



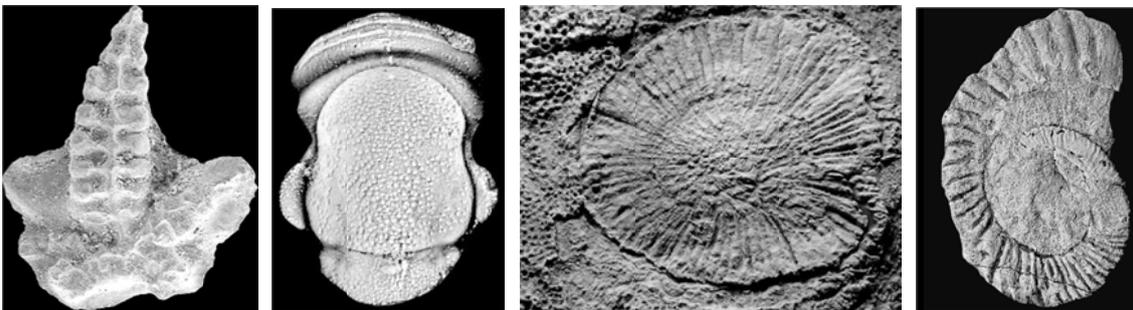
*INTERNATIONAL UNION OF
GEOLOGICAL SCIENCES
COMMISSION ON STRATIGRAPHY*

—s—D—s—

SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

NEWSLETTER No. 28

**R.T. BECKER, Editor
WWU Münster
Germany**



June 2013

ISSN 2074-7268

SDS NEWSLETTER 28

Editorial

The SDS Newsletter is published annually by the International Subcommittee on Devonian Stratigraphy of the IUGS Subcommittee 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
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 (figures imbedded or as separate high resolution jpg 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.

Content:

Message from the Chairman (J.E. MARSHALL)	1
1	
SDS Reports	
1. SDS Annual Report 2011 to ICS (J.E. MARSHALL & R.T. BECKER)	2-6
2. Minutes of the Brisbane Business Meeting (R.T. BECKER & C.E. BRETT)	6-10
3. D/C Boundary Task Group (M. ARETZ, Ed.)	11-14
SDS Documents	
1. Comments on MORROW et al. 2011 (C.W. STOCK & C.A. SANDBERG)	15-24
SDS Forum	
1. Towards the Famennian substage votes (R.T. BECKER)	24-29
2. <i>Polygnathus</i> species list – update and corrections (R.T. BECKER)	29-31
Devonian Meetings	
1. Pre-Cenozoic Climates, Toulouse, June 2013	32
2. ICPSEA3, Perak, Malaysia, October 2013	33-35
3. Joint Meeting IGCP 580 & 596, Calgary, August 2013	36-37
4. 4 th International Palaeontological Congress, Mendoza, Argentina 2014	38-39
Devonian Publications	
1. BARDASHEV & BARDASHEVA 2012	40
2. SAVAGE 2013	40-41
3. IGCP 580, Abstract Book, Graz	41-42
4. Morocco 2013 Field Symposium, Abstract Book	42-45
5. Morocco 2013 Field Symposium, Field Guidebook	45
6. Ferrantia, 68, 2012	46
7. Special Papers in Palaeontology, 87, 2012	46-48
Membership News	
CM Olga V. ARTYUSHKOVA AND the UFA GROUP	49
CM Gordon C. BAIRD	50
TM Carlton E. BRETT	50-51
CM Denise BRICE	52
CM Rainer BROCKE	52
TM Carlo CORRADINI	52-54

TM Nadezhda G. IZOKH and the NOVOSIBIRSK GROUP	54-56
CM Semen A. KRUCHEK and the BELARUSSIAN DEVONIAN GROUP	56-57
CM Elga MARK-KURIK	57-58
TM John E. MARSHALL	58
CM Bruno MISTIAEN	58-59
TM The MÜNSTER DEVONIAN TEAM	59-63
CM Marek NARKIEWICZ	63
CM Mena SCHERMM-GREGORY	64-65
TM Eberhard SCHINDLER	65-67
TM Ladislav SLAVIK	67
CM Claudia SPALLETTA	67
CM Maurice STREEL	68
CM Thomas J. SUTTNER	68-71
CM Ta Hoa PHUONG	71
CM Kate M. TRINAJSTIC and the PERTH GROUP	71-72
TM Jenaro I. VALENZUELA-RÍOS	72-74
CM Chuck VER STRAETEN	74-75
CM Michael WHALEN	75-76
CM James J. ZAMBITO	76

MESSAGE FROM THE CHAIRMAN

Dear SDS Members,

This is the first time that I address you in my new role as Chair of the SDS. Firstly we must all congratulate Thomas for the excellent job he has done over the last 16 years, Firstly, as Secretary and then as Chair he has provided excellent leadership and been responsible for initiating many successful meetings and publications. He has taken important new initiatives with the ICS in promoting the formal sub-division of some of our longer stages. We have also seen Thomas's determination to revisit the definition of the base Emsian and D-C boundaries when these both proved to be problematic. But above all Thomas has been a great strength and source of knowledge and direction for all things Devonian. We are all delighted that Thomas has volunteered to continue with the editing and production of this Newsletter aided by Mrs. KLAUS.

We must also thank the retiring vice-chair Ahmed EL HASSANI for his past and indeed future efforts on our imminent SDS field trip to Morocco.

The new SDS team includes Carl BRETT as vice-chair, someone who I hope is known to most of us, and an exceptional field geologist with a strong palaeontological bias and vast range of Palaeozoic stratigraphic experience. The new Secretary is Ladislav SLAVIK from the Czech Republic who hopefully most of you have met on recent SDS fieldtrips and other conferences. We are pleased that Carlo CORRADINI has agreed to continue as webmaster for our SDS webpages, something the ICS see as increasingly important.

2012 was again a very active year in the Devonian with the SDS meeting at the 34th IGC in Brisbane, Australia. I know that it went very successfully and our SDS attracted a rather larger attendance than normally attend an IGC meeting.

Our main event this year is the International Field Symposium to Morocco jointly with IGCP 596, the SCS and the Institut Scientifique, Mohammed V University, Rabat. It looks like attendance will be good and we have a packed programme of activities. All days but one will be devoted to fieldwork with the various business meetings taking place in the evenings.

The ICS has recognised that the IGC conferences are not always valued and has indicated that the official business could be transferred to the International Congress on Stratigraphy, of which the first, STRATI 2013, will be held in Lisbon, Portugal in early July 2013. The first circular is available at <http://www.strati2013.org/>. It includes a preliminary program, but the organizing committee

is still open to suggestions particularly for sessions specific to ICS sub-commissions. It is suggested that future Congresses are likely to be held in locations that are readily accessible and inexpensive for large numbers of sub-commission members. We await this development with interest.

Future Directions

Essentially the direction will be to continue as hencetofore, an expression that means we will continue doing as we did before. I think we are particularly fortunate in the Devonian as we had the benefit of a pioneering group of geologists and palaeontologists who took decisions on stage boundaries such that we have had stability in our stratigraphic subdivision for some time. This has enabled us to use this stratigraphy to more fully understand the Devonian and its life. It is increasingly clear that a lot happens in the Devonian with its two mass extinctions, the spread of the first forests and the development of the terrestrial carbon cycle, some of the globally highest sea-levels before it all ends with the descent into icehouse conditions at the very end of our Period. To this end we will continue our highly productive collaboration with IGCP 596 and future programmes to better understand this key interval in Earth history.

Our immediate tasks are to complete the revisions of the base Emsian and D-C boundary which will both be discussed in Morocco. We also need to formally move to a vote on the subdivisions of the Famennian and the formal definition of all the new sub-stages as papers in the journal *Lethaia*.

I would like to send a particular message to all those SDS members who don't often get an opportunity to attend meetings. This is your Newsletter and designed to keep you in contact with other Devonian workers. We particularly value your annual reports and publication lists as it is information that we otherwise find difficult to see and key information for understanding the entire Devonian World. Everything Devonian is important.

Finally can I thank all those who nominated me for SDS Chair and supported me in the vote. Hopefully I will repay this confidence and follow the excellent example set by Thomas.

With best wishes to all, John MARSHALL

SDS REPORTS

INTERNATIONAL COMMISSION ON STRATIGRAPHY

SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

ANNUAL REPORT 2012

J.E. MARSHALL & R.T. BECKER

1. TITLE OF CONSTITUENT BODY

Subcommission on Devonian Stratigraphy

2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

SDS has continued in 2012 its work on the revision of problematical GSSPs (Emsian, Devonian-Carboniferous boundary) and on the formal definition of substages. Discussions on GSSP revisions were held at the Annual Business Meeting during the IGC (Brisbane), in the summer of 2012. Other continued activities include multidisciplinary international correlation, the completion of the Devonian chapter to GTS 2012, the organisation of Devonian stratigraphic symposia, the publication of the SDS Newsletter and of monographic books/journal volumes. SDS objectives for 2012 onwards can be summarized as:

- Formal definitions of Pragian, Givetian, Frasnian, and Famennian substages.
- Revision of the basal Emsian GSSP in Uzbekistan.
- Revision of the D/C boundary in the frame of the D/C Boundary Task Group (Chairman: M. ARETZ) and in close collaboration with the Carboniferous Subcommission.
- Close co-operation with IGCP 596 on "Climate Change and Biodiversity Patterns in the Mid-Paleozoic", coordinated by P. KÖNIGSHOF et al.
- Publication of volumes on Devonian stratigraphy, partly in co-operation with IGCP 596.
- Compilation and distribution of SDS Newsletter 27.
- Annual Business Meeting in conjunction with the 34th IGC in Brisbane.
- Updates of the SDS Homepage.
- Preparations for the International Field Symposium in spring 2012 in southern Morocco.

