high-amplitude negative carbon isotopic excursion detected by Yans et al. (2007) in the *Pa. punctata* Zone. We estimate that a new analysis of carbon isotopes across that conodont zone in the type region is consequently desirable even if the ^{13}C isotopic negative excursion is found in Poland (YANS et al., 2007) and in China (MA et al., 2008). The high-amplitude negative carbon isotopic excursion detected by Yans et al. (2007) in brachiopod valves may have been amplified by a short hiatus or may be related to the collection. The brachiopod used for the isotopic analysis by Yans et al. (2007) were collected in the Ermitage path at Boussu-en-Fagne, a section that has been inaccessible for several tens of years.

J. -G. Casier has also finished the study of about 2,500 ostracods collected in three sections at Nismes, a little village close to Frasnes. The first and main section exposes the upper part of the Fromelennes Fm (Givetian), and the stratotype for the Nismes Fm (Givetian and Frasnian). The two other sections expose Devonian related publications and abstracts 2008.

Publications

- CASIER, J.-G., 2008. Guide de l'excursion: Les Ostracodes du Dévonien Moyen et Supérieur du Synclinorium de Dinant. In J.-G. CASIER (ed.): Résumé des communications et guide de l'excursion de la 22ième Réunion des Ostracodologistes de Langue Française (Bruxelles, 2-4 juin 2008), 25-79.
- CASIER, J.-G., EL HASSANI, A. & PRÉAT, A., 2008. Middle and Upper Devonian ostracods from the Tafilalt. *Revue de Micropaléontologie*, doi:10.1016/j.revmic.2008.06.003.
- CASIER, J.-G. & OLEMPSKA, 2008a. Middle Frasnian (Devonian) ostracods from the Frasnes railway section (Dinant Synclinorium, Belgium); taxonomy, biostratigraphy, paleoecology. *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre*, 78: 51-66.
- CASIER, J.-G. & OLEMPSKA, 2008b. Early Frasnian ostracods from the Arche quarry (Dinant Synclinorium, Belgium) and the *Palmatolepis punctata* Isotopic Event. *Acta Palaeontologica Polonica*, 53, 4: 635-646.
- CASIER, J.-G. & OLEMPSKA, 2008c. Les Ostracodes et l'éventuelle crise biologique de la Zone à *punctata* (Conodonte) dans la localité-type de l'Etage Frasnien. In J.-G. CASIER (ed.): Résumé des communications et guide de l'excursion de la 22ième Réunion des Ostracodologistes de Langue Française (Bruxelles, 2-4 juin 2008), 12-13.
- CASIER, J.-G. & OLEMPSKA, 2008d. Ostracods and the alleged *punctata* crisis in the type-locality for the definition of the Frasnian Stage. In B. KRÖGER & T. SERVAIS (eds.): Abstract of the Palaeozoic Climates - International Congress (Lille, August 22-31), 21.
- CASIER, J.-G. & RACHEBOEUF, P., 2008a. Ostracodes de la Formation de Belén à Pisacavina (Altiplano de Bolivie). In J.-G. CASIER (ed.): Résumé des communications et guide de l'excursion de la 22ième Réunion des Ostracodologistes de Langue Française (Bruxelles, 2-4 juin 2008), 14.
- CASIER, J.-G. & RACHEBOEUF, P., 2008b. Ostracods from the Belén Formation at Pisacavina (Altiplano, Bolivia). In P. KÖNIGSHOF & U. LINNEMANN (eds.): Abstracts and Programme of the final meeting of IGCP 497 and IGCCP 499 - 20th International Senckenberg-Conference & 2nd Geinitz-Conference: "From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents", 162-163.

the Chalon Mbr belonging to the Moulin Liénaux Fm which overlaps the Early / Middle Frasnian boundary. The only significant change in the ostracod fauna at Nismes is the progressive passage from lagoonal and semi-restricted environments to open marine environments in the upper part of the Fromelennes Fm, and consequently several meters below the Givetian / Frasnian boundary. A paper entitled "Late Givetian to Middle Frasnian ostracods from Nismes (Dinant Synclinorium, Belgium) and their lithological context" in collaboration with and A. Prémat (University of Brussels) has been submitted to the "Bulletin de l'Institut royal des Sciences naturelles de Belgique".

Finally, J. -G. Casier also in collaboration with A. Prémat for the sedimentological analysis, has begun the study of ostracods present in the Givetian of the Mont d'Hairs (Givét, France). The first part of this study is focused on ostracods from the Trois-Fontaines Fm visible in the Rancenne quarry where 1200 ostracods have been extracted and more than 50 species already recognized.

CM Carlo CORRADINI

My research is mainly devoted to conodont biostratigraphy in Sardinia, the Carnic Alps and other North Gondwana regions, specially on time intervals across the Silurian/Devonian and the Devonian/Carboniferous boundaries.

In Sardinia several Silurian and lowermost Devonian outcrops and sections are restudied in connection with the organization of June 2009 Subcommission on Silurian Stratigraphy meeting.

A project with the goal to achieve a formal lithostratigraphic subdivision of the pre-Variscan sequence of the Carnic Alps is in progress: in fact, the different parts of this sequence are mainly denominated with informal names, that derivate either from facies or historical terms. Furthermore, being the region across the state border between Italy and Austria, different terminologies have been adopted on both sides of the mountain chain, which result in a high number of names indicating similar -if not the same- lithological units. Almost none has been formalized according to the ICS rules. The goal is to

achieve a common but unified terminology, subdividing the lithostratigraphic column in possible formal units by well defined stratotypes and names of the pre-Variscan sequence of the entire region. The project is coordinated by T. Suttner (Graz) and me, involves several colleagues from various countries and is open to everybody can give a contribution.

Problems related with the Devonian/Carboniferous boundary have been recently highlighted and an international task group on the redefinition of the D/C boundary was established at the IGC in Oslo and is going to start working. In this respect, the starting point should be a revision of early Siphonodellids, that is now in progress (with S. Kaiser, Bonn).

Maria G. Corrigan has started a PhD on conodont biostratigraphy across the S/D boundary in some North Gondwana regions. Researches are now focused on few sections in different sectors of the Carnic Alps, as well as some outcrops in Sardinia.

Published papers and abstracts related to Devonian (2007-2008)

- CORRADINI C. 2007, Scisti a Graptoliti. In: Carta Geologica d'Italia 1:50000 – Catalogo delle Formazioni; fascicolo VI – Unità tradizionali e/o storiche. *Quaderni*, s.III, **7**, 293-297.
- CORRADINI C. 2007, Calcarei a Clymenie. In: Carta Geologica d'Italia 1:50000 – Catalogo delle Formazioni; fascicolo VI – Unità tradizionali e/o storiche. *Quaderni*, s.III, **7**, 298-301.
- GOUWY S. & CORRADINI C., 2007. Dati preliminari sulla biostratigrafia a conodonti dell'intervallo Emsiano-Frasniano (Devoniano) della Sardegna Sud-Orientale. In: Tintori A. & Boccaletti M. (Eds), VII Giornate di Paleontologia, Barzio, 6-10 giugno 2006, Riassunti, 36.
- GOUWY S. & CORRADINI C., 2007, Preliminary data on the Lower-Middle Devonian conodont biostratigraphy of South-East Sardinia (Italy). In: Over J.D. & Morrow J. (Eds), Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Sea Land Interactions, Eureka, Nevada, 9-17 September 2007, Program and Abstract, 39.
- KAISER S. & CORRADINI C., 2007, General problems in conodont stratigraphy around the Devonian/Carboniferous boundary and possible solutions. In: Over J.D. & Morrow J. (Eds), Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Sea Land Interactions, Eureka, Nevada, 9-17 September 2007, Program and Abstract, 48-49.
- CORRADINI C., 2008, The conodont Genus *Pseudooneotodus* Drygant from the Silurian and Lower Devonian of Sardinia and the Carnic Alps (Italy). *Bollettino della Società Paleontologica Italiana*, **36** (2-3), 139-148.
- KAISER S. & CORRADINI C., 2008, Should the Devonian/Carboniferous boundary be redefined?. *SDS Newsletter*, **23**, 55-56.
- CORRADINI C., 2008. Revision of Famennian-Tournaisian (Late Devonian-Early Carboniferous) conodont biostratigraphy of Sardinia, Italy. *Revue de Micropaleontologie*, **51**, 123-132
- DERYCKE-KHATIR C., SPALLETTA C., PERRI M.C. & CORRADINI C., 2008. Famennian chondrichthyan microremains from Morocco and Sardinia. *Journal of Paleontology*, **82**, 984-955.
- CORRADINI C. & KAISER S., 2008. Towards a redefinition of the Devonian/Carboniferous Boundary. *Rendiconti online della Società Geologica Italiana*, **3**, 260-261.
- CORRIGAN M.G. & CORRADINI C., 2008. Nuovi dati sulla sequenza Siluriano-Devoniana della Sardegna sud-occidentale. *Rendiconti online della Società Geologica Italiana*, **3**, 262-263.
- KAISER S. & CORRADINI C., 2008. The siphonodellids: overview and taxonomic state. In: Königshof P. & Lindemann U. (Eds): From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg Conference & 2nd Geinitz Conference; Final meeting of IGCP 497 and IGCP 499, Abstracts and Programme, 64-65.
- CORRIGAN M.G. & CORRADINI C., 2008. Conodonts from the Silurian-Lower Devonian "Monte Cocco II" section

(Carnic Alps, Italy). In: Königshof P. & Lindemann U. (Eds): From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg Conference & 2nd Geinitz Conference; Final meeting of IGCP 497 and IGCP 499, Abstracts and Programme, 166.

HABIBI T. & CORRADINI C., YAZDI M., 2008. Famennian-Tournaisian conodont biostratigraphy of the Shahmirzad section, central Alborz, Iran. *Geobios*, 41, 763-777.

CM Dr. James (Jed) DAY

Western Alberta Miette and Ancient Wall Detached Reef Platform and Basinal Successions.—We (JD-C.M.; Michael Whalen, University of Alaska-Fairbanks, and Jeff Over-C.M. SUNY Geneseo) hope to complete field operations in western Canada in 2009-2010 to complete outcrop investigations of the late Givetian-Famennian in the Alberta and British Columbia Rocky Mountains and southern Northwest Territories. The focus of this major project is to develop a high resolution brachiopod-conodont biostratigraphy, shelly fossil records of late Givetian-Famennian bioevents at multiple sites featuring F-F boundary sections, and temporal control for detailed Magnetic Susceptibility records (fourteen basin-wide ms excursions or events) spanning the entire late Givetian-Early Famennian, as well as detailed sea level event records (see Whalen and Day, 2008; Day and Whalen, 2005, 2006; Day et al. 2007; Lester et al., 2005). We have outlined data on the late Frasnian and Early Famennian brachiopod and conodont sequences in recent papers and conference presentations including: Whalen and Day, 2008; nitrogen isotopic data on nutrient cycling in the western Panthalassian Ocean during the Late Frasnian-Early Famennian in Payne et al. 2008; and Kellwasser extinction records in western Alberta boundary sections in Day et al. 2008b.

Kakwa Park-Eastern BC.—We anticipate completing field-based sampling in the Kakwa-Cecilia Lakes area featuring well developed late Givetian-Famennian continental shelf succession originally illustrated by Gil Raasch in the early 1970s, featuring well-developed brachiopod and conodont sequences in July of 2009 or 2010. The base of the Devonian continental shelf sections can now be documented to be older than previously thought (Raasch interpreted base as late Givetian or early Frasnian), with the initial marine transgression coinciding to the initial Taghanic Event (upper Middle varcus

Subzone), with Flume Formation fringing reef development likely beginning during the *disparilis* Zone (Day, 2007; Day et al., 2007), and Flume reef drowning by offshore facies of the Waterways Formation likely during the very late Givetian *norrisi* Zone. TM D.J. Over, CM M.T. Whalen and I are near completion of a paper on the Middle Devonian Event history of Eastern B.C.

Upper Mackenzie River Valley, Southern NWT.—I am working with one of D.J. Over's students on description of the very Late Frasnian brachiopod fauna from the near equatorial Kakisa Platform of the southern NWT. Nick Sullivan and I presented a poster (Sullivan and Day, 2008) illustrating specimens of nearly all brachiopod taxa known from the Amoco collections (collected in the 1970a and 1980s) and my collections from the 1990s from the Kakisa Formation (post Lower Kellwasser event faunas associated with latest Frasnian conodonts of Montagne Noire Zones 13a-13c?). I hope to have a larger paper focusing on very late Frasnian brachiopod faunas of the NWT and Alberta completed sometime in 2009.

Eifelian-Famennian of the Iowa and Illinois Basins.

Eifelian-Early Frasnian of the Iowa Basin-Southeastern Iowa.—We are publishing a paper in the Middle Devonian volume edited by C. Brett and E. Schindler outlining results of current sequence stratigraphic, conodont & brachiopod biostratigraphic, magnetostratigraphic, and chemostratigraphic investigations of Middle Givetian-Early Frasnian Cedar Valley Group., based on data from previously published works, recent data published in number of contributed articles contributed to the Great Lakes Section of the Society for Sedimentary Geology Fall 2006 Field Conference (IGS Guidebook 26 at <http://www.igsb.uiowa.edu>), and additional new data recently outlined in articles in IGS Guidebook 28 will be available in early 2009

for online download at the Iowa Geological Survey's website <http://www.igsb.uiowa.edu> shortly. See recent papers and conference abstracts including: Day, 2008a, 2008b, Day and Witzke, 2008; Day et al., 2008.