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.

3a. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2012

Revision of Emsian base

KIM et al. (2012; in SDS Newsletter 27) presented a defense of the current Zinzilban GSSP based on revised/new dacryoconarid data. Much of their arguments rely on the range and international correlation of *Nowakia (Dmitriella) praesulcata*, which is not a zone-defining species in the current zonation and which range needs further investigations outside the GSSP area. JANSEN (2012; in SDS Newsletter 27) provided the demanded review of brachiopod stratigraphy in the Emsian type region of Germany, which is one of the major arguments to project the current GSSP level well into the Pragian of the Bohemian type region.

Revision of Devonian/Carboniferous boundary

BECKER et al. (2012; both in SDS Newsletter 27 and in SCCS Newsletter 29) summarized the new data concerning the Lalla Mimouna North section in the Anti-Atlas of Morocco. Research is continuing, including more information on brachiopods and isotope stratigraphy. One of the most significant aspects is the discovery of many conodonts that are transitional between polygnathids and *Siphonodella*. The same transitional group was found in a different new uppermost Famennian section of the Tafilalt (HARTENFELS & BECKER 2012; abstract of the IGCP 596 Symposium at the 100th Anniversary Meeting of the Paläontologische Gesellschaft). Further new D/C boundary successions have been reported from Russia (Moscow Syncline; GATOVSKY et al. 2011; Vaygach Island, ZHURAVLEV et al. 2010), Azerbaijan (GRECHISHNIKOVA & LEVITSKII 2011), Iran (BAHRAMI et al. 2011), and Hainan Island (ZHANG et al. 2010); all in literature review of SDS Newsletter 27. Other active work is taking place in Poland (MATYJA and co-authors), Czechia (J. KALVODA and co-authors), South China (WANG, Cheng-yuan and co-authors), and eastern North America (G. BAIRD and co-authors).

Substage Subdivisions

Following an initiative by SDS, ICS approved at its business meeting in Brisbane the proposal to recognize formal substages, defined in the usual way by GSSPs. SDS agreed that priority will be given to stage definitions, in this case to the basal Emsian revision. At its Annual Business Meeting in Brisbane it was noted that substages are widely in use for the Lochkovian, based on the conodont zonation. The question of formal Lochkovian (three) and Eifelian (two) substages will be addressed after progress has been made in the case of the other stages.

Pragian

Ongoing work deals with the correlation of the current Emsian GSSP into conodont successions of other regions, such as Spain and Morocco.

Emsian

The revision of dacryoconarid successions across the Zlíchovian-Dalejan transition in its Bohemian type region by FERROVÁ et al. (2012) has highlighted the significance of the tentaculite *Nowakia elegans* for the planned sub-division of the Emsian, although it is a somewhat lower level than the so far proposed “*cancellata* boundary”.

Givetian

Significant new results have been published on the Taghanic Event in the North American type region (BAIRD et al. 2012, ZAMBITO et al. 2012a, b), which is the interval that has been chosen to define a formal Upper Givetian substage.

Frasnian

The significance of perturbations of the global carbon cycle causing strong isotope excursions just before, at and subsequent to the proposed Lower/Middle Frasnian substage boundary was further strengthened by a study of PISARZOWSKA & RACKI (2012). New data for the same time interval in Western Canada were provided by SLIWINSKI et al. (2012). These studies underline the chronostratigraphic potential of integrated bio-, chemo-, magneto- and isotope stratigraphy in the Devonian.

TSYGANKO (2012; in SDS Newsletter 27) summarized data for the southern Timan of the Russian Platform, which indicate how to correlate the Frasnian substage levels into that shallow-water region.

Famennian

The global *Annulata* Event has been proposed as the level for the definition of a future Upper Famennian substage. WEINER (2012; abstract of the IGCP 596 Symposium at the 100th Anniversary Meeting of the Paläontologische Gesellschaft)

presented new data for four localities in the Moravian Karst.

Multidisciplinary Stratigraphy

The integration of magnetic susceptibility data, bio-, sequence and cyclostratigraphy in NW Canada (DE VLEESCHOUWER et al. 2012) led to a new Frasnian timescale, which is not based on geochronological data. It illustrates the potential of astronomical cycles in the Devonian but future work has to produce data from the same interval of different continents and facies settings.

3B. LIST OF MAJOR PUBLICATIONS OF SUBCOMMISSION WORK

(books, special volumes, key scientific papers)

Subcommission Publications

- BECKER, R. T. (Ed.) 2012. *SDS Newsletter*, **27**: 106 pp. [ISSN 2074-7268].

Key Papers

- BAIRD, G., ZAMBITO, J.J. & BRETT, C.E. (2012). Genesis of unusual lithologies associated with the Late Middle Devonian Taghanic biocrisis in the type Taghanic succession of New York State and Pennsylvania. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **137/138**: 121-136.
- BECKER, R. T., GRADSTEIN, F. M. & HAMMER, O. (2012). *The Devonian Period*. – In: GRADSTEIN, F.M., OGG, J.G., SCHMITZ, M. & Ogg, G. (Eds.), *The Geologic Time Scale 2012*, Vol. 2: 559-601, Elsevier.
- CORRADINI, C. & CORRIGA, M.G. 2012. A Prídoli-Lochkovian conodont zonation in Sardinia and the Carnic Alps: implications for a global zonation scheme. - *Bulletin of Geosciences*, **87**(4): 635-650. [A review and revision of the Lochkovian conodont zonation and its potential for global correlation, which eventually will be crucial for substage definition.]
- DE VLEESCHOUWER, D., WHALEN, M.T., DAY, J.E. & CLAYES, P. 2012. Cyclostratigraphic calibration of the Frasnian (Late Devonian) time scale (western Alberta, Canada). - *GSA Bulletin*, 15 pp., doi 10.1130/B30547.1.
- FERROVÁ, L., FRÝDA, J. & LUKEŠ, P. 2012. High-resolution tentaculite biostratigraphy and facies development across the Early Devonian Daleje Event in the Barrandian (Bohemia): implications for global Emsian stratigraphy. - *Bulletin of Geosciences*, **87**(3), 587–624.
- PISARZOWSKA, A. & RACKI, G. (2012). Isotopic chemostratigraphy across the Early-Middle Frasnian transition (Late Devonian) on the South Polish carbonate shelf: A reference for

the global *punctate* Event. - *Chemical Geology*, **334**: 199-220.

- SLIWINSKI, M.G., WHALEN, M.T., MEYER, F.J. & MAJS, F. (2012). Constraining clastic input controls on magnetic susceptibility and trace element anomalies during the Late Devonian *punctata* Event in the Western Canada Sedimentary Basin. – *Terra Nova*, **24**: 301-309.
- ZAMBITO, J.J., BRETT, C.E., BAIRD, G.C., KOLBE, S.E. & MILLER, A.I. (2012a). New perspectives on transitions between ecological-evolutionary subunits in the „type interval“ for coordinated stasis. - *Paleobiology*, **38** (4): 664-681.
- ZAMBITO, J.J., BRETT, C.E. & BAIRD, G.C. (2012b). *The Late Middle Devonian (Givetian) Global Taghanic Biocrisis in Its Type Area (Northern Appalachian Basin): Geologically Rapid Faunal Transitions Driven by Global and Local Environmental Changes*. – In: TALENT, J. (Ed.), *Earth and Life*, 677-703, Springer.

3c. PROBLEMS ENCOUNTERED, IF APPROPRIATE

- The rarity of polygnathids at Zinzilban in the critical interval for a re-definition of the Emsian GSSP.
- The still unpublished early siphonodellids from the Uppermost Famennian of Franconia/Thuringia.
- The continuing lack of SDS Members from most South American countries.

4a. OBJECTIVES AND WORK PLAN FOR NEXT YEAR (2013)

- Annual Business Meeting, jointly with IGCP 596 and D/C Boundary Task Group, in the Tafilalt/Maider region of Morocco (spring 2013).
- Editorial work for a Proceedings Volume of the Novosibirsk Meeting in “*Palaeobiodiversity and Palaeoenvironments*”.
- Publication of SDS Newsletter 28.
- Update of SDS homepage (pdf files of former SDS Newsletters and new GSSP illustrations).
- Active participation in the work of ICS.
- Editorial work for a Proceedings Volume of the joint IGCP/SDS Meeting at Brisbane in “The Geological Society of London, Special Publications”.
- Participation of members in “Strati 2012”, 1st International Congress on Stratigraphy, early July, Lisboa.

- Contributions to the “Encyclopedia of Stratigraphy”.

4b SPECIFIC GSSP FOCUS FOR 2013

- Active participation in joint Devonian/Carboniferous Boundary Task Group with a focus on conodont revisions and pelagic-neritic correlations.
- Manuscript on Givetian and Frasnian substages for *Lethaia*.
- Active work on the redefinition and subdivision of the Emsian Stage. SDS members are collaboratively working on conodonts from Zinzilban, Uzbekistan and the Pyrenees, Spain in an attempt to find a resolution. Czech colleagues are actively pursuing the problem in the Barrandian Basin. German and Moroccan colleagues collect new data for Morocco.
- Progress on Famennian substage definitions, including a formal vote on the Uppermost Famennian.

5. SUMMARY OF EXPENDITURES IN 2012

INCOME	
Balance from 2011	6 \$
EXPENSES 2012	
SDS Newsletter 28	500 \$
Support for (outgoing) SDS Chairman and (new) Vice-Chairman to attend the 34 th IGC in Brisbane	2750 \$
Support/subvention from IUGS/ICS	3250 \$

6. BUDGET REQUESTS AND ICS COMPONENT FOR 2013

\$500 for SDS Newsletter 29
 \$1500 for a member/officer to attend the SDS Meeting in Morocco
 Total Request: \$2000

APPENDICES

7. CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (2008-2012)

Being a highly proactive subcommission with at least yearly meetings.

2008 33rd IGC Oslo, Norway & SDS Field Meeting, Kitab Reserve, Uzbekistan

2009 9th NAPC, Cincinnati, USA; excursions to the Devonian of Kentucky, Ohio, and Michigan

2010 3rd IPC London, UK; excursion to the Devonian of the Old Red Continent

2011 SDS Field Meeting Novosibirsk, Russia; excursions to the Devonian of the Urals, Salair and Kuznetsk Basin

2012 34th IGC Brisbane, Australia

Sponsoring a series of publications in international journals and special publication series.

Promoting and proposing the next level of stratigraphic subdivision: sub-stages

Time sub-division within the Devonian Period is well organized and defined. This allows us to have highly successful IGCP Projects on Devonian environment, time, evolution, extinctions and sea-levels.

8. OBJECTIVES AND WORK PLAN FOR NEXT 4 YEARS (2013-2017)

- Redefinition of the Devonian/Carboniferous Boundary within the joint Task Group.
- Publish the definitions of the Givetian and Frasnian substages in *Lethaia*.
- Redefine the base of the Emsian Stage and the new 'Zinzilbanian' sub-stage of the Pragian.
- Define and publish the Famennian substages.
- Further integration of physical, chemo-, bio- and sequence stratigraphic scales.
- Revision of the Devonian eustatic sea-level curve.

9. ORGANIZATION AND SUBCOMMISSION MEMBERSHIP

9a Names and Addresses of current Officers and Voting Members

CHAIRMAN

John E. A. MARSHALL, Ocean and Earth Science, University of Southampton, National

Oceanography Centre, European Way, Southampton SO14 3 ZH, UK; +44 2380592015
jeam@soc.soton.ac.uk

VICE-CHAIRMAN

Carl E. BRETT, Department of Geology, University of Cincinnati, Cincinnati, Ohio, OH 45221, USA, 513-566-4556, carlton.brett@uc.edu

SECRETARY

Ladislav SLAVIK, Laboratory of Paleobiology and Paleocology, Institute of Geology AS CR, Rozvojova 269, CZ-165 02 Praha 6, Czech Republic, Tel.: +420 233087247, Fax: +420220922670, slavik@gli.cas.cz

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

WEBMASTER

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

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 Xiuqin: Nanjing, brachiopods;
xqchen@nigpas.ac.cn
5. C. CORRADINI: Italy, conodonts;
corradin@unica.it
6. N. IZOKH: Siberia, Asian Russia, conodonts;
izokhn@uiggm.nsc.ru
7. MA Xueping: Beijing, brachiopods;
maxp@pku.edu.cn
8. 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
13. E. SCHINDLER: Germany, tentaculites, event stratigraphy;
eberhard.schindler@senckenberg.de
14. L. SLAVIK: Czechia, conodonts,
slavik@gli.cas.cz
15. V. TSYGANKO: European Russia, corals;
tsyganko@geo.komisc.ru
16. J. I. VALENZUELA-RIOS, Spain, conodonts;
jose.i.valenzuela@uv.es.
17. U. JANSEN, Germany, brachiopods;
ulrich.jansen@senckenberg.de
18. ZHU Huaicheng, Nanjing, China; palynology;
hczhu@nigpas.ac.cn
19. R.T. BECKER: Germany, ammonoids;
rbecker@uni-muenster.de

9b LIST OF WORKING (TASK) GROUPS AND THEIR OFFICERS

There is a working group appointed to reinvestigate the D-C boundary. This has 10 members from the SDS and 10 from the SCS.

The Devonian members are:

R. Thomas BECKER, Germany: ammonoids;
rbecker@uni-muenster.de
Denise BRICE, France: brachiopods;
d.brice@isa-lille.fr
Carlo CORRADINI, Italy: conodonts;
corradin@unica.it
Brooks ELWOOD, USA: magnetostratigraphy;
ellwood@lsu.edu
Ji Qiang, China: conodonts;
Jirod@cags.net.cn
Sandra KAISER, Germany: conodonts, isotope
stratigraphy;
kaiser.smns@naturkundemuseum-bw.de
John MARSHALL, UK: miospores;
jeam@noc.soton.ac.uk
Hanna MATYJA, Poland: conodonts;
hanna.matyja@pgi.gov.pl
Claudia SPALLETTA, Italy: conodonts ;
claudia.spalletta@unibo.it
WANG Cheng-yuan, China: conodonts;
cywang@nigpas.ac.cn

9c INTERFACES WITH OTHER INTERNATIONAL PROJECT

SDS is traditionally strongly tied with IGCP projects that have a Devonian focus. The main current project is IGCP 596 on “Climate change and biodiversity patterns in the Mid-Paleozoic”, led by P. KÖNIGSHOF, T. SUTTNER, and others. Many SDS members gave presentations for the IGCP 596 sponsored Symposium 12 at the Centenary meeting of the Paläontologische Gesellschaft.

In autumn 2012, the second circular for a joint meeting in Morocco in spring 2013 has been finalized. SDS also cooperates with IGCP 591 on “The Early to Middle Paleozoic Revolution: Bridging the Gap between the Great Ordovician Biodiversification Event and the Devonian Terrestrial Revolution”, led by B.D. CRAMER, T.R.A. VANDENBROUKE, and others. Several SDS members contribute actively to IGCP 580 on “Application of magnetic susceptibility as a palaeoclimate proxy on Palaeozoic sedimentary rocks and characterization of the magnetic signal”.

MINUTES OF THE ANNUAL SDS BUSINESS MEETING, 34th IGC, BRISBANE, AUSTRALIA TUESDAY, JUNE 7, 2012

R.T. BECKER & C.E. BRETT

Attendance: The Chairman (R.T. BECKER), (future) Vice-Chairman (C.E. BRETT), **TMs:** C. BURROW, CHEN, X., MA, X., M. NARKIEWICZ, S. TURNER, J.I. VALENZUELA-RÍOS; **Cms:** P. BUDIL, J. FRYDA, K. HISTON, L. KOPTIKOVÁ, T. SUTTNER;

GUESTS: L. FERROVÁ, S. HARTENFELS, E. KIDO, LIAO, J.-C., K. NARKIEWICZ, K. TRINAJSTIC, J. WATERS. This is a much better attendance as at the past IGCs.

1. Introductions and apologies for absence

The meeting started in Room P8 of the Brisbane Convention and Exhibition Centre at 19.00 and was opened by the CHAIRMAN. Some copies of the agenda were passed out since they were posted by email rather late (the previous Sunday).

The current secretary of SDS and incoming Chairman, John MARSHALL, was unable to attend as he is doing fieldwork in the Arctic region. The Vice-Chairman, A. EL HASSANI, is not part of the Moroccan Delegation to IGCs and, as many others, even from within Australia, could not afford the high IGC fees and travel costs. The secretary-elect is Ladislav SLAVIK, who also could not attend. **Other apologies:** **TMs:** N. IZOKH, U. JANSEN, R. MAWSON, J. OVER, E. SCHINDLER **Cms:** AUNG, A.-K., K. BAKHAREV, C. DOJEN, C. HARTKOPF-FRÖDER, O. OBUT, J. TALENT, G. YOUNG, T. WRIGHT.

2. Approval of 2011 Minutes

The Minutes of the Novosibirsk Business Meeting were circulated in SDS Newsletter 27. The CHAIRMAN reminded that all CMs and TMs should have a section in the SDS Newsletter. He has incorrect addresses for some members whose newsletters were returned; everybody should record any changes, especially of email addresses. TM J.I. VALENZUELA-RÍOS commented that he was surprised by the new contribution of CM A. KIM on the Kitab GSSP section; he seems to ignore some of earlier discussions. TM J.I. VALENZUELA-RÍOS intends to send detailed comments. The Minutes were otherwise approved.

3. Chairman's Business

3.1. Obituaries

Since the Novosibirsk meeting K. ZAGORA died. He has been too ill for many years to attend meetings but maintained a strong interest in SDS.

Also non-members, who were deeply involved in Devonian research, have passed away, notably Volker EBBINGHAUSEN, the famous ostracod worker Arnold RABIEN, and Hans Juergen ANDELE.

3.2. New Officers

By the rules of ICS, the new SDS Officers will start their duties after the IGC. The CHAIRMAN expressed his pleasure that John MARSHALL agreed to take over, accepting the formal vote. Carl BRETT will be the new Vice Chairman, replacing Ahmed EL HASSANI, who will continue as a TM for

Morocco. Ladislav SLAVIK is the new SECRETARY. The full slate of new officers was elected by unanimous vote (but a few TMs did not cast their vote).