Late Frasnian-Famennian Event Stratigraphy-Biostratigraphy, Organic Matter Characterization-Floral Dynamics and the Famennian Greenhouse-Icehouse Transition.—A working group (CM J. Day, B.J. Witzke, Iowa Geological Survey; CM D.J. Over; S Rimmer University of Kentucky; Harry Rowe, University of Texas-Arlington) is presently engaged on study of the late Frasnian to late Famennian in the subsurface of western margin of the Illinois Basin. The composite of sections in the IGS H-32 and Sullivan cores features a nearly complete late Frasnian to late Famennian hemipelagic basinal succession with virtually pristine organic-rich shales (conodont CAI of 1 or less), displaying cyclicity at varying scales (cm, m, 10s m). In the Sullivan Core we have completed preliminary sampling (every 30 cm, and continuous sampling at 5 cm or less scale across the F-F boundary interval), and at intervals every other 20 cm through the Early-Upper Famennian units to provide unprecedented biostratigraphic control to constrain the timing of major 3rd order sequence packages. Rimmer and students are characterizing the organic matter in the sequence to assess the role that terrestrial higher plants played in altering the mode of organic carbon accumulation in the extensive, anoxic marine settings in the Appalachian and Illinois basin and document a marine record of this terrestrial colonization using organic petrography and organic geochemistry.

My student Sarah Clark and I (see Clarke et al. 2008, and attached summary of the poster presented at the Houston GSA meeting in 2008) conducted high-resolution delta carbon 13 (1st round at every 30 cm) and magnetic susceptibility (MS) every 5 cm through the Upper Famennian to earliest Tournasian interval in the IGS H-32 core that provide a very interesting series of carbon isotope excursions and coincident MS excursions

reflecting Malankovitch cyclicity, and record what we believe is the onset of the Famennian glacial climate transition. Preliminary time series analysis of the MS data appears to permit us to astronomically calibrate the duration of the sampled interval (additional signal analysis will be necessary to confirm our initial interpretations of the data). I have attached a copy of the poster text and figures for those interested in this interval.

Pragian-Middle Givetian of the Southern Illinois Basin.—J. Day and students are presently engaged in restudy of the sequence stratigraphy, conodont biostratigraphy, brachiopod sequence and stable carbon isotopic chemostratigraphy of Grand Tower and Saint Laurent formations (spanning the Eifelian-Givetian boundary) in the southern Illinois Basin Sparta Shelf area, and have documented a significant δC^{13} excursion coincident with the initial major marine flooding event of Devonian T-R cycle If, at or just above the Eifelian-Givetian boundary, recognized elsewhere in Europe (van Geldern et al., 2006; Buggisch and Joachimski, 2006). I also began working on the documenting the Pragian and Emsian-earliest Eifelian brachiopod faunas of the southern Illinois from the Backbone and Clear Creek formations with Mena Schem-Gregory, and we are submitting the first of a series of papers in early 2009 on a new genus of delthyridoid brachiopod from the Late Emsian part of the Clear Creek Formation.

Very Late Famennian Hangenberg δC^{13} Excursion.—Our (Cramer et al., 2008) study of the whole-rock (micrite) δC^{13} chemostratigraphy of the very late Famennian Louisiana Limestone in outcrop exposures in its type area of eastern Missouri (Upper *praesulcata* Zone) documenting a major plus 5-7 per mil δC^{13} event recording the peak of the very late Famennian excursion reported from European and north African sections by TM Becker and his student Sandra Kaiser. A much more complete δC^{13} and high-resolution MS record of the entire Upper Famennian to Early Tournasian interval was presented as a poster (Clark et al. 2008), and is presented below.

Recent Published Articles

Ma, X. and Day, J., 2007, Revision of the Famennian (Late Devonian) species of *Cyrtospirifer* Nalivkin, 1924, and related forms from North America and South China. *Journal of Paleontology*, v. 81, p. 286-311.

- Cramer, B.D., Saltzman, M.R., Day, J., and B.J. Witzke. 2008, Record of the Late Devonian Hangenberg Global Positive Carbon Isotope Excursion in Epeiric Sea Setting: Carbonate Production, Organic Carbon Burial, and Paleooceanography during the Late Famennian. Pratt, B., and C. Holmden, eds., Epeiric Seas, Geological Association of Canada Paper 48, p. (this was just released by the Geological Association of Canada on 12-15-2008 and we do not have hardcopy or electronic copies of the volume or reprints at this time).
- Whalen, M.T., and Day, J.E., 2008, Magnetic Susceptibility, Biostratigraphy, and Sequence Stratigraphy: Insights into Devonian Carbonate Platform Development and Basin Infilling, Western Alberta. Papers on Phanerozoic Reef Carbonates in Honor of Wolfgang Schlaeger. Society for Sedimentary Geology Special Publication **89**, p.291-316.

Society for Sedimentary Geology Fall 2008 Field Conference Guidebook Articles and Stop Descriptions

- Day, J., 2008a, Unusual Facies Relationships Within the Middle Frasnian Shell Rock Formation Recording Reefal Carbonate Bank Aggradation and Progradation & Offbank Facies Onlap. Iowa Geological Survey Guidebook **28**, Stop 5, p. 72-76.
- Day, J., 2008b, Lime Creek Formation in the vicinity of the Rockford Brick and tile Quarry. Iowa Geological Survey Guidebook **28**, Stop 7, p. 85-95.
- Day, J., and B. J. Witzke, 2008, Upper Devonian (middle Frasnian) Stratigraphy of the Shell Rock Formation in its type area. Iowa Geological Survey Guidebook **28**, Stop 6, p. 77-84.
- Day, J., Witzke, B.J., and B. Bunker, 2008a, Overview of Middle and Upper Devonian Cedar Valley Group and Lime Creek Formation Carbonate Platform Facies, Faunas, and Event Stratigraphy of Northern Iowa. Iowa Geological Survey Guidebook **28**, p. 15-39.

Published Conference Abstracts (2007-2008)

- Day, J. 2007. *Tecnocyrtina* (Spiriferinida) Redux: Timing and Pattern of Allopatric Speciation and Phyletic Transitions in a Lineage of Cyrtinid Brachiopods in the Middle-Upper Devonian of North America. In GSA Abstracts with Programs, v. **39**, no. 3, p. 7.
- Day, J., Whalen M. T., and Over D. J., 2007. Middle-Upper Devonian (Middle Givetian-Early Frasnian) Brachiopod Sequence in the Flume and "Waterways" Formations; Kakwa Park, British Columbia. In GSA Abstracts with Programs, v. **39**, no. 6, p. 73.
- Whalen M. T., Missler, R., Day, J., and Over D. J., 2007. Magnetic Susceptibility and Insights into Devonian Sea Level and Climate Change, Alberta Rocky Mountains, Western Canada. In Program and Abstracts for the September 2007 Field Conference and Meeting of the Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, p. 85.
- Witzke, B.J., Day, J., and Bunker, B, 2007. Middle-Upper Devonian (Middle Givetian-Early Famennian) Record of Relative Sea Level and Climate Change in the Iowa and Western Illinois Basins, Western Laurussia. In Program and Abstracts for the September 2007 Field Conference and Meeting of the Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, p. 87.
- Clark, S., Day, J., Rowe, H., Ellwood, B., and J. Thompkin, 2008, Astronomical Tuning of Integrated Upper Famennian-Early Carboniferous Faunal, carbon isotope and High Resolution Magnetic Susceptibility Records: Western Illinois Basin. In GSA Abstracts with Programs, Abstract 152-6.
- Day, J., 2008c, Late Devonian Conodont Biostratigraphy: Key to Understanding the Timing and cause of Shelly Fossil Faunal Extinctions and Carbonate Platform Evolution in the Iowa and Western Illinois Basins. In GSA Abstracts with Programs, v. **40**, no. 5, p. 11.
- Day, J., Whalen, M.T., and Over, D.J., 2008b, Record of Late Frasnian Kellwasser Extinction Bioevents, Terminal Frasnian Upper Kellwasser Crisis Fauna, and Early Famennian Post-Extinction Recovery: Alberta Rocky Mountains. In GSA Abstracts with Programs, abstract 285-5.
- Payne, J., M. T. Whalen, and J. Day, 2008, Carbon and nutrient cycling during the Frasnian-Famennian extinction event, Rocky Mountains, Western Canada. Abstracts and Program, AAPG-SEPM National Meeting, San Antonio, Tx.
- Schemm-Gregory, M., M.D. Sutton, H.R. Feldmann,, and J. Day, 2008, Really Cool High Resolution 3D Reconstruction of Internal Structures of Paleozoic and Mesozoic Brachiopods. In GSA Abstracts with Programs, Abstract 303-22
- Schemm-Gregory, M., Sutton, M.D., Feldman, H.R. & Day J.E. 2008, A new technique for revealing the internal anatomy of articulated brachiopods. – Newsletter, **69**: 77-78; The Palaeontological Association; London.
- Sullivan, N., and J. Day, 2008, Very Late Frasnian (Upper Devonian) Brachiopod Fauna of the *Theodossia scopulorum* Zone in the Paleoequatorial Mackenzie Shelf (Northwest Territories-Canada) - Western Laurussia. In GSA Abstracts with Programs, Abstract 303-5.

CM James EBERT

Research in the Helderberg Group (Přídolí – Lochkovian) in New York continues and forays have been made in equivalent strata farther south in the Appalachian Basin (Pennsylvania, Maryland, West Virginia and Virginia). Several formations and members (e.g., Manlius Formation, Dayville Member of the Coeymans Formation) that have previously considered part of the New York Devonian are now viewed as Late Silurian (Přídolían). Clarification of the stratigraphy within these Silurian units also continues, but will not be reported here.

The most significant recent finding involves the stratigraphic placement of the “Kalkberg” K-bentonite which has been used to peg the age of the Silurian/Devonian boundary at 418 Ma (Tucker, R.D., Bradley, D.C., Ver Straeten, C.A., Harris, A.G., Ebert, J.R., and McCutcheon, S.R. 1998; Kaumann 2006). Correlation from the Hudson Valley to Cherry Valley, New York indicates that the Kalkberg Formation and the superjacent New Scotland Formation exhibit onlapping relationships to the Punch Kill Unconformity at the top of the Coeymans Formation. As a result, units mapped as Kalkberg in the Hudson Valley are progressively lost westward so that at Cherry Valley, beds originally mapped as Kalkberg Formation are actually assignable to the New Scotland Formation. This includes the dated K-bentonite and several others which have also been correlated from the Hudson Valley. A greatly thinned Kalkberg representing shallower environments is present at Cherry Valley, but occurs below the bentonite-bearing strata.

The bentonite-bearing part of the New Scotland likely represents lower portions of a highstand systems tract in the middle Helderberg transgression (Field observations and Ver Straeten 2008). This recognition helps clarify correlation of Helderberg units in New York State but raises questions regarding correlations with southern portions of the Appalachian Basin. The bentonite interval in New York has been correlated with the Bald Hill Bentonites of Smith, Berkheiser and Way (1988) but it now appears that the ashes in Pennsylvania and the overlying black shale of the Mandata Formation occupy a different position in a sequence stratigraphic framework (transgressive systems tract) and may represent a separate cluster of ashes.

Ongoing studies of conodonts and carbon isotope chemostratigraphy with Mark Kleffner and Jim Barrick have done little thus far to clarify the position of the Silurian/Devonian boundary in the Appalachian Basin. These studies have placed the first occurrence of *Icriodus woschmidti* just above the Terrace Mountain Unconformity at the base of the Dayville Member of the Coeymans Formation (though this unit should be reassigned to the Manlius Formation). However, this appears to be an early form, similar to Přídolían occurrences elsewhere in the world. A positive delta ¹³C excursion in the Green Vedder Member of the Manlius Formation is likely a Přídolían event. This excursion appears to be older than the Silurian/Devonian boundary excursion recognized by Saltzman (2002) in West Virginia, Nevada and Oklahoma and in the Barrandian (Hladikova, Hladil and Kribek 1997).

Recent Publications

- Ebert, J.R., 2008, Onlapping Units and Converging Unconformities: Stratigraphic Relationships in the Lower Helderberg Group on the Northwestern Margin of the Appalachian Basin: Geological Society of America Abstracts with Programs, v. **40**, n. 2, p. 16.
- Ebert, J.R., Johnson, E., Grimes, A., Routh, R., Pechenik, N., McCredy, R., Bowler, J., 2007, The Kalkberg Formation (Helderberg Group, L. Dev., Lochkovian) at Cherry Valley, New York is Actually New Scotland – Preliminary Results of Sedimentologic and Stratigraphic Investigations: Geological Society of America Abstracts with Programs, v. **39**, n. 1, p. 60.
- D. K. Loydell, M. A. Kleffner, G. L. Mullins, A. Butcher, D. K. Matteson & J. R. Ebert, 2007, The lower Williamson Shale (Silurian) of New York: a biostratigraphical enigma: Geological Magazine, v. **144**, p. 225-234
- Kleffner, M. and Ebert, J., 2006, Conodont Biostratigraphy, $\delta^{13}\text{C}$ Chemostratigraphy, and Recognition of Silurian/Devonian Boundary in the Appalachian Basin at Cherry Valley, New York: Geological Society of America Abstracts with Programs, v. **38**, n. 7, p. 146.
- Ebert, J., Miller, J., Nierenberg, D., Wilson, R., Weeks, B., D. Matteson, 2006, Stratigraphic and Sedimentologic Insights from Schoharie, NY: Coeymans Formation (Lower Lochkovian, Helderberg Group): Geological Society of America Abstracts with Programs, v. **38**, n. 2, p. 90.