The CHAIRMAN expressed his appreciation for his involvement in SDS, especially for the field meetings. He noted the excellent meetings in Nevada, the Kitab Reserve, Cincinnati, and Novosibirsk, not to forget the Old Red Continent Fieldtrip that he could not join.

SDS has been successful in replacing older members with new and active members; he thanked all past and current members for their valuable contributions. He promised to continue to be actively involved and to edit the SDS Newsletter.

CM S. TURNER followed up with a formal note of sincere thanks to RTB for his service to SDS; as did others.

3.3. Other topics

The CHAIRMAN reported that each November there must be a report to ICS outlining goals and achievements; he is impressed with all that SDS has accomplished; many of the goals for 2012 have been or will be met. However, the symposium on "The Devonian of Asia and Australia" planned for this IGC failed, because only three contributions were submitted. These presentations were merged with Symposium 8 of IGCP 596 on "Climate change and biodiversity patterns in the Mid-Palaeozoic".

Something that has not yet been completed are the formal descriptions of substage levels in *Lethaia* (which is an official ICS journal). TM J. OVER should normally address/lead the mid-upper Frasnian substage boundaries. CM P. BULTYNK and colleagues should deal with the Middle Givetian, the CHAIRMAN and Sarah ABOUSSALAM with the Upper Givetian. However, an official recognition of substages has yet to be voted on by ICS.

At the ICS Workshop in Prague, the CHAIRMAN presented a discussion on the utility of substages but it was not brought to a vote; Stan FINNEY, the ICS Chairman, appeared favorable to this idea but had not yet included it as a formal item on his agenda. However, it would be a topic for the ICS Subcommission chairs meeting on Thursday, August 9 (it was brought to a vote and approved).

Another topic was the proposed second re-sampling campaign of the Emsian at the Kitab Reserve; the CHAIRMAN called upon the Czech contingent to discuss the further strategy with the Uzbek and Novosibirsk members.

Update of SDS homepage: all issues of the SDS Newsletter since RTB took over as the editor are available on-line; but older issues, some of them in

rather poor shape, need to be scanned and added as they contain a good deal of critical information on GSSPs etc, which has not been published anywhere else. The scanning is in progress but he is still missing a copy of issue No. 10. He has also compiled a new set of GSSP illustrations in color, including photos of outcrops and of the index fossils. CM G. KLAPPER, for example, sent a picture of the oldest *A. rotundiloba* from the Frasnian GSSP, CM L. SLAVIK provided photos from Czech GSSPs. The CHAIRMAN agreed to write a Devonian chapter for the planned new *Encyclopedia of Stratigraphy* but other members should be involved for shorter, more specialized chapters, such as Devonian palynostratigraphy or on specific regions. The Devonian Chapter for the new Phanerozoic Time Scale volumes (GRADSTEIN et al. 2012) should be out but there will be no presentation at this IGC (partly because of lack of cooperation with ICS).

The objectives for 2012 have been met by 2/3; some issues are:

The rarity of critical early polygnathids at Zinzilban for defining a revised future basal Emsian GSSP

The revision of siphonodellids; there is a wide array of poorly understood and documented morphotypes/taxa prior to the Hangenberg Event level.

A major problem around the world is a decline of support for or interest in the Devonian or other deep time studies in general. CM S. TURNER noted the lack of funding for Paleozoic studies in most surveys. Kate TRINAJSTIC of Western Australia is more optimistic and noted active work in the Palaeozoic and the reintroduction of biostratigraphy into curricula of several universities. The CHAIRMAN reported that the situation in Canada is poor; Charles HENDERSON (Permian Subcommission Chairman) and D.I. JOHNSTON are working on conodonts but both are no members of SDS. Therefore, Jed DAY has been made titular member representing Canada because of his extensive work, together with CM M. WHALEN, in the western Canada Devonian.

There is not much improvement concerning South America, with almost no formal representation. Some work on the Devonian is done by Petrobras but this is locked in confidential files. Guillermo ALBANESI will organize the next ICOS meeting in Mendoza, Argentina, next year. SDS representation in SE Asia has improved in recent years and there are good future perspectives, especially by the cooperation with IGCP 596.

4. ICS Matters

ICS had several meetings in conjunction with this IGC convention: Monday night an open general meeting; a meeting of the International Subcommission on Stratigraphic Nomenclature (ISSC – but without its chairman), and the ICS Business meeting Thursday night (the CHAIRMAN and new VICE-CHAIRMAN attended; both received some support from ICS)

Two major issues came up in Monday's meeting:

a) There is a call to modify and update the International Stratigraphic Code (often termed HEDBERG Code). It was modified subsequently but is now partly out of date, especially with respect to the variety of new methods now being employed in stratigraphic correlation. For example, CM B. ELLWOOD is using a bar code approach to magnetic susceptibility and proposing widespread correlations of MS zones, which he numbers. But so far there is no formal policy governing how this is to be applied. Without formal guides there might be nomenclatorial chaos. The same problem applies to units in sequence stratigraphy, cyclostratigraphy, and quantitative stratigraphy (e.g., the numbering of CS units of graphic correlation). The ICS (first via ISSC) will have a lot of say in the revisions and subcommissions should provide important input. Proposals for new chapters of the future code have been and will be published in Newsletters on Stratigraphy. But, partly, e.g., in the case of sequence stratigraphy, they have been the source of significant disagreement among some specialists.

b) Stan FINNEY would like formal monuments like that at Nanbiancun in China (D/C Boundary Auxiliary Stratype) or at least plaques set up at all GSSPs. Many Devonian ones have no such markers, including the Frasnian, Famennian and the Givetian at Jebel Mech Irdane (Vice-Chairman A. EL HASSANI will work toward getting this accomplished). There are some bad experiences: in the Prague area plaques were stolen for the copper. Perhaps at least cheaper and replaceable markers should be used.

5. Revision of GSSPs

5.1. Pragian-Emsian

A new boundary stratotype needs to be agreed upon. TM J.I. VALENZUELA-RÍOS noted that there seemed to be some backsliding by our Uzbek colleagues, concerning issues that were thought to have been sorted out. He plans to present a formal discussion of details soon and hopes we can move forward toward ratification of a new, higher GSSP level. The CHAIRMAN noted that specific questions,

such as the taxonomy and range of *Nowakia praesulcata*, have to be re-addressed.

As for the Emsian substages, the CHAIRMAN called on CM J. FRYDA, who introduced Lenka FERROVÁ. She is presently working on dacryoconarids around the type Zlichovian/Dalejan boundary. This will provide a zonation that will help to clarify aspects of the type basal Dalejan boundary, a very narrow interval prior to the extinction of anetoceratids. The CHAIRMAN expressed some concern that only very few people in the world could identify the critical dacryoconarids. He discussed the issue of the "Pragian Limestone" in Morocco, which yielded icriodid conodonts (*Caud. celtibericus*); these are correlated in Spain with the *excavatus* Zone. The base of the Emsian, at least in the present GSSP definition, seems to fall within the upper part of this lithological unit. CM P. BUDIL expressed concern about the many marker trilobites of that unit, which appeared to be of typical Pragian aspect (of Bohemian definition).

At the Novosibirsk meeting a need to have a revision of the brachiopod stratigraphy in the Emsian type area was expressed. This was met by the review of TM U. JANSEN in Newsletter No. 27.

5.2. D/C Boundary

We were joined during the meeting by colleagues from the Carboniferous Subcommission and the D/C Boundary Task Group. Markus ARETZ, the D/C TG Chairman, reported that he has circulated lists of questions, and he is trying to gather data from others. But so far he has gotten very little feedback from other members.

The CHAIRMAN noted that the sampling of conodonts at the Lalla Mimouna North D/C boundary sections has been completed – samples are currently being processed.

Jiri KALVODA noted that conodonts from the Moravia area have been processed by a student. Others have done new fieldwork in Belgium and in the Montagne Noire. The CHAIRMAN stressed the importance of communication, as some important results are not known to the Task Group and subcommissions. The D/C Task Group will join the Morocco meeting in March 2013. The CHAIRMAN also suggested that we might keep better track of research by CM G. BAIRD and Joe HANNIBAL on the very high Devonian in SW New York State and Pennsylvania

Barry RICHARDS (Chairman of the Carboniferous Subcommission) reported on new results from D/C boundary section in South China. A publication in *Paleoworld* discusses the results of absolute dating at Dapoushang. The CHAIRMAN was asked to review a paper on a new South China

section but he felt it was inadequately documented and returned it to authors for substantial revision; the section, which includes ~50m of the Hangenberg Shale interval, needs much more thorough sampling. The SDS Newsletter 27 included a section on possibly poorly known D/C boundary publications, for example from Vietnam.

Barry RICHARDS then talked about the economic importance of oil sands at the D/C boundary; the Exshaw Shale and related units have an enormous hydrocarbon potential, especially when horizontal drilling is employed. He then went on to a short presentation on the present D/C stratotype at LaSerre; there are well-known problems with the section and at least the D/C boundary golden spike would need to be lowered. It remains the GSSP until a more adequate section is established. There is some concern that a local sheep farmer might fill in the trench and therefore, he has taken steps to try and insure its preservation. The farmer did fill in other trenches, such as La Serre A, A', C and D, which were among the most important sections for the Givetian/Frasnian and Frasnian/Famennian boundaries. Currently the D/C boundary is placed between Beds 88/89 but CM S. KAISER found the first *Siphonodella sulcata* in Bed 84. Lower beds are clastics without conodonts, so there is no preserved *praesulcata-sulcata* lineage. The section is probably in reasonable shape. Dieter WEYER excavated lower and higher beds but those parts were quickly filled in. In any case, perhaps not too much time should be spent on this section, as it clearly seems not to be an adequate GSSP.

Moving on, Sven HARTENFELS and the CHAIRMAN sampled additional sections in southern Morocco and found more *Siphonodella*-relatives (intermediates to *Polygnathus*) in pre-Hangenberg beds; they were more common and more widely distributed than people had thought. For the Urals, Svetlana NIKOLAEVA noted a list of potential sites; these have to be better presented to the Task Group.

6. Devonian Substages

6.1. Lochkovian

A new paper by CM Carlo CORRADINI and Maria CORRIGA in the *Bulletin of Geosciences* gives a tri-partite subdivision of Lochkovian; this was actually already proposed in several previous publications and in new work in the type region (SLAVIK et al. 2012, *Geological Journal*). A formal substage subdivision of the Lochkovian could be a future task for SDS.

6.2. Pragian

It will need to have two substages, once the Pragian-Emsian boundary is figured out. The current basal Emsian GSSP shall define the future upper substage.

6.3. Emsian

See Emsian revision.

6.4. Eifelian

It can be subdivided into two substages, perhaps using the base of Union Springs (Bakoven bioevent), as recognized by DESANTIS & BRETT (2011) in the Appalachian Basin (i.e. at the *costatus-australis* zonal boundary). Eifelian substages should be dealt with after the Emsian and Givetian-Famennian substages have been formalized.

6.5. Givetian

The Givetian has three divisions. At Blauer Bruch (Kellerwald, Germany), LOTMAN'S (1990) *pumilio* beds and the Taghanic Event Interval are present. There are new unpublished data, which update and correct previous papers. Better sections should be sought for the Upper Givetian; one possibility might be the Boyle-Portwood section in Irvine, Kentucky.

TM J.I. VALENZUELA-RÍOS and LIAO Jau-Chyn have a manuscript on Givetian conodonts in the Pyrenees for the proceedings volume of IGCP 596 in *Bulletin of Geosciences*.

6.6. Frasnian

TM J. OVER was unable to attend and to report. TM J. DAY, CM M. WHALEN and co-authors keep supplying new Canadian data concerning the "punctata Event" (= Middlesex Event).

Re-sampling at the famous Martenberg section of the Rhenish Massif by KLAPPER & BECKER (1999) suggested that the *jamieae* Zone may not exist in its type-section. This is currently being checked by additional samples and important for the understanding of the basal Upper Frasnian.

6.7. Famennian

It is time to vote on the formal definition of an Upper Famennian substage. A publication by CM M. STREEL and co-authors on the palynostratigraphy and conodont correlation in the Ardennes is in preparation.

The proposal by HARTENFELS et al. (2009) to place the base of the Upper Famennian at the base of the (Lower) *Annulata* Event and near the extinction of *Scaphignathus velifer velifer* (SDS Newsletter 24) has never received any comments.

7. SDS Membership

7.1. New TMs for 2012-2016

CM Ladislav SLAVIK (Czechia), replacing Jindra HLADIL (Czechia)

CM ZHU Huuaicheng (Nanjing, China), replacing ZHU Min (Beijing, China)
 CM Carlo CORRADINI (Italy), replacing Gavin YOUNG (Australia)

7.2. New CMs

Sven HARTENFELS (Münster, Germany: conodonts)
 shartenf@uni-muenster.de
 Zhor Sarah ABOUSSALAM (Münster, Germany: conodonts)
 taghanic@uni-muenster.de
 Svetlana NIKOLAEVA (Moscow, Russia, and London: ammonoids)
 44svnikol@mail.ru
 Olga P. IZOKH (Novosibirsk, Russia, isotope stratigraphy)
 izokhop@gmail.com
 Aleksandr Yu. YAZIKOV (Novosibirsk, Russia, brachiopods)
 yazikovay@ipgg.nsc.ru
 David I. JOHNSTON (Calgary, Canada, conodonts)
 Calgary, Alberta
 James ZAMBITO (Cincinnati, USA, event and sequence stratigraphy)
 james.zambito@mail.wvu.edu
 Kate TRINAJSTIC (Perth, Australia, conodonts and fish)
 k.trinajstic@curtin.edu.au
 Lenka FERROVÁ (Prague, Czechia, dacryoconarids)
 lenka.ferrova@leznam.cz
 Leona KOPTIKOVÁ (Prague, Czechia, physical and chemostratigraphy)
 koptikova@gli.cas.cz
 Stanislava VODRÁSKOVÁ (Prague, Czechia, conodonts)
 stana.vodrazkova@seznam.cz
 A. POLINAEVA (Bulgaria, sedimentology, sequence stratigraphy)
 polina_a@abv.bg

8. SDS Publications:

The new *Phanerozoic Timescale* (GRADSTEIN et al. 2012) includes a Devonian chapter by BECKER, R.T., GRADSTEIN, F.M & HAMMER, O. The latter two authors are responsible for the new and partly different geochronological timescale, RTB wrote the other chapters, building on the chapter of the last timescale book by M.R. HOUSE.

It is planned to publish a Proceedings Volume of the Novosibirsk meeting in *Palaeodiversity and Palaeoenvironments* (chief editor P. KÖNIGSHOF) of the Senckenberg Institute. But contributions are overdue.

Proceedings of the symposium of IGC 596 held here at the IGC in Brisbane (plus perhaps papers from the London meeting of IPC in 2010) shall be published as a special volume: "Devonian Climate, Sea Level and Biological Events" in the *Special*

Publications series of the *Geological Society of London*, with R.T. BECKER, P. KÖNIGSHOF & C. BRETT as editors. The CHAIRMAN noted that he needed a list of probable contributors and approximate titles. The anticipated deadline for manuscripts will be July, 2013 or somewhat later (the PRS is now given an impact ranking and should not be considered "gray literature")

The planned *Encyclopedia of Stratigraphy* needs a general Devonian chapter and short papers on special topics.

9. Meetings

International Field Symposium "The Devonian and Lower Carboniferous of northern Gondwana", jointly with the D/C Boundary Task Group and IGCP 596. end March-early April. Please submit registrations soon; at least indicate to Ahmed El Hassani your intent to attend so the list can be finalized. This meeting will include both Devonian and Carboniferous and provide a forum for discussing D/C boundary issues

International Meeting on Pre-Cenozoic Climate; Toulouse September 17th to 19th

STRATI 2013, 1st International Congress on Stratigraphy, 1st to 7th July 2013, Lisbon, Portugal. ICS wants SDS to play some role but there is no special Devonian topics day.

ICOS (Conodont) meeting in Mendoza, Argentina summer 2013.

Fourth International Paleontological Congress, also in Mendoza, September 28 to October 24, 2014

Meetings of IGCP 596

2012: GSA North Central joint meeting, with an IGCP 596 symposium, hosted by Jed DAY & Brian WITZKE

2013: joint Morocco meeting with SDS (see above)

Possible meeting in SE Asia (Vietnam-Malaysia)

2014: Evolutionary Paleoeology in mid-Paleozoic; possible meeting in Mongolia

2015: Final meeting, Frankfurt, Germany

10. Financial Report

The CHAIRMAN reported that just \$6.00 remained from the last year. The ICS subvention for 2012 of 3250 \$ was used for Newsletter 28 (500 \$) and for two SDS Officers to attend the IGC (CHAIRMAN and future VICE-CHAIRMAN). Originally, a full coverage of the enormous costs was promised by ICS/IUGS.

11. No other business (none)

REPORT OF THE JOINT DEVONIAN–CARBONIFEROUS BOUNDARY GSSP REAPPRAISAL TASK GROUP

M. ARETZ and Task Group

Introduction and general activities

Members of the task group for the redefinition of the Devonian–Carboniferous boundary are currently conducting research at a variety of locations in Europe, North Africa, Russia, Asia and North America. Task-group members and co-workers are focusing on obtaining data from various sections to present in spring 2013 at a workshop in Morocco. Few task-group members were present at the 34th International Geological Congress in Brisbane where a short discussion of research activities around the Devonian–Carboniferous boundary took place during the SDS business meeting. During the discussion it became evident that a series of research activities are going on in different countries, but the activities are not necessarily communicated within or to the task group.

Progress reports from members

J. KALVODA (Brno). Czech researchers are very actively working in Central and Western Europe and are accumulating large multidisciplinary datasets for key sections in different facies realms and countries. The group is composed of J. KALVODA, T. KUMPAN (biostratigraphy of foraminifers and conodonts), J. FRÝDA (isotope geochemistry), T. GRYGAR (element geochemistry) and O. BÁBEK (petrophysical logging, sedimentology, sequence-stratigraphic interpretation). The results of their multidisciplinary correlation of the Devonian–Carboniferous (D–C) boundary sections from the Moravian Karst (Czech Republic) and the Carnic Alps (Austria) have been written up in a manuscript submitted to the Geological Magazine.