- Barnett, J., Greenemeier, R., Fulton, A., Matteson, D.K., and Ebert, J.R., 2006, Stratigraphic, Sedimentologic, and Taphonomic Insights from Schoharie, NY: Green Vedder Member, Manlius Formation (Upper Přídolí, Helderberg Group): Geological Society of America Abstracts with Programs, v. **38**, n. 2, p. 64.
- Matteson, D., Taylor, B., Tracy, M., Franzi, A., Folino, A., Armbruster, J., Hoenninger, A., Ebert, J., 2006, Stratigraphic and Sedimentologic Insights from Schoharie, NY: Thacher Member, Manlius Formation (Upper Přídolí, Helderberg Group): Geological Society of America Abstracts with Programs, v. **38**, n. 2, p. 90.
- Ebert, J.R. and Matteson, D.K., 2005, Preliminary Sequence and Event Stratigraphic Correlations within the Helderberg Group (Silurian – Devonian) between New York and the Central Appalachian Basin: Geological Society of America Abstracts with Programs, v. **37**, n. 1, p. 66.
- Ver Straeten, C., Ebert, J.R., Bartholomew, A., Shaw, G.H., Benedict, L.J., Matteson, D.K., 2005, Devonian stratigraphy and K-bentonites in the Cherry Valley – Schoharie Valley Region: *in* Rodbell, D.T., (ed.) Northeast Section of the Geological Society of America 40th Ann. Mtg. , Saratoga Springs, New York, Fieldtrip Guidebook, p. D1 - D57.

TM Nadezhda IZOKH

During the year 2008 different activities of our team were connected with investigation of stratigraphy of the Devonian sequences from West Siberia and western part of the South Tien Shan. Research group includes: Drs. E.A. Yolkin, N.K. Bakharev, N.G. Izokh, O.T. Obut, V.G. Khromykh, N.V. Sennikov, T.P. Kipriyanova, PhD students O.P. Izokh and T.A. Shcherbanenko.

In cooperation with the Uzbekistan team (under the leadership of Drs. A.I. Kim and M.V. Erina) data on geology and biostratigraphy of the Devonian sequences exposed on the territory of the Kitab State Geological Reserve (Republic Uzbekistan), western part of the Zeravshan Range in the South Tien Shan, were revised. Most complete carbonate sections of the Lower Devonian and lowermost Middle Devonian are well-exposed and characterized by extremely abundant and diverse benthic and pelagic fauna (stromatoporoids, tabulate and rugose corals, ammonoids, trilobites, brachiopods, ostracods, crinoids, bryozoans, conodonts, tentaculites, chitinozoans, graptolites, microremains of vertebrates). These sections are unique because of presence of such groups as graptolites, those last representatives were found in conodont *nothoperbonus* Zone (lower part of upper Emsian) and by findings of early ammonoids in the *inversus* Zone. The most important for the Devonian biochronology lineages of conodont genera *Ozarkodina*, *Eognathodus* and *Polygnathus* are designated for the entire Lower Devonian succession. This allowed establishing of the GSSP for the lower boundary of the Emsian Stage (Yolkin et al., 1997). There are good perspectives for establishment of the lower boundary of the upper Emsian. Summarized data have been

published in the guidebook “Devonian sequences of the Kitab Reserve Area” (see references below). International Conference “Global alignment of Lower Devonian carbonate and clastic sequences” (SDS/IGCP499 project joint field meeting) was organized in the Kitab State Geological Reserve, Uzbekistan on August 25 – September 3, 2008. During the conference the Annual Business Meeting of the International Subcommission on Devonian Stratigraphy was held.

CM E.A. Yolkin, TM N.G. Izokh in cooperation with TM K. Weddige and CM M.V. Erina (Yolkin et al., 2008) have summarized data on evolution and phylogeny of the early polygnathids (conodonts). Three specific polygnathid lineages for Pragian and Emsian stages were proposed: (a) *Po. kitabicus* – *Po. excavatus* – *Po. nothoperbonus*, (b) *Po. pannonicus* – *Po. “postpannonicus”* – *Po. “postpostpannonicus”* and (c) *Po. sokolovi* – *Po. hindei* – *Po. tamarae* as well as demonstrated polymorphic structure of the archetype (the species *Po. pirenae*).

TM N.G. Izokh and CM O.T. Obut: We continue examination of Middle-Upper Devonian siliceous-terrigenous rocks on a presence of conodonts and radiolarians. Frasnian conodont and radiolarian biofacies have been distinguished in the Rudny Altai. Comparative studies of conodonts and radiolarians occurred together in the Frasnian-Famennian strata of the Rudny Altai, South Urals (Russia) and Nevada (USA) have been started (Izokh et al., 2008 a, b; Obut, 2008).

CM N.K. Bakharev investigated the Emsian ostracods from Salair (South of West Siberia,

Russia) and Zeravshan Ridge (Republic Uzbekistan). Comparative studies revealed that different facial associations are most diverse in the late Emsian (Shandian Horizon and Gorlisayian Subhorizon). Considerable similarity was revealed within associations, characteristic for the slope facies (bedded or platy carbonates).

V.G. Khromykh made biostratigraphic analysis of the Emsian stromatoporoids. On Salair (South of West Siberia, Russia) they were distributed in the shallow shelf and stromatoporoids studied from the Zeravshan Ridge (Republic Uzbekistan) inhabited upper part of the shallow shelf and are represented by more diverse associations.

PhD student O.P. Izokh continues investigations of the carbon (organic and inorganic) and oxygen isotope composition from the F/F carbonates from the Kuznetsk Basin (Kolyvan'-Tomsk fold-thrusted area) and of South Urals, as a part of compiling of the data basis (O. Izokh, 2008a, b). First data on $\delta^{13}\text{C}$ - и $\delta^{18}\text{O}$ obtained from F/F carbonates collected from sections Akkyr and Bolshaya Barma on western slope South Urals showed positive excursions characteristic for F/F carbonates reported from other regions. However amplitude of the positive shift and $\delta^{13}\text{C}$ maximum values differ from that reported previously. For the section Akkyr maximum values exceed 6,7‰ and shift amplitude is 5,5‰. In the section Bolshaya Barma only lowermost Famennian part was sampled and thus only beginning of $\delta^{13}\text{C}$ positive excursion was fixed.

PhD student T.A. Shcherbanenko together with R.T. Gratsianova and CM J. Talent revised of Early Emsian Chonetoidean brachiopods from the Zeravshan Ridge of the

South Tien Shan (Republic Uzbekistan) and Salair (South of West Siberia) (Gratsianova et al., 2008). Within 5 chonetoidean species presently known from the two regions, Salair and the South Tien Shan, only three are common to the two regions, which is quite high level of similarity.

Field works in Kemerovo and SE Altai regions have been carried out in August 2008. The Lower to Upper Devonian sections have been examined. Sampling on microfauna (conodonts, ostracods), ammonoids, brachiopods, corals and for isotopic studies ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$) was made. Participants: CM N.K. Bakharev, TM N.G. Izokh, PhD students O.P. Izokh and T.A. Shcherbanenko.

We would like to make first announcement of the International Conference and **SDS field meeting to be held in the Kuznetsk Basin region (South of West Siberia, Russia) in 2011**. This proposal was approved during the Annual meeting of the Subcommission on Devonian Stratigraphy in the Kitab State Reserve, Uzbekistan (September, 2008). Preliminary terms 12-14 days between 20 July – 10 August, 2011. One-two days indoor session is planned in the Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of RAS (Novosibirsk).

Middle and Upper Devonian as well as Lower Carboniferous mainly carbonate sections will be introduced. They are characterized by diverse benthic and pelagic fauna (brachiopods, corals, ammonoids, trilobites, conodonts, ostracods). More details and circular would be distributed in 2010. Organizing Committee warmly welcomes Devonian workers to participate in the meeting.

References

- Devonian sequences of the Kitab Reserve area. Field Excursion Guidebook. International Conference "Global Alignments of Lower Devonian Carbonate and Clastic Sequences" (SDS/IGCP 499 project joint field meeting). August 25 – September 3, 2008, Kitab State Geological Reserve, Uzbekistan / Eds E.A. Yolkin, A.I. Kim, J.A. Talent. – Novosibirsk: Publishing House of SB RAS. 2008. 100 p. Authors: A.I. Kim, E.A. Yolkin, M.V. Erina, I.A. Kim, N.A. Meshchankina, F.A. Salimova, F.S. Karimova, U.D. Rakhmonov, E.S. Tsmevrek, N.K. Bakharev, N.G. Izokh, T.P. Kipriyanova, O.T. Obut, N.V. Sennikov.
- Bakharev N.K. Devonian ostracods from Salair and Kuznetsk Basin // News of Paleontology and Stratigraphy: vol. 10-11. Supplement to journal "Geologiya i geofizika", vol. 49, 2008. Novosibirsk: SB RAS Publ. House, 2008. P. 85-87. [in Russian]
- Bakharev N.K. Comparison of Emsian ostracods from Salair and Zeravshan Ridge // "Global Alignment of Lower Devonian Carbonate and Clastic Sequences" (IGCP 499 project / SDS joint field meeting): Contributions of the International Conference. August 25 – September 3, 2008. Kitab State Geological reserve, Uzbekistan / Eds. A.I. Kim, F.A. Salimova, N.A. Meshchankina; SealMag Press, 2008. P. 13-14. [in Russian]

- Gratsianova R.T., Shcherbanenko T.A., Talent J.A. Early Emsian chonetoid brachiopods from the Zeravshan-Hissar mountain area (Uzbekistan) and the Salair (Southern West Siberia, Russia) // "Global Alignment of Lower Devonian Carbonate and Clastic Sequences" (IGCP 499 project / SDS joint field meeting): Contributions of the International Conference. August 25 – September 3, 2008. Kitab State Geological reserve, Uzbekistan / Eds. A.I. Kim, F.A. Salomova, N.A. Meshchankina; SealMag Press, 2008. P. 35-36.
- Izokh N.G., Obut O.T., Sennikov N.V., Yolkin E.A. Late Frasnian conodonts and radiolarians from the Rudny Altai (south of West Siberia) // Geobiosphere events and history of the organic world. Abstracts of the LIV session of the Paleontological society of RAS (April 7-11 2008, Sankt-Petersburg). Sankt-Petersburg. 2008a. P. 77-78. [In Russian]
- Izokh N.G., Obut O.T., Morrow J. and Sandberg Ch.A. New findings of Upper Frasnian conodonts and radiolarians from the WMO section (Nevada, U.S.A) //Final Meeting of IGCP 497 and IGCP 499. Abstracts and Programme. Editors: Peter Konigshof & Ulf Linnemann. Frankfurt am Main, September 30-October 3, 2008 b. P. 186-188.
- Izokh N.G., Yolkin E.A., Bukolova E.V. Frasnian biofacies and taxonomic diversity of conodonts from the Rudny Altai (South of West Siberia) // News of Paleontology and Stratigraphy: vol. 10-11. Supplement to journal "Geologiya i geofizika", vol. 49, 2008. Novosibirsk: SB RAS Publ. House, 2008c. P. 122-124. [In Russian]
- Izokh O.P. Peculiarities of $\delta^{13}\text{C}_{\text{carb}}$, $\delta^{13}\text{C}_{\text{org}}$ and $\delta^{18}\text{O}$ in the Upper Devonian sections from the Kuznetsk Basin // "Global Alignment of Lower Devonian Carbonate and Clastic Sequences" (IGCP 499 project / SDS joint field meeting): Contributions of the International Conference. August 25 – September 3, 2008. Kitab State Geological reserve, Uzbekistan / Eds. A.I. Kim, F.A. Salomova, N.A. Meshchankina; SealMag Press, 2008. P. 40-42.
- Izokh O.P. Isotopic composition of carbon and oxygen in the Upper Devonian carbonate sections from the Kuznetsk Basin and Western part of South Urals. Abstracts of the IV Siberian International Conference of young scientists on Earth Sciences. Novosibirsk: IGM SB RAS, 2008. P. 130-131.
- Khromykh V.G. Similarity and difference in Emsian stromatoporoids from Salair and Zeravshan Ridge // "Global Alignment of Lower Devonian Carbonate and Clastic Sequences" (IGCP 499 project / SDS joint field meeting): Contributions of the International Conference. August 25 – September 3, 2008. Kitab State Geological reserve, Uzbekistan / Eds. A.I. Kim, F.A. Salomova, N.A. Meshchankina; SealMag Press, 2008. P. 59. [In Russian]
- Obut O.T. Analysis of biodiversity of Upper Devonian radiolarians in siliciclastic and terrigenous-carbonate facies from Rudny Altai, south of West Siberia // "Global Alignment of Lower Devonian Carbonate and Clastic Sequences" (IGCP 499 project / SDS joint field meeting): Contributions of the International Conference. August 25 – September 3, 2008. Kitab State Geological reserve, Uzbekistan / Eds. A.I. Kim, F.A. Salomova, N.A. Meshchankina; SealMag Press, 2008. P. 91-92.
- Sennikov N.V. The distribution of Early Devonian graptolites in the Zinzilban section (Kitabian Regiostage, Zinzilbanian and Norbonakian regiosubstages) // "Global Alignment of Lower Devonian Carbonate and Clastic Sequences" (IGCP 499 project / SDS joint field meeting): Contributions of the International Conference. August 25 – September 3, 2008. Kitab State Geological reserve, Uzbekistan / Eds. A.I. Kim, F.A. Salomova, N.A. Meshchankina; SealMag Press, 2008. P. 107-109.
- Shcherbanenko T.A. Peculiarities in the stratigraphic distribution of strophomenids (Brachiopoda) in the Emsian sediments of different facies from NE Salair (South of West Siberia) // Modern paleontology: classic and new methods. V All-Russian school for young paleontologists. October 6-8, 2008. Borissiak Paleontological Institute RAS, Moscow. Abstracts. Moscow, 2008. P. 58-59. [in Russian]
- Talent J.A., Yolkina V.N., Kipriyanova T.P., Yolkin E.A. and Gratsianova R.T. Implications of changes/transformations in the pattern of brachiopod biogeography in northern Asia through latest Silurian (Pridoli), Early and Middle Devonian times // Final Meeting of IGCP 497 and IGCP 499. Abstracts and Programme. Editors: Peter Konigshof & Ulf Linnemann. Frankfurt am Main, September 30-October 3, 2008. P. 134-136.
- Yolkin E.A., Sennikov N.V., Bakharev N.K., Belyaev S.Yu., Izokh N.G., Kanygin A.V., Klets A.G., Kontorovich A.E., Kontorovich V.A., Obut O.T., Saraev S.V., Filippov Yu.F. Main features of modern structure and history of formation of the Precambrian-Paleozoic West Siberian sedimentary basin // Contributions of the All-Russian scientific conference "Base, adjacent structures of the West-Siberian Mesozoic-Cenozoic sedimentary basin, their geodynamic evolution and problems of oil-and-gas content". September, 29 – October, 2, 2008, Tyumen'-Novosibirsk. P. 75-80. [in Russian]
- Yolkin E.A., Weddige K., Izokh N.G., Erina M.V. Pragian-Early Emsian polygnathids from Kitab Reserve sequences: their origin, main evolutionary stock and specific lineages // "Global Alignment of Lower Devonian Carbonate and Clastic Sequences" (IGCP 499 project / SDS joint field meeting): Contributions of the International Conference. August 25 – September 3, 2008. Kitab State Geological reserve, Uzbekistan / Eds. A.I. Kim, F.A. Salomova, N.A. Meshchankina; SealMag Press, 2008. P. 115-117.