The study of the Czech team focused on the interval from the Middle *Palmatolepis gracilis expansa* Zone (Late Famennian) to the *Siphonodella sandbergi* Zone (Early Tournaisian). In Lesní lom quarry (Moravian Karst), a positive $\delta^{13}\text{C}$ excursion in the *Bisphatodus costatus* – *Protognathodus kockeli* Interregnum (part of the middle *Siphonodella praesulcata* Zone) from a distinct laminated carbonate horizon was correlated to the Grüne Schneid section, Carnic. These carbonate deposits in the Lesní lom section were interpreted as the equivalent of the Hangenberg black shales and a local expression of the global Hangenberg Event *sensu stricto*. Higher values of Mn/Al ratio were documented from this level in the

Moravian Karst (Lesní lom quarry, Mokrá) and Carnic Alps (Grüne Schneid). Higher up at Moravian Karst sections (Lesní lom quarry, Mokrá, Křtiny), a significant increase in the terrigenous input, which is inferred from the gamma-ray GRS signal and elevated concentrations of terrigenous elements (Si, Ti, Zr, Rb, Al, etc.) provided another correlation tieline interpreted as the equivalent of the Hangenberg sandstone. The presence of Famennian foraminiferal genus *Quasiendothyra* was documented up to the Tournaisian *Siphonodella bransoni* Zone in the Moravian Karst where the FAD of *Tournayellina beata pseudobeata* REITLINGER & KULAGINA, 1987 recognized in Belgium (POTY et al. 2006), the Urals (REITLINGER & KULAGINA 1987; PAZUKHIN et al. 2009) and China (HANCE et al. 2011) represents an important event close to the D–C boundary. In contrast to the other sections, the Moravian sections enable the precise establishment of its FAD to the higher part of the *Bisphatodus costatus* – *Protognathodus kockeli* Interregnum.

Recent studies (see D–C boundary task-group report for 2011) showed that conodont biostratigraphy is facing serious problems associated with the taxonomy of the first siphonodellids, their dependence on facies and discontinuous occurrences of protognathodids at the D–C boundary. Therefore, the correlative potential of geochemical and petrophysical signatures is high and offers an alternative to the refining of the problematic biostratigraphic division of the D–C boundary. The results obtained by the Czech team support the views of WALLISER (1984) who regarded the Hangenberg Event as worldwide, synchronous, and a natural D–C boundary.

Similar studies started in sections in Belgium in the Namur–Dinant basin (Gendron–Celles, Rivage and Avesnois) in cooperation with task-group member Eddy POTY and in southern France in the French Pyrenees (Miles, Saubette) and the Montagne Noire (La Serre, Puech) in cooperation with task-group member Markus ARETZ. First results from the Namur–Dinant Basin show a distinct positive $\delta^{13}\text{C}$ excursion in the basal part of the Avesnelles Limestone in Avesnois and Hastiere Limestone in the Gendron–Celles section which is different from the excursion in the *Bisphatodus costatus* – *Protognathodus kockeli* Interregnum. In the Avesnois the basal part of the Avesnelles Limestone contains advanced *Chernyshyshinella* foraminifers indicating already a higher level in of the lower Tournaisian.

C. CORRADINI (Cagliari) has several ongoing projects related to the D/C boundary in various part of North Gondwana. In Sardinia (Italy) the Monte Taccu section has been resampled, and a new section has been measured in the Clymeniae

limestone of the southwestern part of the island. Further studies of D-C sections are being conducted in Iran (collaboration with A. BAHRAMI) and in the Montagne Noire (collaboration with C. GIRARD).

R.T. BECKER (Münster) reports for his research group the following activities in 2012.

1. Continuing investigation of the Lalla Mimouna North section at the northern margin of the Maider region, SE Anti-Atlas, Morocco: All additional conodont samples from 2011 and spring 2012 have been picked but are not yet fully identified. The full set of identifications will be included in the Field Guide contribution for next year's (spring 2013) field symposium, which will be an update of the preliminary reports in the SCCS and SDS Newsletters. D. BRICE has just submitted an identification list for the brachiopods from the Hangenberg Sandstone interval (Fezzou Formation tongue) from between the local pre- and post-Hangenberg Event crinoidal limestones. A new collection of ammonoids from the overlying *Gattendorfia* shale, jointly with S. Stichling, extends the number of basal Tournaisian ammonoid taxa and includes the first *Eocanites* from the section. The Münster isotope laboratory provided data on stable- carbon and oxygen isotopes for all conodont sample beds and for samples from the adjacent section with "Stockum level" goniatites. There, the dark marker bed with *Postclymenia evoluta* FRECH, 1887 (*kockeli* Zone) produced an unusual and strong negative carbon isotope signal, which suggests a strong influx of diagenetically mobilized and recycled organic carbon. Thin sections of all beds have been produced and will soon be subject to detailed microfacies analyses.

BECKER (2012) listed in the SDS Newsletter 27 poorly known and recent publications on D-C boundary sections -successions of southern Saskatchewan (Canada), Iran, Russia (Moscow Syncline, southern Urals, Vaygach Island), Azerbaijan, China (Hainan Island), and Vietnam. It seems to be important to involve the various authors in the work of the task group.

Colleagues from Malaysia, especially Hakif Hassan MEOR (Kuala Lumpur, University of Malaya), contacted us in relation to the succession of the Perlis region, where a published occurrence of deposits that may lie within the Hangenberg Black Shale level with "*Posidonia*" (probably *Guerichia*) and ammonoids overlying the regional Chepor Formation (MEOR & LEE, 2005) has been mostly overlooked by other D-C boundary workers. Cooperation concerning underlying Famennian conodont faunas was agreed upon and the conspicuous black shale will be sampled for palynomorphs.

In the frame of the running German-Moroccan programme (DFG-CNRST) on the Eovariscan evolution of the southern and northern external margins of the Variscides, we took some preliminary samples from several successions across the D-C boundary in the Moroccan Meseta. All sections are in elastic facies but we hope for some biostratigraphic dating with the help of palynomorphs. The Meseta has no potential for a conodont-defined boundary but may provide important auxiliary clastic sections, depending on the outcome of our sampling.

The group at Münster assisted H. TRAGELEHN to finish the extensive photography of his important early siphonodellids and related new genera from the pre-Hangenberg limestones of Franconia and Thuringia. He commented on the contemporaneous and closely related new forms from the Wocklumian (Upper Devonian VI) of the Tafilalt (HARTENFELS & BECKER, 2012), which will be published in detail next year. These forms further underline the taxonomic complexity at the transition from polygnathids to siphonodellids in the uppermost Devonian, with implications for our understanding of the siphonodellid lineage through the Hangenberg Crisis and into the post-event radiation phase.

T. FISCHER is investigating in the frame of his current M.Sc. the ontogenetic morphometry of uppermost Famennian ammonoids from Morocco, and Germany. First results show that the early ontogenetic opening of the umbilicus is not restricted to the *Acutimitoceras* Group during and after the Hangenberg Event Interval but is already rather wide-spread in specific Prionoceratidae ("imitoceratids") before the event. This has implications for the understanding of the phylogeny of ammonoids across the D-C interval, with possible implications for the stratigraphic significance of some taxa.

A new monograph on the Lower Carboniferous trilobites of southern Morocco (HAHN et al. 2012) includes new records of a few rare taxa from just before or within the wider Hangenberg Crisis Intervall (*Pudoproetus zhorae* HAHN & MÜLLER in Hahn et al. 2012, from Mkakrig, eastern Tafilalt, *Pseudowaribole* (*Pseudowaribole*) *conifera* aff. *gibber* (ALBERTI, 1975) from Kheneg Lakahal, western Dra Valley). The first implication of the trilobite study is that *Pudoproetus* can be used to locate the initial phase of the post-Hangenberg transgression in Morocco, thereby extending the known region impacted by the event into northern Gondwana. The second major impact of the study is that it suggests all of the Maader Talmout Member of the Tazout Formation, including the characteristic, supposed basal Tournaisian brachiopod fauna 2 of BRICE et al. (2005, 2008), still falls in the pre-Hangenberg Event interval.

Pudoproetus has significant implications for the brachiopod stratigraphy across the Hangenberg Crisis and D-C Boundary interval. Its presence suggests a correlation of the subsequent, unfossiliferous, probably marginal marine Kheneg Lakahal Member of the Tazout Formation with the Hangenberg Regression.

B. ELLWOOD (Baton Rouge, U.S.A.) and colleagues have been working on some of the Woodford Shale D-C boundary intervals in Oklahoma, where there is fair knowledge of the conodont biostratigraphy (from J. OVER). They have been sampling and measuring magnetic susceptibility on collected samples, and have obtained gamma-ray measurements from outcrops and collected samples. Although they are working in silicified shales with limited biostratigraphic information, the sections are easily correlated over a distance of ~100 km using geophysical data sets and therefore these data sets may provide good, diagnostic secondary parameters for comparison among other sections.

Ji Qiang (Beijing) and his research group have worked in recent years on the D-C boundary and the phylogeny of *Siphonodella* in China.

1. Three D-C boundary sections in Muhua area of Guizhou Province are being re-studied, and additional conodont samples collected from them. According to the morphology, ornamentation and symmetry of the platforms, the ratio of platform to anterior blade dimensions, and the size, morphology and position of the basal cavity, four genera of siphonodellids can be differentiated: *Protosiphonodella*, *Siphonodella*, *Eusiphonodella* and *Eosiphonodella*. Among them, only *Eosiphonodella* can be found in shallow-water facies.

2. The phylogeny of the siphonodellid group is re-studied, and the D-C boundary can be defined by the first occurrence of *Siphonodella sulcata* (HUDDLE, 1934) morphotype 1 sensu KAISER & CORRADINI (2011).