CM Ulrich JANSEN

Research of the last two years essentially concentrated on Pridolian to Eifelian brachiopod stratigraphy of the Rhenish Massif and neighbouring regions. The biostratigraphical potential of little considered groups, such as strophomenids, orthotetids and orthids has turned out to be unexpectedly high. I have continued the work on the brachiopod monograph and anticipate to finish it in the forthcoming two years.

I participated in the SDS meetings in Nevada 2007 and Usbekistan 2008 where I gave reports on the present state of Rhenish brachiopod stratigraphy with special attention to the base of the Emsian stage in its traditional sense and international correlation of this level.

I am currently working in the DEVEC-TR project (sub-project of IGCP 499, led by V. WILDE, Frankfurt and N. YALCIN, Istanbul) concerning stratigraphy, facies and palaeogeography of the Turkish Devonian. During a visit at the General Directorate of Mineral Research and Exploration (MTA) in Ankara in summer 2007, my Turkish colleague Gonca NALCIOGLU and I studied Devonian brachiopods from the Pontides (NW Turkey) and the Taurides (S Turkey). Using the brachiopods, it was possible to improve age assignments of biostratigraphically poorly located formations. We have also got new implications on the palaeobiogeographical position of the Istanbul Devonian. During a workshop of the whole Turkish-German group in Ankara in May 2008, results were compared and integrated for forthcoming publications. The first results were presented at the Nevada SDS Meeting and the IGCP-497/499 meeting in Frankfurt in September 2008.

Publications (2007-2008)

- JANSEN, U., LAZREQ, N., PLODOWSKI, G., SCHEMM-GREGORY, M., SCHINDLER, E. & WEDDIGE, K. (2007): Neritic-pelagic correlation in the Lower and basal Middle Devonian of the Dra Valley (S Anti-Atlas, Moroccan Pre-Sahara). – Geological Society, Special Publications, **278**: 9-37; London.
- SCHEMM-GREGORY, M. & JANSEN, U. (2007): A new genus of terebratulid brachiopod from the Siegenian of the Rhenisches Schiefergebirge. – Acta Palaeontologica Polonica, **52** (2): 413-422; Warsaw.
- JANSEN, U. (2007): Upper Silurian to Middle Devonian of the Rhenish Mountains, Germany: new brachiopod data and implications. – Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction: Devonian Global Change: compelling changes in the Devonian world, highlighting new findings in the terrestrial and marine biomes: fish, invertebrates, plants, terrestrial vertebrates, global warming, mass extinction, bolide strikes, and global correlation. Program and Abstracts; Eureka, Nevada, 9-17 September 2007: 46-47; Rochester.

Several years of stratigraphic research in the Devonian of the Dra Valley (Morocco) culminated in a summarizing paper on neritic-pelagic correlation published together with colleagues in the Michael HOUSE volume of the Geological Society Special Publications.

Another study in cooperation with CHEN Xiuqin (Nanjing), dedicated to the comparison of Devonian spiriferids from South China and western Europe, has been continued and resulted in a first publication in Fossils and Strata. In our opinion the faunal relationships are less close than previously claimed by different brachiopod workers.

My Ph.D. student **Mena SCHEMM-GREGORY** and I published a paper on the enigmatic stringocephaloid genus *Paracrothyris* reported for the first time from NW Africa. A paper dealing with another stringocephaloid brachiopod taxon from central Nevada has been submitted to the progress volume of the Nevada meeting. The new rhenorenselaeriid genus *Crassirenselaeria* was described in a publication of Acta Palaeontologica Polonica.

The project “phylogeny of delthyridoid spiriferids” supported by the “Deutsche Forschungsgemeinschaft” (DFG) has been continued. In the frame of this project Mena SCHEMM-GREGORY has already published first results of her Ph.D. thesis.

Nadia KNAPP is currently finishing a diploma thesis on Emsian biofacies and stratigraphy of the northwestern Taunus (southern Rhenish Massif).

- KÖNIGSHOF, P., BROCKE, R., JANSEN, U., SCHINDLER, E., WEDDIGE, K., WEHRMANN, A. & WILDE, V. (2007): Erdgeschichte im Wandel der Zeit: Ökosysteme und Klima im Devon. – Senckenberg 2005-2006: 40-41; Frankfurt am Main.
- SCHEMM-GREGORY, M. & JANSEN, U. (2007): The first report of the rare enigmatic stringocephalid genus *Paracrothyris* (Brachiopoda, Middle Devonian) from North Africa. – Newsletter, **66**: 92; The Palaeontological Association; London.
- SCHEMM-GREGORY, M. & JANSEN, U. (2007): *Calceola sandalina* – Die Pantoffel-Koralle. – Natur und Museum, **137** (1/2): 24-25; Frankfurt am Main.
- YILMAZ, I., YALCIN, M.N., WILDE, V., WEHRMANN, A., UGUZ, M.F., SCHINDLER, E., SAYDAM, G., ÖZKAN, R., MANN, U., NAZIK, A., NALCIOGLU, G., KOZLU, H., KÖNIGSHOF, P., KARSLIOGLU, Ö., JANSEN, U., GEDIK, I., ERTUG, K., BROCKE, BOZDOGAN, N. & BAHTIYAR, I. (2007): The Devonian of Turkey – an attempt for comparison of Laurussian and Gondwanan continental margins. – Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction: Devonian Global Change: compelling changes in the Devonian world, highlighting new findings in the terrestrial and marine biomes: fish, invertebrates, plants, terrestrial vertebrates, global warming, mass extinction, bolide strikes, and global correlation. Program and Abstracts; Eureka, Nevada, 9-17 September 2007: 90-91, 1 fig.; Rochester.
- JANSEN, U., SCHEMM-GREGORY, M. & CHEN XIUQIN, U. (2008): Comparison of some spiriferid brachiopods from the Lower Devonian of South China and Europe. – Fossils and Strata, **54**: 99-104.
- JANSEN, U. & NALCIOGLU, G. (2008): Silurian and Devonian brachiopods from Turkey. – In: KÖNIGSHOF, P. & LINNEMANN, U. (eds.): From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg Conference and 2nd Geinitz Conference. Final Meeting of IGCP 497 and 499. Abstracts and Programme: 58-59.
- JANSEN, U. & SCHEMM-GREGORY, M. (2008): Graptolithen – 200 Millionen Jahre Formenvielfalt. – Natur und Museum, **138** (5/6): 144-145.
- KÖNIGSHOF, P., YALCIN, N., BOZDOGAN, N., BROCKE, R., GEDIK, I., JANSEN, U., KARSLIOGLU, Ö., NAZIK, A., NALCIOGLU, G., SAYDAM, G. & YILMAZ, I., M.N. (2008): Stratigraphy, sedimentology and facies development of the Devonian of northwestern Turkey. – In: KÖNIGSHOF, P. & LINNEMANN, U. (eds.): From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg Conference and 2nd Geinitz Conference. Final Meeting of IGCP 497 and 499. Abstracts and Programme: 192-194.
- SCHEMM-GREGORY, M. & JANSEN, U. (2008): First report of the Middle Devonian stringocephalid genus *Paracrothyris* (Brachiopoda) from North Africa. – Bulletin of Geosciences **83**(2): 169-173.
- SCHEMM-GREGORY, M. & JANSEN, U. (2008): *Pleurodictyum problematicum* – Was machte der Wurm in der Koralle? – Natur und Museum, **138** (9/10): 236-237.
- SCHEMM-GREGORY, M. & JANSEN, U. (2008): Der erste Nachweis der seltenen stringocephaliden Gattung *Paracrothyris* (Brachiopoda, Mittel-Devon) aus Nordafrika. – Erlanger Geologische Abhandlungen, Sonderband **6**: 112.
- SCHEMM-GREGORY, M. & JANSEN, U. (2008): The first report of the rare enigmatic stringocephalid genus *Paracrothyris* (Brachiopoda, Middle Devonian) from North Africa. – In: KÖNIGSHOF, P. & LINNEMANN, U. (eds.): From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg Conference and 2nd Geinitz Conference. Final Meeting of IGCP 497 and 499. Abstracts and Programme: 230.
- WEHRMANN, A., YILMAZ, I., SCHINDLER, E., KOZLU, H., BOZDOGAN, N., BROCKE, R., ERTUG, K., GEDIK, I., JANSEN, U., KARSLIOGLU, Ö., NALCIOGLU, G., NAZIK, A., ÖZKAN, U., SAYDAM, D., WEDDIGE, K., WILDE, V. & YALCIN, M.N. (2008): Key sections from the Devonian of the central and eastern Taurides (Turkey). – In: KÖNIGSHOF, P. & LINNEMANN, U. (eds.): From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg Conference and 2nd Geinitz Conference. Final Meeting of IGCP 497 and 499. Abstracts and Programme: 241.
- YALCIN, YILMAZ, I., M.N., WILDE, V., WEHRMANN, A., SCHINDLER, E., ÖZKAN, U., NAZIK, A., NALCIOGLU, G., KÖNIGSHOF, P., JANSEN, U., BROCKE, R. (2008): Palaeogeographical setting of Devonian successions of Turkey – A Gondwanan vs. Laurussian comparison. – In: KÖNIGSHOF, P. & LINNEMANN, U. (eds.): From Gondwana and Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg Conference and 2nd Geinitz Conference. Final Meeting of IGCP 497 and 499. Abstracts and Programme: 141-142.
- SCHEMM-GREGORY, M. (2008): A new terebratulid brachiopod species from the Siegenian (middle Lower Devonian) of the Dra Valley, Morocco. – Palaeontology, **51** (4): 793-806.
- SCHEMM-GREGORY, M. (2008): A new delthyridoid spiriferid genus from the Dra Valley, Morocco, and its phylogenetic affinities (Brachiopoda, Lower Devonian). – Paläontologische Zeitschrift, **82** (4): 385-401.

- SCHEMM-GREGORY, M. (2008): A new species of Filispirifer (Brachiopoda: Delthyridoidea) from the Dra Valley, Morocco (Lower Devonian) – *Zootaxa*, **1739**: 53-68.
- SCHEMM-GREGORY, M. (2008): New interpretations of the phylogeny of delthyridoid spiriferids (Brachiopoda, Lower and Middle Devonian). – *Bulletin of Geosciences*, **83** (4): 401-448.
- KLUG, C., KRÖGER, B., RÜCKLIN, M., KORN, D., SCHEMM-GREGORY, M., DE BAETS, K., & MAPES, R.H. (2008): Composition and Ecology of two Early Emsian Faunules from the Tafilalt, (Devonian, Morocco) containing diverse molluscs, the first coiled ammonoids, edrioasteroids, and machaerids. – *Palaeontographica Abt. A*, 283 (4-6): 83-176.

Publications of P. Königshof and co-authors

- ERNST A & KÖNIGSHOF P (2008): Reef building potential of Devonian bryozoans: an example from southern Morocco. *Facies* **54** (4): 613-620.
- ANTOSHKINA, A. & KÖNIGSHOF, P. (2008) Lower Devonian reef structures in Russia – an example from the Urals. *Facies*, **54** (2): 233-251.
- KÖNIGSHOF, P., BEN RAHUMA, M., PROUST, J.-N (2008). IGCP 499: Devonian land-sea transitional settings. *Episodes*, **31** (4).
- KÖNIGSHOF, P. OBUT, O., IZOKH, N., [eds] (2008): Devonian land-sea interaction evolution of ecosystems and climate, IGCP 499. *Bulletin of Geosciences*, Special volume **84** (4), 355-506.
- KÖNIGSHOF, P. OBUT, O., IZOKH, N. (2008): Devonian land-sea interaction evolution of ecosystems and climate, IGCP 499. Editorial of the Special volume. *Bulletin of Geosciences* **84** (4), 355-356.
- LIAO, J.-C., KÖNIGSHOF, P., VALENZUELA-RIOS, J.I., SCHINDLER, E. (2008). Depositional environment interpretation and development of the Renanue section (Upper Eifelian-Lower Frasnian; Aragonian Pyrenees, N. Spain) *Bulletin of Geosciences*, **84** (4), 481-490.
- KÖNIGSHOF P & LINNEMANN U [eds] (2008) From Gondwana to Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. 20th International Senckenberg-Conference and 2nd Geinitz-Conference. Final Meeting of IGCP 497 and 499. Abstracts and Programme, Frankfurt am Main, Dresden, 1-241.
- KÖNIGSHOF P & LINNEMANN U. [eds] (2008) The Rheno-Hercynian, Mid-German Crystalline – and Saxo-Thuringian Zones (Central European Variscides), Excursion Guide, 20th International Senckenberg-Conference and 2nd Geinitz-Conference: From Gondwana to Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. Final Meeting of IGCP 497 and 499. Abstracts and Programme, Frankfurt am Main, Dresden, 1-159.
- KÖNIGSHOF P, FLICK H, NESBOR D, SCHÄFER A, STETS J (2008) Rheno-Hercynian Zone. In: Königshof P & Linnemann U [eds] (2008) The Rheno-Hercynian, Mid-German Crystalline – and Saxo-Thuringian Zones (Central European Variscides), Excursion Guide, 20th International Senckenberg-Conference and 2nd Geinitz-Conference: From Gondwana to Laurussia to Pangaea: Dynamics of Oceans and Supercontinents. Final Meeting of IGCP 497 and 499. Abstracts and Programme, Frankfurt am Main, Dresden, 11-78.

TM MA Xue-ping

Our field work is related to two areas. One is western Junggar of Xinjiang, northwestern China, where the Devonian sequence represents one of the important depositional and biotic types in China and is characterized by geosynclinal volcanic and clastic associations, with great lithofacies and thickness variations. Carbonate deposits are rare. Due to contemporaneous and post-Paleozoic tectonic movement, the Devonian sequence has been mostly fragmented, although it can be well exposed, in some areas. The Hoboksar and Hoxtolgay region is such an area, where a relatively complete Devonian sequence has been established by previous workers. The Lower Devonian, Middle Devonian Eifelian, and Upper Devonian Famennian lithologic formations are

characterized by marine deposits, whereas the Givetian and Frasnian are mainly characterized by terrestrial deposits. Whether this facies pattern is applicable to other areas of west Junggar needs further study since most other areas have not been seriously studied, except for a general geological survey 25 to 45 years ago so that many mistakes exist, e.g., our new findings of Lower-Middle Devonian fossils in a section formerly mapped as the Lower Carboniferous strata about 150 km west of Karamay (or Kelamayi) City.

The other area of fieldwork is South China, where our major concern has turned to Frasnian strata for the last few years. One issue is related to the punctata event in the Early-Middle Frasnian transition period, which was a collaborative project with Profs. Wang

Chengyuan (China), G. Racki, and M. Racka (Poland). In the Dongcun (Guilin) section, the studied interval (uppermost Givetian to Middle Frasnian basal *Palmatolepis hassi* Zone) is characterized by repeated shallower and deeper water deposits, but the cyclic depositional trend was mainly deepening upward. Both organic and inorganic carbon isotopic analyses show a major negative and positive perturbation across the Lower–Middle Frasnian boundary, which is also evident in the Holy Cross Mountains (Poland). The result has been published in the journal *3-Palaeo* (2008). Another issue in South China is related to early Frasnian pelagic and neritic correlation. Although benthic fossils were abundant in shallow water settings, the exact age of their emergence in South China is not clear, e.g., the

Cyrtospirifer group; in addition, brachiopod faunal succession across the Givetian-Frasnian boundary still needs detailed study in terms of their taxonomy and distribution. After several years' field and laboratory investigations, we were led to the conclusion that the Caiziyan section near Guilin is a relatively suitable reference section for neritic-pelagic correlations of the Middle-Upper Devonian boundary interval in South China since it yields a mixed pelagic and benthic fauna, including relatively abundant benthic corals and brachiopods and common conodonts (*Polygnathus*, *Ancyrodella*, *Mesotaxis*, *Palmatolepis* etc.) that serve to define the international "standard" conodont zonation. The study of conodonts is close to completion by one of my PhD student LI Hua.

Publications

- Ma Xueping, Volker Ebbighausen, R. Thomas Becker. 2008. Desquamatia and related atrypid brachiopods from the Frasnian (Upper Devonian) of Bergisches Land, Germany. *Canadian Journal of Earth Sciences*, **45**(2): 121–134.
- Ma Xue-ping, Wang Cheng-yuan, Grzegorz Racki, Maria Racka. 2008. Facies and geochemistry across the Early-Middle Frasnian transition (Late Devonian) on South China carbonate shelf: comparison with the Polish reference succession. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **269**: 130–151.
- Liao Weihua, Ma Xueping. 2008. The assemblage sequences and biogeographic provinces of the Eifelian rugose corals in near-shore facies from South China. *Acta Palaeontologica Sinica*, **47** (1): 39–46. (in Chinese with English abstract).
- Sun Yuanyuan, Liu Jianbo, Ma Xueping. 2008. Preservation and Stable Carbon-Oxygen Isotopes of Late Devonian Brachiopods in South China. *Acta Scientiarum Naturalium Universitatis Pekinensis*, **44**(4): 566–578. (in Chinese with English abstract)
- Liao Weihua, Ma Xueping and Sun Yuanlin. (in press) The Famennian rugose coral assemblages in near-shore facies from South China. *Acta Palaeontologica Sinica*, **47**. (in Chinese with English abstract).

CM Elga MARK-KURIK

This year the activity included description of fish material, correcting proofs of several papers and/or presentation of talks, the topic of which was mainly paleobiology, more exactly paleopathology and biomechanics of the Devonian fishes.

The paper on *Panderichthys*, a Middle Devonian sarcopterygian fish, fairly close to tetrapods from the Baltic area, published in "Nature" deserved special interest. New information on the structure of the pectoral fin was obtained in result of CT scanning of the 'patient' at the East-Tallinn Central Hospital. My part in this extraordinary action was limited mostly with logistics, and earlier, removal of the partly destroyed specimen from a vertical wall of the clay quarry Lode (Latvia) in rather complicated conditions. Luckily, the right pectoral fin appeared to be safely buried

under the 'dead body' and could be studied only using tomograph. Online information gives data on localities and age of this important fossil fish.

A team, consisting of several Baltic authors and Russian colleagues were busy with studying and describing injuries, caused by Devonian predatory fishes as well as by parasites to different prey fishes, in particular to heterostracans and placoderms. Information on specimens with biting marks and actions of parasites has earlier been published in rare cases.

An Eifelian (Narva Formation) holonematid from Estonia under description has an ornament, consisting of tubercles not fused into ridges as in 'normal' *Holonema* species. A similar species, *H. bruehni* Otto (1998) occurs

in the Eifelian of Rhineland, showing possibilities for correlation of these regions.

At the end of this year a new project started with a brief visit in Tallinn by Dr. Alain Blicq, Lille University, France. We shall be

busy with a Lochkovian-Pragian fish collection from the far North-West of Siberia (Russia), Central Chukotka at the Long Strait, highly interesting in paleogeographical and other aspects.

References

- Boisvert, C., Mark-Kurik, E. & Ahlberg, P. E. (2008). The pectoral fin of *Panderichthys* and the origin of digits. *Nature* 456, 4th Dec., Letters: 636-638 + Supplementary Information: 1-5 in Online, www.nature.com/nature
- Mark-Kurik, E. (2008). Unsuccessful attacks of predators on the prey fishes, psammosteids and placoderms in the Middle Devonian. In: Grine, I. (ed.), *Geografija, geologija, vides zinatne: Latvias universitates 66. zinatniska konference*. Riga, Latvia: 202 - 203.
- Mark-Kurik, E. (2008). A Middle-Devonian holonematid arthrodire with unusual ornament from Estonia. In: Hints, O., Ainsaar, L., Männik, P. & Meidla, T. (eds.), *The 7th Baltic Stratigraphical Conference. Abstracts & Field Guide: The 7th Baltic Stratigraphical Conference, Tallinn, 15-22 May 2008*. Tallinn: 46.
- Marshall, J., Plink-Björklund, P. & Mark-Kurik, E. (2008). Recognising the Givetian Taghanic Event in the Devonian Baltic Basin and its importance as a high-resolution international correlation datum. In: Hints, O., Ainsaar, L., Männik, P. & Meidla, T. (eds.), *The 7th Baltic Stratigraphical Conference. Abstracts & Field Guide: The 7th Baltic Stratigraphical Conference, Tallinn, 15-22 May 2008*. Tallinn, 47.
- Marshall, J., Plink-Björklund, P. & Mark-Kurik, E. (2008). Recognising the Givetian Taghanic Event in the Devonian Baltic Basin and its importance as a high-resolution international correlation datum. In: *33rd International Geological Congress, Oslo, August 2008*. Oslo. HPS-01
- Mark-Kurik, E. & Botella, H. (in press). On the tail of *Errivaspis* and the condition of the caudal fin in heterostracans. *Acta Zoologica*, **89**
- Lebedev, O., Mark-Kurik, E., Karatajute-Talimaa, V., Luksevics, E. & Ivanov, A. (in press). Bite marks as evidence of predation in early vertebrates. *Acta Zoologica*, **89**
- Luksevics, E., Lebedev, O., Mark-Kurik, E. & Karatajute-Talimaa, V. (in press). The earliest evidence of host-parasite interaction in vertebrates. *Acta Zoologica*, **89**

TM John MARSHALL

Another busy year in the Devonian. In May I attended the 7th Baltic Stratigraphy Conference in Tallinn, Estonia and went on the field excursion to the Middle and Upper Devonian of Estonia and northernmost Latvia that included a number of classic localities.

In late June I went on a long anticipated field trip to Orkney when we sampled for a yet more detailed time series from the terrestrial equivalent to the Taghanic Crisis. These samples are now being analysed and are producing excellent data but with a sample spacing at 2 cm it will take a while.

In July I accompanied/escorted a PhD student for a project to the rarefied stratigraphic heights of the Eocene in Svalbard. This meant that I also got 48 hours on the Givetian of Mimerdalen. This was where Keith Allen published an early monograph on Devonian spore taxonomy. It is also a locality where there would appear to be a correlative of the Taghanic Crisis. I was able to make an interim study of the sections including an

internally correlating log from these tectonically disrupted sections.

I had made a cunning plan to attend the Oslo IGC on my return trip from Svalbard. This was to specifically attend the SDS meeting as long arranged for the IGC Sunday session of business meetings. Unfortunately the organisers had decided to change the arrangements at a late stage (i.e. after I had bought the plane tickets) and move the IGC business meetings forward so they took place before I arrived. This also left me giving a talk in the second half of the conference after all the other SDS workers had departed. It has also meant that Thomas Becker had to write the Business Meeting minutes. After this experience I certainly won't be rushing back to the next IGC.

In late August whilst a group of SDS members went to the Zinzilban sections in Uzbekistan I attended the Palaeozoic palaeoclimate meeting in Lille. This was an excellent meeting with a well constructed

sequence of keynote talks on palaeoclimates and their proxies. I contributed a talk on Famennian palaeoclimate. The Lille meeting merged seamlessly with the XII International Palynological Congress in Bonn which was held jointly with the VIII International Organisation of Palaeobotany Conference. Here I contributed a talk on the Devonian palynology of the Falkland Islands and was a co-author on four others.

CM Hanna MATYJA

My research has been concentrated on Devonian to Mississippian stratigraphy and sedimentology. Devonian studies are concentrated on (1) Middle and Upper Devonian conodont biostratigraphy, including collaborative biostratigraphic work with Prof. E. TURNAU (miospores) and Dr. A. TOMAŚ (foraminifers), (2) Middle-Upper Devonian sedimentology, (3) Devonian sea-level history, (4) Conodont biostratigraphy and biofacies, and extinction events around the Devonian-Carboniferous boundary. All research activities are related to the Polish Geological Institute research projects. At present, work is focused on stratigraphic and sedimentologic study of Middle-Upper Devonian strata in NW Poland. The manuscript on the Pomeranian Basin and its sedimentary evolution during the Devonian time is almost finished. This paper synthesizes and integrates the available data and presents, had an exceptionally interesting and successful trip to Asia. In late August I took part in *the IGCP 499/Subcommission on Devonian Stratigraphy joint field meeting in Uzbekistan* with its excellent fieldtrip to South Tien-Shan followed by the 2 day meeting in the Kitab State Geological Reserve (scientific session and SDS business meeting and minutes). Conodont samples taken from the Devonian/Carboniferous boundary of the Kule section are currently processed, and, fortunately, proved to be positive. During the scientific session I presented a talk, as a result of cooperation with Elżbieta Turnau, on an integrated biostratigraphic analysis of miospores and conodonts. It looks like miospores and conodonts offer the best tool for

The final Devonian interest conference was the final IGCP 499 meeting in Frankfurt. This was an excellent meeting with many Devonian contributions. I gave a keynote presentation on *Diversification of Early Terrestrial Ecosystems*.

The year concluded at the Palaeontological Association 52nd Annual Meeting in Glasgow, Scotland.

in fact, an updated version of an earlier synthesis by Matyja (1993, 1998, 2006). Other project includes a correlation of Upper Devonian conodont and foraminiferal fauna (MATYJA & TOMAŚ in prep.). The joint (MATYJA & TURNAU) manuscript dealing with Middle Devonian conodont and miospore biostratigraphy and correlation is still in preparation. The joint project with German colleagues on Western Pomerania relationship with Rügen Island during Devonian is currently in progress.

In late June I participated in *the First Polish Geological Congress in Cracow, Poland*. I gave a presentation on sedimentary evolution of the Pomeranian Basin (NW Poland) at the end of Famennian and during Mississippian. I had an exceptionally interesting and successful trip to Asia. In late August I took part in the IGCP 499/Subcommission on Devonian relatively high-resolution correlation in a shallow-water, mixed siliciclastic-carbonate succession. Such combined studies can provide more precise age determinations for those parts of the succession which were hitherto unfavourable for individual fossil groups. This meeting was then followed (late September-early October) by *the 20th International Senckenberg Conference & 2nd Geinitz Conference in Frankfurt*. It was the final meeting of IGCP 497 & IGCP 499. I gave a presentation on palaeogeographic, eustatic and tectonic controls of sedimentary evolution of the Pomeranian Basin (NW Poland) during Devonian and Mississippian times.

Devonian related publications and abstracts 2006-2008:

MATYJA H. 2006a. Stratigraphy and facies development of Devonian and Carboniferous deposits in the Pomeranian Basin and in the western part of the Baltic Basin, and palaeogeography of the northern TESZ during Late Palaeozoic times [in Polish, extended English summary]. In: MATYJA H. & POPRAWA P.