3. The elements of *Protognathodus* are very rare in China, and it is difficult to recognize the D-C boundary based on the first occurrence of either *Pr. kockeli* ZIEGLER & LEUTERITZ, 1970 or *Pr. kuehni* (BISCHOFF, 1957).

4. A bentonite layer occurs in Bed E of the Dapoushang Member of the Wangyou Formation, and has provided a radiometric age of 359.6 Ma. The age of the D-C boundary at Dapoushang, Guizhou province, South China, is estimated at 358.6 Ma or 359.58 Ma.

Barry RICHARDS (Calgary, Canada) and colleagues continued their studies of the upper

Famennian to lower Tournaisian (includes Exshaw and Bakken formations) in the Western Canada Sedimentary Basin and adjacent Montana to see if the main events in the multi-phase Hangenberg Event Interval (KAISER 2005, Kaiser et al. 2008), can be more precisely located in the region using a multidisciplinary approach. The year's activities included the measurement of surface sections and study of several bore-hole cores in preparation for a core conference. The work is part of a broader investigation intended to access the conventional and non-conventional hydrocarbon resources of the interval.

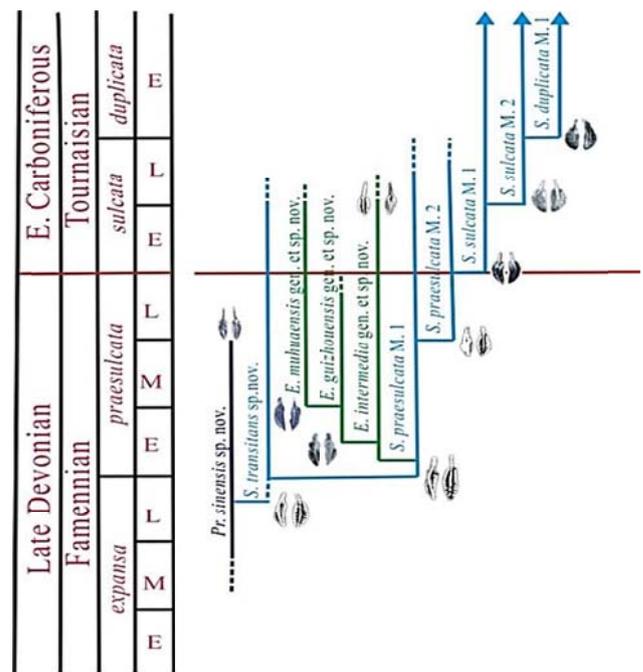


Fig. 1: Phylogenetic relationships of *Protosiphonodella*, *Siphonodella* and *Eusiphonodella*.

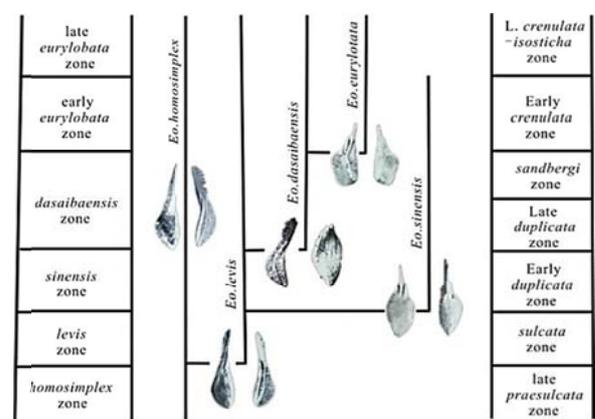


Fig. 2: Phylogeny of *Eosiphonodella* of shallow-water facies in China.

Knowledge of the succession's conodont biostratigraphy was greatly advanced by JOHNSTON et al. (2010). The conodont data indicate the contact between the Devonian and Carboniferous lies in the upper part of the black shale member of the Exshaw at its type section and some other localities; but the position of the D-C boundary has not been precisely located. It is anticipated that data from a multidisciplinary approach including stable-isotope geochemistry and radiometric dating will more tightly constrain the position of the boundary.

Outlook

The results presented at the Morocco workshop in March 2013 will determine the future steps and directions of the work of the task group in the next years.

The primary task remains to locate either a suitable event horizon or a suitable event in a biological lineage to define the boundary. However, the recent progress shows that new detailed correlations and agreements on taxonomy and temporal distribution of many taxa are needed, especially when the correlations are still based on the *Siphonodella praesulcata*-*S. sulcata* lineage or on protognathodids. The problems outlined by KAISER & CORRADINI (2011) and CORRADINI et al. (2011) have to be fully integrated in the current discussions. The paradigm that conodonts are the best markers for the definition of the boundary can currently not be upheld and thus the working group will have to reevaluate the potential of other taxa than conodonts for the boundary definition.

References

- BECKER, R.T., ABOUSSALAM, Z.S. & S. HARTENFELS 2012. The Devonian-Carboniferous boundary at Lalla Mimouna (northern Maider, Anti-Atlas, SE Morocco) – preliminary new data. – *SDS Newsletter*, **27**: 31-37.
- BECKER, R.T. 2012. Interesting but potentially overlooked recent Devonian papers: D/C Boundary. – *SDS Newsletter*, **27**: 62-63.
- BRICE D., LEGRAND-BLAIN M. & J.P. NICOLLIN 2005. New data on Late Devonian and Early Carboniferous brachiopods from NW Sahara : Morocco, Algeria. - *Annales de la Société Géologique du Nord*, **12** (2ème série): 1-45.
- BRICE D., LEGRAND-BLAIN M. & J.P. NICOLLIN 2008. Brachiopod faunal changes across the Devonian-Carboniferous boundary in NW Sahara (Morocco, Algeria). – In: BECKER R.T. & W.T. KIRCHGASSER (eds.), Devonian Events and Correlations. *Geological Society, London, Special Publications*, **278**: 261-271.
- CORRADINI, C., KAISER, S.I., PERRI, M.C., & C. SPALLETTA 2011. *Protognathodus* (Conodonts) and its potential as a tool for defining the Devonian/Carboniferous boundary. - *Rivista Italiana di Paleontologia e Stratigrafia*, **117**: 15-28.
- HAHN, G., MÜLLER, P. & R.T. BECKER 2012. Unter-karbonische Trilobiten aus dem Anti-Atlas (S-Marokko). – *Geologica et Palaeontologica*, **44**: 37-74.
- HARTENFELS, S. & R.T. BECKER 2012. Conodont age and correlation of the transgressive *Gonioclymenia* and *Kallocklymenia* Limestones (Famennian, Anti-Atlas, SE Morocco). – *Terra Nostra*, **2012** (3): 67.
- JOHNSTON, D.I., HENDERSON, C.M. & M.J. SCHMIDT 2010. Upper Devonian to Lower Mississippian conodont biostratigraphy of uppermost Wabamun Group and Palliser Formation to lowermost Banff and Lodgepole formations, southern Alberta and southeastern British Columbia, Canada: Implications for correlations and sequence stratigraphy. - *Bulletin of Canadian Petroleum Geology*, **58** (4): 295-341.
- KAISER, S.I. 2005. *Mass extinction, climatic change and oceanographic changes at the Devonian-Carboniferous boundary*. - Ph. D. Thesis, Ruhr-Universität Bochum, Germany, 156 p. (unpublished).
- KAISER, S.I., STEUBER, T. & R.T. BECKER 2008. Environmental change during the Late Famennian and Early Tournaisian (Late Devonian-Early Carboniferous): implications from stable isotopes and conodont biofacies in southern Europe. - *Geological Journal*, **43**: 241-260.
- KAISER, S.I. & C. CORRADINI (2011). The early siphonodellids (Conodonts, Late Devonian-Early Carboniferous): overview and taxonomic state. – *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, **261/1**: 19-35.
- MEOR, H. H. & C.P. LEE 2005. The Devonian-Lower Carboniferous succession in Northwest Peninsular Malaysia. - *Journal of Asian Earth Sciences* **24**:719-738.
- WALLISER O.H. 1984. Pleading for a natural D/C boundary. - *Courier Forschungsinstitut Senckenberg*, **67**: 241-246.

Joint D-C Boundary GSSP Reappraisal Task Group

Chairman: Markus ARETZ

Vice-chairman: Carlo CORRADINI

Members: Markus ARETZ, Jim BARRICK, R. Thomas BECKER, Paul BRENCKLE, Denise BRICE, Geoff CLAYTON, Carlo CORRADINI, Brooks ELWOOD, Ji QIANG, Jiri KALVODA, Rich LANE, Sandra I. KAISER, John E. MARSHALL, Hanna MATYJA, Svetlana NIKOLAEVA, Vladimir PAZUKHIN, Edouard POTY, Barry RICHARDS, Claudia SPALLETTA, WANG Cheng-Yuan.

SDS DOCUMENTS

**COMMENT ON “REEF RECOVERY
FOLLOWING THE FRASNIAN-
FAMENNIAN (LATE DEVONIAN)
MASS EXTINCTION: EVIDENCE
FROM THE DUGWAY RANGE,
WEST-CENTRAL UTAH”
PUBLISHED IN *PALAIOS* BY J.R.
MORROW, P.J. HARRIES, AND J.G.
KRIVANEK**

C.W. STOCK¹ & C.A. SANDBERG²

¹Department of Geological Sciences, University of Alabama, Emeritus, 31220 Florence Road, Conifer, Colorado, 80433-7515, USA, cstock@geo.ua.edu

²Geologist Emeritus, U.S. Geological Survey, 395 South Lee Street, Lakewood, Colorado 80226-2749, USA.