- [Eds.], Facies, tectonic and thermal evolution of the Pomeranian sector of Trans-European Suture Zone and adjacent areas. – *Prace Państwowego Instytutu Geologicznego* **186**: 79-122.
- MATYJA H. 2006b. Late Devonian conodont ecology and biogeography: an example from the Pomeranian Basin, NW Poland. In: PURNELL M., DONOGHUE P., ALDRIDGE R. & REPETSKI J. (Eds.), *International Conodont Symposium, July 12-30, 2006, Leicester, UK, Programme & Abstracts*: 56.
- MATYJA H. 2006c. Pomeranian Basin (NW Poland) and its sedimentary evolution during Carboniferous time. In: ARETZ M. & HERBIG H.-G. (Eds.), *Carboniferous Conference Cologne 2006 From platform to basin.*, September 4-10. 2006, Köln, Deutschland, Programme & Abstracts. – *Kölner Forum für Geologie und Paläontologie*, **15**: 78-79.
- MATYJA H. 2007a. Famennian event stratigraphy (Western Pomerania, NW Poland) – implications for a proposed sub-stage division. In: OVER D.J. & MORROW J. (Eds.), *Joint Meeting Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction*, Eureka, Nevada, 9-17 September 2007, Program and Abstracts: 65-66.
- MATYJA H. 2007b. The Devonian and Carboniferous sedimentary evolution of the Pomeranian Basin (NW Poland). In: RÖHLING H.-G., BREITKREUZ CH., DUDA TH., STACKEBRANDT W., WITKOWSKI A. & UHLMAN O. (Eds.), *Joint Meeting of the Polish Geological Society and the German Society for Geosciences GEO-POMERANIA 2007, Geology cross-bordering the Western and Eastern European Platform*, 24-26 September 2007, Szczecin, Poland. – *Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften*, Heft **53**, Abstract-Volume: 186.
- MATYJA H. 2007c. Tło regionalne (Regional geology). In: MATYJA H. (Ed.), *Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Polskie Łąki PIG 1 (Deep Boreholes of the Polish Geological Institute, Polskie Łąki PIG 1 section)*, **122**: 7-8 [in Polish, English summary].
- MATYJA H. 2007d. Profil stratygraficzny – kenozoik, mezozoik i paleozoik (General stratigraphic succession – Cenozoic, Mesozoic and Palaeozoic). In: MATYJA H. (Ed.), *Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Polskie Łąki PIG 1 (Deep Boreholes of the Polish Geological Institute, Polskie Łąki PIG 1 section)*, **122**: 9-14 [in Polish, English summary].
- MILACZEWSKI L., MATYJA H., PACZEŚNA J. 2007. Profil litologiczno-stratygraficzny. Devon. (Lithological succession. Devonian). In: MATYJA H. (Ed.), *Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Polskie Łąki PIG 1 (Deep Boreholes of the Polish Geological Institute, Polskie Łąki PIG 1 section)*, **122**: 31-47 [in Polish, English summary].
- MATYJA H. 2007e. Devon. Lito- i biostratygrafia (Devonian. Regional litho- and biostratigraphy). In: MATYJA H. (Ed.), *Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Polskie Łąki PIG 1 (Deep Boreholes of the Polish Geological Institute, Polskie Łąki PIG 1 section)*, **122**: 54-62 [in Polish, English summary].
- MATYJA H. 2007f. Devon. Osady węglanowe i środowiska ich depozycji (Devonian carbonate facies and palaeoenvironments). In: MATYJA H. (Ed.), *Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Polskie Łąki PIG 1 (Deep Boreholes of the Polish Geological Institute, Polskie Łąki PIG 1 section)*, **122**: 73-74 [in Polish, English summary].
- MATYJA H. 2007g. Devon. Uwagi o rozwoju facjalnym obszaru pomorskiego w dewonie wczesnym, środkowym i na początku późnego (Devonian. Facies evolution during the Early?, Middle and early Late Devonian). In: MATYJA H. (Ed.), *Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Polskie Łąki PIG 1 (Deep Boreholes of the Polish Geological Institute, Polskie Łąki PIG 1 section)*, **122**: 80-81 [in Polish, English summary].
- MATYJA H. 2007h. Wyniki badań właściwości fizycznych i chemicznych skał (Physical and chemical parameters of Cenozoic, Mesozoic and Palaeozoic rocks). In: MATYJA H. (Ed.), *Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Polskie Łąki PIG 1 (Deep Boreholes of the Polish Geological Institute, Polskie Łąki PIG 1 section)*, **122**: 135-147 [in Polish, English summary].
- MATYJA H. 2008a. Pomeranian basin (NW Poland) and its sedimentary evolution during Mississippian times. In: ARETZ M., HERBIG H.-G. & SOMERVILLE ID. (Eds.), *Carboniferous platforms and basins.* – *Geological Journal*, **43**(2-3): 123 – 150.
- MATYJA H. 2008b. Paleogeograficzne i paleotektoniczne uwarunkowania rozwoju facjalnego osadów mississippu w basenie pomorskim, NW Polska (Palaeogeographic and palaeotectonic controls of sedimentary evolution of the Pomeranian Basin (NW Poland) during Mississippian times). *First Polish Geological Congress, Kraków 2008. Abstracts*: 76 [in Polish].
- HAYDUKIEWICZ J., MATYJA H., MILACZEWSKI L., NARKIEWICZ M., RACKI G. & SZULCZEWSKI M. 2008. Devon (Devonian). In: WAGNER R. (Ed.), *Tabela stratygraficzna Polski (Stratigraphic Table of Poland)*. Polish Geological Institute. [in Polish].
- MATYJA H., TURNAU E. 2008. Integrated analysis of miospores and conodonts: a tool for correlation of shallow-water, mixed siliciclastic – carbonate succession of Lower? and Middle Devonian (Pomeranian Basin, NW Poland). In: KIM A.I., SALIMOVA F.A. & MESHCHANKINA N.A., *Global alignments of the Lower Devonian carbonate and clastic sequences (IGCP Project 499/Subcommission on Devonian*

- Stratigraphy joint field meeting), August 25-September 9, 2008. Kitab State Geological Reserve, Uzbekistan. Contributions of International Conference: 67-71.
- MATYJA H. 2008c. Palaeogeographic, eustatic and tectonic controls of sedimentary evolution of the Pomeranian basin during Devonian and Mississippian times. In: KÖNIGSHOF P. & LINNEMANN U., *From Gondwana and Laurussia to Pangea: Dynamics of Oceans and Supercontinents*. 20th International Senckenberg Conference & 2nd Geinitz Conference “(Final Meeting of IGCP 497 & IGCP 499), September 30 – October 10 2008, Frankfurt, Germany. Abstracts and Programme: 97-100.
- MATYJA H. 2008d. Regionalne tło geologiczne (Regional geology). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 7-9 [in Polish, English summary].
- MATYJA H. 2008e. Profile stratygraficzne w otworach Jamno IG 1, Jamno IG 2 i Jamno IG 3– kenozoik, mezozoik i paleozoik (General stratigraphic successions in the Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections– Cenozoic, Mesozoic and Palaeozoic). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 12-22 [in Polish, English summary].
- MATYJA H., PACZEŚNA J., PAJCHŁOWA M. 2008. Profil litologiczno-stratygraficzny otworu wiertniczego Jamno IG 1. Dewon (Lithological succession in the Jamno IG 1 borehole section. Devonian). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 23-62 [in Polish, English summary].
- PACZEŚNA J., PAJCHŁOWA M., MATYJA H. 2008. Profil litologiczno-stratygraficzny otworu wiertniczego Jamno IG 2. Dewon (Lithological succession in the Jamno IG 2 borehole section. Devonian). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 63-82 [in Polish, English summary].
- PACZEŚNA J., PAJCHŁOWA M., MATYJA H. 2008. Profil litologiczno-stratygraficzny otworu wiertniczego Jamno IG 3. Dewon (Lithological succession in the Jamno IG 3 borehole section. Devonian). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 83-109 [in Polish, English summary].
- MATYJA H. 2008f. Dewon. Lito- i biostratygrafia osadów dewonu pomorskiego (Devonian. Regional litho- and biostratigraphy). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 117-124 [in Polish, English summary].
- MATYJA H. 2008g. Dewon. Biostratygrafia osadów franu na podstawie fauny konodontowej (Devonian. Conodont biostratigraphy in the Frasnian part of the succession). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 136-138 [in Polish, English summary].
- MATYJA H. 2008h. Dewon. Osady węglanowe i środowiska ich depozycji (Devonian carbonate facies and palaeoenvironments). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 160-164 [in Polish, English summary].
- MATYJA H. 2008i. Dewon. Rozwój facjalny pn. wsch. części obszaru pomorskiego w dewonie ?wczesnym, środkowym i na początku późnego (Devonian. Facies evolution during the Early?, Middle and early Late Devonian, north-eastern part of the Western Pomerania area). In MATYJA H. (Ed.), Profile Głębokich Otworów Wiertniczych Państwowego Instytutu Geologicznego, Jamno IG 1, Jamno IG 2, Jamno IG 3 (Deep Boreholes of the Polish Geological Institute, Jamno IG 1, Jamno IG 2 and Jamno IG 3 sections), **124**: 174-176 [in Polish, English summary].

CM M. A. MURPHY

Study of Early Devonian ostracodes at the Coal Canyon sections in the northern Simpson Range, Nevada.- with Gena M. Evola and Claudia Dojen.

Study of the conodont sequence across the S/D boundary in the Barrandian – with Peter

Carls, Ladislav Slavik, Nacho Valenzuela-Rios and Karsten Weddige.

Study of the S/D Boundary biostratigraphy of conodonts, graptolites, acanthodians, brachiopods and ostracodes at the Birch Creek II section in the northern Roberts Mountains,

Nevada. – with Kathleen Springer, Michael Andeson, Carol Burrow and Claudia Dojen.

Study of the conodonts of the Denay Formation, Middle Devonian of the Roberts Mountains. With Staňa Berkyova and Gilbert Klapper.

Study of the Emsian and lowermost Middle Devonian corals, brachiopods, fish and conodonts of the Romano Ranch section, Sulphur springs Range, Nevada – with Alan Pedder and Carol Burrow.

CM Jeff Over

Several projects are on going or recently completed, which has lead to several abstracts and publications.

1) Middle-Upper Devonian facies and correlation of the Alberta Platform with Jed Day and Mike Whalen.

2) Eifelian-Givetian boundary in the Appalachian and Michigan basins of the eastern United States. In conjunction with Gordon Baird and students, Alex Bartholomew and students, Carl Brett and students, Brooks Ellwood, and Chuck Ver Straeten the boundary in New York State is placed - based on macrofauna and magnetic susceptibility - between the Cherry Valley Member and the David Elliot Bed in the lower part of the East Berne Member.

3) Conodont fauna and correlation of the New Albany Shale in the Illinois Basin of the eastern United States with Remus Lazar and Juegen Schieber.

4) The biostratigraphic position of the Famennian (Upper Devonian) enigmatic plant *Protosalvinia* in the eastern United States with Gordon Baird, Frank Etensohn, Remus Lazar, and Juergen Schieber. The main *Protosalvinia* appearance horizon seems to be in the Upper *trachytera* Zone, other occurrences, which may

correspond to a major unconformity and flooding surface is in the Middle *expansa* Zone.

5) Conodonts in the Woodford Shale in the Permian Basins of west Texas. Thick stratigraphic packages that are correlative across the basin correspond to major high-stand periods in the Upper *crepida* - *marginifera* zones and in the Middle *expansa* Zone.

6) Conodonts in the Ohio Shale of the central Appalachian Basin.

7) Upper Devonian conodonts in Bolivia. A high latitude fauna of *Cryptotaxis* and *Polygnathus* were recovered from organic-rich shales from drill core in the Madre de Dios Basin of northern Bolivia. The two fauna-rich intervals seem to bracket the Frasnian-Famennian boundary.

8) Upper Devonian stratigraphy of the Ohio Shale equivalents in northeastern Pennsylvania of the Appalachian Basin. I have collaborated with Gordon Baird to identify the conodonts from fish-rich bone-beds. These strata are tentatively Middle *expansa* Zone or higher based on numerous *Bispathodus*, but also *Polygnathus* and "*Icriodus*."

Publications

Over, D.J., Lazar, R., Baird, G.C., Schieber, J., and Etensohn, F.R., 2009, *Protosalvinia* Dawson and associated conodonts of the Upper *trachytera* Zone, Famennian, Upper Devonian, in the eastern United States: *Journal of Paleontology*, v. **83**, p. 70-79.

Day, J.E., Whalen, M.T., and Over, D.J., 2008, Record of late Frasnian Kellwasser extinction bioevents, terminal Frasnian Upper Kellwasser crisis fauna, and early Famennian post-extinction recovery: Alberta Rocky Mountains: *Geological Society of America Abstracts with Programs*, v. **40**(6), p.437.

Over, D. J., D'Andrea, R., Donohue, P., Rabideau, S, Wood, A., and Ellwood, B., 2008, The Eifelian-Givetian boundary in the Oatka Creek Formation, lower Hamilton Group, Middle Devonian, western New York - conodonts, dacroconarids, and magnetic susceptibility: *Geological Society of America Abstracts with Programs*, v. **40**(6), p.562.

Over, D.J., de la Rue, S., Isaacson, P.E., and Ellwood, B. 2009, Upper Devonian conodonts from black shales of the high latitude Tomachi Formation, Madre de Dios Basin, northern Bolivia. in press *Palaeontographica Americana*.

CM Susan TURNER

Susan Turner continues to work on the histology and morphology of Devonian microvertebrate assemblages and some macrovertebrates.

She attended the SDS business session in Oslo but the clash of so many meetings prevented attendance at all scientific sessions.

Sue is currently working on the earliest sharks from Canada, *Doliodus* and *Protodus*, with colleagues Randall Miller (New Brunswick) and John Maisey (New York) and on other shark remains from the mid-western USA and Australia. Other projects, e.g. on

Devonian thelodonts in UK, Iran, Turkey, China, Australia and elsewhere are in train. A major review with Carole Burrow and Gavin Young has been completed for the Final IGCP 491 volume in *Paleoworld*.

This year, with Christian Klug and colleagues she has been looking at the evolution and palaeoecology of vertebrates in the Devonian.

A paper reviewing the affinities of conodonts (co-authors A. Blicek, Burrow, G. Nowlan, W.-E. Reif, C. Rexroad, H-P Schultze) has been submitted.

Publications

- Turner, S. & Miller, R.F. 2008. *Protodus jexi*, Woodward, 1892 (Chondrichthyes), from the Lower Devonian Campbellton Formation, New Brunswick, Canada. *Acta Geologica Polonica*, **58** (2), 133-144. Warsaw volume extended abstracts,
- Burrow, Carole J. Dirk C. Hovestadt, Maria Hovestadt-Euler Susan Turner & Gavin C. Young Mid-Palaeozoic (Devonian, ?late Emsian) shark *McMurdodus whitei* from western Queensland, Australia. *Acta Geologica Polonica* **58** (2), 151-159 Warsaw volume extended
- Burrow, C. J., Susan Turner, Sylvain Desbiens and Randall F. Miller, 2008. Early Devonian putative gyracanthid acanthodians from eastern Canada. *Canadian JI of Earth Sciences* **45**, 897-908,

Abstracts

- Turner, S., Schneider J. & Hampe O. 2008 The survivors: Devonian-Triassic xenacanth from Gondwana. In S. Stamberg ed. *C/p symposium*, Hradec Kralove, July 6-11, 2008, p. x
- Turner, S. & Miller, R.F. 2008. *Protodus jexi*, Woodward, 1892 (Chondrichthyes), from the Lower Devonian Campbellton Formation, New Brunswick, Canada. In Ginter, M. ed. on Chondrichthyan symposium, abstract. *Ichthyolith Issues SP 11*, p. 20-21.
- Burrow, Carole J. Dirk C. Hovestadt, Maria Hovestadt-Euler Susan Turner & Gavin C. Young Mid-Palaeozoic (Devonian, ?late Emsian) shark *McMurdodus whitei* from western Queensland, Australia. In Ginter, M. ed. Warsaw Chondrichthyan symposium, July 29-Aug. 2, abstract. *Ichthyolith Issues SP 11*, p. 2.

In press

- Burrow, C.J., & Turner, S., in press. Reassessment of "*Protodus*" *scoticus* from the Early Devonian of Scotland. In Yu Xiao-bo, Maisey, J & Miao, D. eds. *Fossil Fishes and related Biota: Morphology, Phyogeny and Paleobiogeography* —in Honor of Meemann CHANG. *Festschrift*. Verlag F. Pfeil Muenchen.
- Christian Klug, Björn Kröger, Wolfgang Kiessling, Gary L. Mullins, Thomas Servais, Jiří Frýda, Dieter Korn, Sue Turner The Devonian ecological revolution, an underrated radiation. *Geology*
- Maisey, J.G., Turner, S. and Miller, R. 2008. The braincase of the chondrichthyan *Doliodus* from the Lower Devonian Campbellton Formation of New Brunswick, Canada. – In, *Forty Years of Early Vertebrates: papers from the 11th International Symposium on Early and Lower Vertebrates. Acta Zoologica, Supplement to volume 89*. (Stockholm):XXX–XXX
- Schultze, H.-P., Turner, S. & Grigelis, A. Great Northern Researchers: Discoverers of the earliest Palaeozoic vertebrates. – In, *Forty Years of Early Vertebrates: papers from the 11th International Symposium on Early and Lower Vertebrates. Acta Zoologica, Supplement to volume 89*. (Stockholm):XXX–XXX. submitted
- Burrow, C.J., Turner, S., Young, G.C., in press. Middle Palaeozoic microvertebrate assemblages and biogeography of East Gondwana (Australasia, Antarctica). *Paleoworld*, 00, 00-00 [IGCP 491 volume].
- Turner, S., Burrow, C.J. Schultze, H.-P. Blicek, A. R.M., Reif, W.-E., Rexroad, C. & Nowlan, G.S., False Teeth: Conodonts are not vertebrates. *Geodiversitas*
- Young, G.C., Burrow, C.J., Long, J.A., Turner, S., Choo, B., in press. Devonian macrovertebrate assemblages and biogeography of East Gondwana (Australasia, Antarctica). *Paleoworld* [IGCP 491 volume].

TM NACHO VALENZUELA

In 2008 several Devonian papers dealing with the intervals included in the three Series have been published (see attached list). During this year cooperation has been intense with other SDS colleagues and friends (see below). Efforts have mainly been focused on two chief projects: 1) the Pragian/Emsian boundary, together with Nadya Izokh, Peter Carls and Ladislav Slavík; 2) Givetian biostratigraphy, mainly due to the great effort of Jau-Chyn Liao (Teresa).

Related to project 1 the following actions are noteworthy:

- a) joint paper with Peter and Ladislav, which represent the updated of previous discussions by Carls & Valenzuela-Ríos (2005 and 2007).
- b) Joint stay in Valencia of Nadya, and starting a collaboration program comparing collections and stratigraphical sequences from northern Spain and Central Asia
- c) As a result of “a” and “b”, new sampling in the type locality of Zinzilban has been carried out and each sample was divided into three parts that first will be separately processed in three laboratories (Novosibirsk, Prague and Valencia) and, then, independent data will be jointly treated by, at least, the three of us (Nadya, Ladislav and myself)

Related to project 2, several papers with different colleagues have been produced; as stated above, Teresa is the main responsible for the merits of them. This set of papers encompassed three main aspects: a) conodont biostratigraphy; b) new fish records from Pyrenean strata of Middle Devonian age, together with Michal Ginter and c) a first combined study of bio and microfacies in one relevant Pyrenean section, jointly with Peter Königshof and Eberhard Schindler. From late 2007, Sofie Gouwy has started cooperation with Teresa and myself on Givetian conodonts; first results were presented in Frankfurt and Colunga meetings.

Besides these important actions several abstracts were presented at different meetings (SDS-IGCP in Libya, together with Ladislav, but not attended; SDS unforgettable meeting in Uzbekistan; final IGCP-499 in Frankfurt and special Spanish IGCP-499 Symposium in Colunga –Asturias).

Finally, I would like to inform SDS colleagues and friends that a new laboratory at my department was built and finished in November 2008 that will allow processing large amount of conodont samples in short time (acid permits), and it is available for cooperation with Devonian microfossils workers.

References 2008

- Carls, P., Slavík, L. & Valenzuela-Ríos, J. I. (2008): Comments on the GSSP for the basal Emsian stage boundary: the need for its redefinition. *Bulletin of Geosciences*, **83** (4): 383-390.
- Liao, J.-C.; Königshof, P.; Valenzuela-Ríos, J. I. & Schindler, E. (2008): Depositional environment interpretation and development of the Renanué section (Upper Eifelian- Lower Frasnian; Aragonian Pyrenees, N. Spain). *Bulletin of Geosciences*. **83** (4): 481-490.
- Ginter, M.; Liao, J.-C. & Valenzuela-Ríos, J. I. (2008): New data on chondrichthyan microremains from the Givetian of the Renanué section in the Aragonian Pyrenees (Middle Devonian, Spain). *Acta Geológica Polonica*, **58** (2): 161-168.
- Liao, J.-C. & Valenzuela-Ríos, J. I. (2008). Givetian and early Frasnian conodonts from the Compte Section (Middle-Upper Devonian, Spanish Central Pyrenees). *Geological Quarterly*, **52** (1): 37-54.
- Slavík, L; Hladil, J.; Koptíková, L.; Carls, P. & Valenzuela-Ríos, J.I. (2008): Integrated Stratigraphy of the Lower Devonian in the Barrandian area, Czech Republic: An introduction of the Project, preliminary data. *Newsletter of the International Subcommission on Devonian Stratigraphy (SDS)* **23**: 71-74.
- Slavík, L.; Carls, P.; Valenzuela-Ríos, J. I.; Koptíková, L.; Hladil, H. & Vacek, F. (2008): Proposal of detailed biostratigraphic subdivision of the Lochkovian in the Prague Synform. Field-Workshop of the IGCP 499-UNESCO: “Devonian land-sea interaction: evolution of ecosystems and climate” (DEVEC). Abstracts: 15-19.
- Slavík, L.; Carls, P.; Valenzuela-Ríos, J. I.; Hladil, J.; Kalvoda, J. & Koptíková, L. (2008): Pragian of the Prague Synform: Stratigraphy, Global Correlation and boundary problems. In: A.I. Kim, F.A. Salimova & N.A. Meshchankina (eds.). International Conference “Global alignments of Lower Devonian Carbonate and Clastic Sequences” (SDS/IGCP Project 499 joint field meeting), Contributions: 110-112.
- Carls, P.; Slavík, L. & Valenzuela-Ríos, J. I. (2008): Application to the SDS for revision of the Pragian-Emsian GSSP. In: A.I. Kim, F.A. Salimova & N.A. Meshchankina (eds.). International Conference “Global alignments of Lower Devonian Carbonate and Clastic Sequences” (SDS/IGCP Project 499 joint field meeting), Contributions: 21-22.

- Gouwy, S., Liao, J.-C. & Valenzuela-Ríos, J.I. (2008): Conodonts of the Middle Devonian and Frasnian deposits of the Villech section (Spanish Central Pyrenees), preliminary results. In: Libro de resúmenes. XXIV Jornadas de la Sociedad Española de Paleontología. Museo del Jurásico de Asturias (MUJA), Colunga, 15-18 de octubre de 2008 (Eds. J.I. Ruiz-Omeñaca, L. Piñuela & J.C. García-Ramos). Museo del Jurásico de Asturias, Colunga, 239.
- Liao, J.-C. & Valenzuela-Ríos, J.I. (2008): El registro de conodontos del Givetense en el Pirineo Central Español: correlación con la biozona estándar. In: Libro de resúmenes. XXIV Jornadas de la Sociedad Española de Paleontología. Museo del Jurásico de Asturias (MUJA), Colunga, 15-18 de octubre de 2008 (Eds. J.I. Ruiz-Omeñaca, L. Piñuela & J.C. García-Ramos). Museo del Jurásico de Asturias, Colunga, 240-241.
- Liao, J.-C. and Valenzuela Ríos, J. I. (2008): Givetian Conodonts from the Spanish Central Pyrenees, a first synthesis
- Gouwy, S.; Liao, J.-C. & Valenzuela-Ríos, J.I. (2008): Middle Devonian and Lower Frasnian conodonts from the Villech section (Spanish Central Pyrenees), preliminary results.

References 2007

- Carls, P.; Slavík, L. & Valenzuela-Ríos, J. I. (2007). Revision of conodont biostratigraphy across the Silurian-Devonian boundary. *Bulletin of Geosciences* **82** (2): 145-164.
- Slavík, L.; Valenzuela-Ríos, J.I.; Hladil, J. & Carls P. (2007): Early Pragian conodont-based correlations between the Barrandian area and the Spanish Central Pyrenees. *Geological Journal*, **42**: 499-512.
- Liao, J.-C.; Ginter, M. & Valenzuela-Ríos, J. I. (2007). Chondrichthyan microremains from the Givetian of Aragonian Pyrenees. *Bulletin de la Société géologique de France*, **178** (3): 171-178.
- Dojen, C., Valenzuela-Ríos, J. I. & Carls, P. (2007): Lochkovian to Pragian (Early Devonian) neritic Ostracodes from Nigüella (Zaragoza, Iberian Chains, NE Spain). *Revista Española de Paleontología*, **22** (2): 105-113.
- Carls, P. & Valenzuela-Ríos, J. I. (2007): From the Emsian GSSP to the early late Emsian—correlations with historical boundaries. *Newsletter of the International Subcommission on Devonian Stratigraphy (SDS)* **22**: 24-28.
- Slavík, L.; Hladil, H.; Koptíková, L.; Carls, P. & Valenzuela-Ríos, J. I. (2007): Integrated stratigraphy of the Lower Devonian in the Barrandian area, Czech Republic—a preliminary data from the Lochkovian. *Field Meeting of the IGCP 499-DEVEC (IUGS/UNESCO)*: 80-84.
- Martínez, C. & Valenzuela-Ríos, J. I. (2007): Emsian conodonts from La Guardia d'Ares (Spanish Central Pyrenees, Lower Devonian). In: D. J. Over & J. Morrow (eds.). *Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Program and Abstracts*: 64
- Liao, J.-C. & Valenzuela-Ríos, J. I. (2007): Middle and early Upper Devonian conodonts from La Guardia d'Ares (Spanish Central Pyrenees). In: D. J. Over & J. Morrow (eds.). *Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Program and Abstracts*: 58
- Dojen, C. & Valenzuela-Ríos, J. I. (2007): Early Devonian ostracods from Spain. In: D. J. Over & J. Morrow (eds.). *Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Program and Abstracts*: 30-31
- Carls, P.; Slavík, L. & Valenzuela-Ríos, J. I. (2007): Pridolian to mid-Lochkovian biostratigraphic time marks in Bohemia. In: D. J. Over & J. Morrow (eds.). *Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Program and Abstracts*: 22-23
- Carls, P.; Slavík, L. & Valenzuela-Ríos, J. I. (2007): Succession of biostratigraphic marks for the Early Emsian. In: D. J. Over & J. Morrow (eds.). *Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Program and Abstracts*: 20-21
- Rodríguez, S.; Fernández-Martínez, E.; Cózar, P.; Valenzuela-Ríos, J.I.; Liao, J.-C.; Pardo, M. V. & May, A. (2007): Emsian reefal development in Ossa-Morena Zone (SW Spain): Stratigraphic sucesión, microfacies, fauna and depositional environment. *X Internacional Congreso on Fossil Cnidaria and Porifera*: 76-77.
- Carls, P. & Valenzuela-Ríos, J. I. (2007): Early Devonian Palaeobiogeography of the Ibero-Armorican Trough between Gondwana and Baltica. *1st International Palaeobiogeography Symposium, París*. Abstracts: 23.
- Martínez-Pérez, C. & Valenzuela-Ríos, J.I. (2007): Conodontos del Emsiense (Devónico Inferior) de la Guardia d'Ares (Pirineos centrales españoles). *XXIII Jornadas de la Sociedad Española de Paleontología (Caravaca de la Cruz, 3-6 Octubre)*. Libro de resúmenes (Eds: J.C. Braga, A. Checa y M. Company). Instituto Geológico y Minero de España y Universidad de Granada, 131-132. ISBN 84-96856-20-8
- Liao, J.-C. & Valenzuela-Ríos, J.I. (2007): Conodontos del Devónico Medio y Superior de la Guardia d'Ares (pirineo Central Español). In: *XXIII Jornadas de la Sociedad Española de Paleontología (Caravaca de la Cruz, 3-6 Octubre)*. Libro de resúmenes (Eds: J.C. Braga, A. Checa y M. Company). Instituto Geológico y Minero de España y Universidad de Granada, 112-113. ISBN 84-96856-20-8.
- Castelló, V.; Valenzuela-Ríos, J.I. & Martínez-Pérez, C. (2007): Evolución morfológica del conodonto *Icriodus steinachensis* (Devónico Inferior) en los Pirineos Centrales Españoles. In: *XXIII Jornadas de la Sociedad*

Española de Paleontología (Caravaca de la Cruz, 3-6 Octubre). Libro de resúmenes (Eds: J.C. Braga, A. Checa y M. Company). Instituto Geológico y Minero de España y Universidad de Granada, 32-33. ISBN 84-96856-20-8

CM Chuck VER STRAETEN

My present research continues to be focused on 1) a variety of Devonian studies, and; 2) the preservation potential of airfall volcanic ash layers in different subaqueous depositional environments. The Devonian studies are concentrated on: 1) Emsian-Eifelian stratigraphy/sedimentology, including collaborative biostratigraphic work in the Appalachian basin, eastern U.S.; 2) Emsian sea level history and global correlations; 3) Devonian volcanic K-bentonites and tuffs in eastern North America; and 4) Lower to Middle Devonian (Acadian) orogenesis in eastern North America, from a foreland basin perspective.

A large part of my time in 2008 was focused on planning a large, permanent Natural History exhibit here at the New York State Museum, integrating geology, paleontology, biology and some anthropology. The exhibit's primary focus is on the evolution of Life and Earth, with a lot of attention on the record in New York State. I am the lead content specialist in geology-paleontology for the exhibit, which is scheduled to open in late 2010.

At times, and later in the year, however, I was able to focus more on research and writing. Highlights of 2008 fieldwork included 10 days studying Emsian and Eifelian strata in Nevada (western U.S.) in June, working with Maya Elrick, Mike Murphy, Jiri Fryda and students, and Alan Pedder; and five days in November with Eberhard Schindler, searching for biostratigraphically-useful Emsian-Eifelian fossils in the central to southern Appalachian Basin (eastern U.S.).

Emsian-Eifelian work in northern Nevada was focused in the Roberts and Northern Antelope Mountains, areas briefly visited during latter part of the 2007 SDS/499 Meeting excursion. Mike Murphy, Alan Pedder and Maya Elrick took the rest of us to various sites in the region. I was there chiefly to examine Emsian-Eifelian sea level history/sequence stratigraphy, for comparison with the detailed record I and others have compiled for New York and the Appalachian Basin (see Ver Straeten, 2007). The Eifelian record in Nevada was very familiar, and I have a stronger sense of the correlatability of those sequences across

the U.S. Emsian strata were not as completely exposed, and I could not tell if there were three lower Emsian sequences in Nevada or not. The classic section at Lone Mountain, visited during the 2007 SDS/499 excursion, was the most informative locality of the trip. An additional trip will be needed to flesh out details.

Eberhard Schinder and I went on a third annual trip to the Devonian of the central and southern Appalachian basin (eastern U.S.), searching for fossil groups that may help correlate our rocks internationally. Two of our peers (Bill Kirchgasser and Dick Lindemann) were unable to join us this year. Eberhard and I visited sites in Pennsylvania, Virginia and West Virginia, and gathered samples for goniatites, dacryoconariids, conodonts, spores and possible K-bentonites. We plan in 2009 to begin distributing samples to additional collaborators for their assistance.

A new paper was published in November, "Volcanic Tephra Bed Formation and Condensation Processes: A Review and Examination from Devonian Stratigraphic Sequences". The paper examines the deposition and preservation of airfall tephra layers under conditions of sediment starvation/condensation, and combines a review of the literature with the record of tephra bed preservation through 11 third order Lochkovian to Eifelian sequences in the eastern U.S.

Three additional Devonian papers are presently in press or review, and an additional one will be submitted in early February (see below). They are focused on: 1) Emsian sea level history and a revision of T-R Cycle Ib; 2) mudrock sequence stratigraphic analysis, in Eifelian to Famennian strata of western New York; 3) Sequence stratigraphy of Middle Devonian strata in eastern North America (co-author with Brett et al.); and 4) an examination of the foreland basin record of Lower to Middle Devonian orogenesis in the eastern United States. Additional papers in preparation focus on the Middle Devonian Marcellus Shale in outcrop in the Appalachian Basin, and a field trip guidebook article on the classic marine to terrestrial Late Silurian to Upper

Devonian strata of the Catskill Front (eastern New York), and examine the record of Acadian orogenesis, volcanism, and sea level

and environmental change through the rock succession (for a 9/09 New York State Geological Association field trip).

Papers in Press, in Review or in Preparation

- Ver Straeten, C.A., "in press", Devonian T-R Cycle Ib: The "lumping of Emsian sea level history. In Over, D.J., ed., special volume of "Palaeontographica Americana", p. XXX-XXX.
- Ver Straeten, C.A., Brett, C.E., and Sageman, B.B., in review, Mudrock Sequence Stratigraphy: A Multi-proxy (sedimentologic, paleobiologic, geochemical) Approach, Devonian Appalachian Basin. Invited submission to special volume of Palaeogeography, Palaeoclimatology, Palaeoecology.
- Brett, C.E., Baird, G.C., Bartholemew, A., and Ver Straeten, C.A., in review, Sequence stratigraphy and revised sea level curve for the Middle Devonian in eastern North America: Invited submission to special volume of Palaeogeography, Palaeoclimatology, Palaeoecology.
- Ver Straeten, C.A. (for submission Feb. 1, 2009), A foreland basin record of Lower to Middle Devonian orogenesis, eastern United States: Sedimentation, volcanism and flexural data. Invited paper for Geological Society of America Special Paper, "From Rodinia to Pangea: The Lithotectonic Record of the Appalachian Region".

Published Papers

- Ver Straeten, C.A., 2008, Volcanic Ash Bed Formation and Condensation Processes: A Review and Examination from Devonian Stratigraphic Sequences. *Journal of Geology*, vol. **116**, p. 545-557.
- Ver Straeten, C.A., 2007, Basinwide Stratigraphic Synthesis and Sequence Stratigraphy, Upper Pragian, Emsian and Eifelian Stages (Lower to Middle Devonian), Appalachian Basin: *in* Becker, R.T., and Kirchgasser, W.T., eds., Devonian Events and Correlations: Geological Society of London, Special Publications, v. **278**, p. 39-81.
- DeSantis, M.K., Brett, C.E., and Ver Straeten, C.A., 2007, Persistent depositional sequences and bioevents in the Eifelian (Early Middle Devonian) of eastern Laurentia: North American evidence of the Kacak Events?: *in* Becker, R.T., and Kirchgasser, W.T., eds., Devonian Events and Correlations: Geological Society of London, Special Publications, v. **278**, p. 83-104.

Public Outreach/Popular Geology Articles

- Ver Straeten, C.A., 2007, Rock of Deep Ages: The Indian Ladder Trail, Ancient Thacher Park. *Legacy* (the magazine of the New York State Museum), v. **3**, no. 1, p. 10-11.
- Ver Straeten, C.A., 2008, The Emsian Stage (upper Lower Devonian), Appalachian Basin: Stratigraphy, Sequences & T-R Cycle Ib, Volcanics & Geochronology, & New Directions: Geological Society of America *Abstracts with Programs*, Vol. **40**, No. 2, p. 16.
- Ver Straeten, C.A., 2007, T-R Cycle Ib: The "Lumping" of Emsian Sea Level History: Abstracts, Joint International Conference of the Subcommission on Devonian Stratigraphy and IGCP Project 499, August 2005, Eureka, Nevada.
- Ver Straeten, C.A., Over, D.J., and Baird G.C., 2007, K-bentonites and Tuffs: A Record of Caledonian Magmatism From The Appalachian Foreland Basin (Eastern U.S.): For Theme Session "Caledonian Magmatism: Cross-Atlantic Connections — Again": Geological Society of America *Abstracts with Programs*, Vol. **39**, No. 1, p. 53.

TM Karsten WEDDIGE

Latest issues of the Devonian Correlation Table (DCT) refer to the Devonian of Australia by the Supplements 2008 and

document the total index of all Table-columns as far as they were issued in the DCT until the end of 2008:

- WEDDIGE, K. [Ed.] (2008): Devonian Correlation Table. Supplements 2008. - *Senckenbergiana lethaea*, **88** (2): 269-284, 89 Tab.-columns; Frankfurt am Main.
- WEDDIGE, K. (2008): Index of the Devonian Correlation Table, 1996-2008. - *Senckenbergiana lethaea*, **88** (2): 285-309, 1 Tab.; Frankfurt am Main.

The whole Devonian Correlation Table (DCT) 1996-2008 is still electronically available, i.e.all its about 900 Table-columns as pdf-files and the total index as well as all references as WORD-files, via Internet directly within the Senckenberg homepage www.senckenberg.de or generally e.g. by Google (search by the keyword: "Devonian Correlation Table").

Moreover, please notice the latest general documentation of the regional stratigraphy of the German Devonian in:

WEDDIGE, K. [coordinating/editing] (2008): *Stratigraphie von Deutschland VIII. Devon.* – Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften, issue **52**: 578 pp., 139 text-figs, 23 tabs, 2 maps; Hannover available via E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u. Obermiller), Stuttgart.

CM Michael WHALEN

I have been continuing collaborative research with Jed Day (TM), Jeff Over (TM), and students on Middle and Upper Devonian (Givetian-Famennian) stratigraphy, sea level history, paleoclimate records, and bioevents in western Canada. We have a paper dealing with the Middle Devonian sea level and bioevent record of eastern British Columbia in the works that will be a contribution to the special volume of *Palaeo-3* resulting from IGCP project 499: Devonian land-sea interactions. We are also finishing up a manuscript that analyzes the variation in the magnetic susceptibility (MS)

signature from stratigraphic sections across the Alberta basin. My MS students Rebecca Missler and Joshua Payne are wrapping up their theses. Josh is completing a study examining stable carbon and nitrogen isotopes across the F-F boundary in western Alberta while Rebecca is examining the MS record in eastern British Columbia. In other MS work, I collaborated with Anne Christine da Silva and co-authors on a paper that is in press dealing with the MS records from carbonate platforms and atolls in Belgium and western Canada.

Papers

- Whalen, M.T., 2007, *Stromatoporoid/Coral/Microbial Isolated Reefal Platforms, Miette and Ancient Wall, Rocky Mountains western Canada*, in Boulvain, F. ed., *Atlas of Facies From Palaeozoic Reefs and Bioaccumulations*, Musée National d'Histoire Naturelle (Paris), Springer, p. 199-201.
- Whalen, M.T., and Day, J.E., 2008, *Magnetic Susceptibility, Biostratigraphy, and Sequence Stratigraphy: Insights into Devonian Carbonate Platform Development and Basin Infilling, Western Alberta*. *Papers on Phanerozoic Reef Carbonates in Honor of Wolfgang Schlager*. SEPM (Society for Sedimentary Geology) Special Publication 89, p. 291-314.
- da Silva, A.C., Mabilille, C., Potma, K., Weissenberger, J., Whalen, M., & Boulvain, F., 2008-in press, *Magnetic susceptibility evolution and sedimentary environments on carbonate platform sediments and atolls, comparison of the Frasnian from Belgium and from Alberta, Canada*, *Palaeogeography, Palaeoclimatology, Palaeoecology*.

Abstracts

- Whalen, M.T., Day, J.E., Missler, R., and Over, D.J., 2007, *Magnetic susceptibility and insights into Devonian sea level and climate change, Alberta Rocky Mountains, western Canada*, *Subcommission on Devonian Stratigraphy and IGCP 499 Devonian land sea interaction, Program with Abstracts*, p. 85-86.
- Day, J.E., Whalen, M.T., and Over, D.J., 2007, *Middle-Early Upper Devonian Brachiopod Sequence In The Kakwa Provincial Park Area Of Eastern British Columbia, Western Canada*, *Geological Society of America Abstracts with Programs*, v. **39**, p. 73.
- Payne, J., M. T. Whalen, and J. Day, 2008, *Carbon and nutrient cycling during the Frasnian-Famennian extinction event, Rocky Mountains, Western Canada*. *Abstracts and Program, AAPG-SEPM National Meeting*, San Antonio, TX.
- Day, J.E., Whalen, M.T., and Over, D.J., 2008, *Record of Late Frasnian Kellwasser Extinction Bioevents, Terminal Frasnian Upper Kellwasser Crisis Fauna, and Early Famennian Post-Extinction Recovery: Alberta Rocky Mountains*, *Geological Society of America Abstracts with Programs*, v. **40**, p. 435