Introduction

MORROW et al. (2011) reported the first occurrence of Famennian stromatoporoids in the United States. The much earlier report of a supposed stromatoporoid, *Parallelopora*, from the Famennian of Wyoming (JOHNSON & PFENDER, 1939) is now discounted (STOCK & SANDBERG submitted) — it is a non-stromatoporoid sponge of Middle Mississippian age. Most stromatoporoids did not survive the end-Frasnian mass extinction, but some genera did, and some new genera appeared during the Famennian, only to have all become extinct at the close of the Devonian.

Despite some errors in this paper in documenting a low Famennian occurrence, we herein confirm that it is datable as Middle *crepida* Zone, based on conodont sample BLD-2 collected by SANDBERG in 1978 at the Bullion Canyon locality from the same level as samples BLD 27 and BLD 28 of MORROW et al. (2011, table 1 and fig. 6). Because of the many high-angle normal and low-angle bedding plane faults, as well as cliffs, at this locality, SANDBERG, BILLER (1976a, 1976b), and MORROW et al. chose different routes for section measurements. These factors account for slight differences in measured bed thickness in their stratigraphic sections. Confirmation of the Middle *crepida* Zone dating is provided by correlation to the stratigraphic section at Bactrian Mountain, Nevada (SANDBERG & ZIEGLER 1973, text-fig. 2). There, as at Bullion Canyon, the lowest unit of the West Range Limestone, overlying the highest sandstone bed of the Guilmette Formation, is a massive cliff-forming limestone, the only massive bed in the West Range. However, in contrast to the sparse conodont faunas found at Bullion Canyon, the lower part of the basal unit at Bactrian

Mountain contains unequivocal, rich faunas of the Middle *crepida* Zone. This dating is constrained by even richer faunas of the Late *crepida* Zone in the upper part of the same unit (SANDBERG & ZIEGLER 1973, table 1).

This otherwise important contribution suffers from four circumstances:

(1) The senior author, Jared MORROW, who was knowledgeable in the local geology of the Dugway Range and in the Devonian of the western United States, could not have been involved in the final assembly of the published paper. He became gravely ill in April 2009. At that time he wrote SANDBERG and asked him to review a correlation chart (Figure 4) that he had been requested to contribute for use in this paper. That was his only involvement. Thereafter, he became gravely ill and died an untimely death, one day before his 51st birthday, in October 2010.

(2) Unfortunately, the authors did not include stromatoporoid generic geologic range information from three extant publications by STEARN et al. (1999), NESTOR & STOCK (2001), and STOCK (2005). The Treatise Online revisions of stromatoporoid nomenclature and ranges by WEBBY et al. (2012) appeared much too late to be considered in the subject paper, but all these publications demonstrate how differently the interpretive discussion in MORROW et al. (2011) could have been.

(3) The M.S. thesis by KRIVANEK (2006), which bears nearly the same title as MORROW et al. (2011), and is undoubtedly its source, was not referenced.

(4) MORROW et al. (2011) was not peer reviewed by any scientists with extensive knowledge of stromatoporoids, conodonts, complex local geology, or geology of the western United States.

Carl W. STOCK is responsible for the discussion of stromatoporoids and Charles A. SANDBERG addresses stratigraphic issues. SANDBERG is uniquely qualified to address these issues. He began work on the Devonian and Mississippian of the Dugway Range in 1975 together with his field assistant Edward J. BILLER. He later supervised BILLER'S M. S. thesis and subsequent Open-File Report (BILLER, 1976b), which presented measured sections of the Upper Devonian in Buckhorn and Bullion Canyons. SANDBERG later worked on the Mississippian of these canyons in collaboration with Raymond C. GUTSCHICK and William J. SANDO. In 2004, SANDBERG introduced MORROW to the complex geology of the northern Dugway Range, and they jointly examined and collected conodont samples from Upper Devonian and Lower Mississippian rocks in 2007 and 2008.

To confirm our statements herein, we visited Bullion Canyon on 28 June 2012, STOCK for the first time, and SANDBERG for the fifth time. STOCK climbed to the “reef” outcrop. There is no question that the deposit is a biostrome. Whether this buildup represents a bank or debris from an adjacent reef remains a matter of conjecture.

Stratigraphy

Following are some of the many errors that detract from this important contribution:

(1) At the end of page 614, and in similar treatment throughout the paper, statements of zonation read, “assemblages that date from the middle *Palmatolepis crepida* biozone to the upper *P. marginifera* biozone.” Jared MORROW in most of his later publications subscribed to the phylogenetic zone concept of ZIEGLER & SANDBERG (1994). In this concept of zones as time, the zonal names are prefixed by a capitalized “Early, Middle, or Late” to demonstrate that they are formal names of separate zones, and not informal parts of a single zone. To demonstrate that these are globally applicable, and not local, zones, a generic name is never used, and the word Zone is capitalized. In fact, as a general rule, Devonian and other conodont workers do not employ generic names based on the most important or Pa element, because genera are subject to change as full apparatuses are reconstructed. Only the specific name remains inviolate. Consequently, had MORROW written the above quotation, it would have read, “assemblages that date from the Middle *crepida* to Late *marginifera* Zone.”

(2) This statement on page 609 demonstrates the scientific inaccuracy produced by a junior author having added a generic name to a zone: “By the late middle Famennian lower *Ozarkodina postera* Biozone. . .” Not only does an *Ozarkodina postera* Zone not exist, but also the conodont species *Ozarkodina postera* does not range above the Frasnian. Moreover, MORROW’S usage of phylogenetic-range zones would have precluded the awkwardness of mixing time and time-rock concepts in the statement.

(3) Figure 6 on page 612 shows a partial usage of MORROW’S application of “early” and “late” to zonal names, in disagreement with the changed usage in the rest of the text. This figure was not part of the M.S. thesis of KRIVANEK (2006), so before his death MORROW might have combined and modified KRIVANEK’S figures 9 and 10. However, MORROW was such a stickler for avoiding misspellings that he would have corrected the lithologic symbol named “Dolomite-cemented sandstone.” This could have been added later. A further detraction from this figure is that conodont sample numbers are identifiable by bed for the

Buckhorn Canyon Section, but not for the Bullion Canyon section. These should have been numbered “BCS 37, 34, 33, 32, 28, 27, 17, and 6,” in descending order, as inferred from Table 1.

(4) Table 1 on page 614 is upside-down. Conventionally, tabulations of conodont sample occurrence are given in descending order from youngest to oldest to conform to their positions on accompanying columnar sections.

(5) The caption for Figure 5 on page 611, stating that “The uppermost, massive limestone is the Dugway Reef”, contains two errors. The “Dugway Reef” is not a reef, but part of a regionally extensive carbonate bank, and more appropriately referred to as a biostrome. The caption employs Dugway Reef without quotation marks, whereas Figure 4 on page 611, which was prepared by MORROW and sent to SANDBERG for review in April 2009, called this the “Dugway Reef” in quotation marks. Figure 4 demonstrates that MORROW knew that the lower stratigraphic position was correct, as demonstrated by his Figure 4. This shows the “Dugway Reef” directly above the Guilmette Formation, which forms the sandstone beds. The reef concept may have developed not because of the unit possessing a wave-resistant framework, but because of the reef-like appearance of the apparent hilltop shown in Figure 5. This appearance results from the extreme upward angle at which this photograph was taken. When we revisited the locality we took several horizontal photographs from different angles. These demonstrate that the “reef” is located on a spur in the middle of a hill slope and that the hill is capped by Lower Mississippian Joana Limestone. The vertical face of the “reef” at the left results from a normal fault that downdrops the spur.

(6) The statement in the second sentence of this quotation from page 614 is incorrect: “There is less biostratigraphic control on the Buckhorn Canyon section (BCS). No *Amphipora*-rich units are present to identify the latest [sic] Frasnian and the overlying Joana Limestone has been removed by Carboniferous erosion.” Not only is the Joana present and 24 m thick, as MORROW knew from sampling it there with SANDBERG in 2008, but also it is overlain by the Osagean to Meramecian Woodman Formation, thicker than 265 m, and the Meramecian to Chesterian Ochre Mountain Limestone (POOLE & SANDBERG 1991, fig. 5, Column 17, Buckhorn Canyon).

(7) The statement on page 609 reading “Final convergence of the Antler Orogen with western North America . . .” is incorrect. The Antler Orogen was part of North America, and formed on the continental shelf, as shown by POOLE & SANDBERG (1977, fig. 8).

Paleontology

Problems arise with the presentation of MORROW et al. (2011) Figure 12, a compilation of the geologic ranges of Paleozoic stromatoporoid genera, and interpretations based on that figure. Here is presented an updated genus range chart (Fig. 1), and commentary on their interpretations.

Errors in their Figure 12 take several forms.

(1) Three genera are misspelled: *Plumatalina* for *Plumatalinia*; *Petroidistroma* for *Petridiostroma*; and *Columnostratum* for *Columnostroma*.

(2) Eight junior synonyms are included: *Diplostroma* for *Simplexodictyon*; *Faciledictyon* for *Petridiostroma*; *Clathrostroma* for *Gerronostroma*; *Amnestostroma* for *Hermatostromella*; *Flexiostroma* for *Trupetostroma*; *Aculatostroma* for *Atelodictyon*; *Imponodictyon* for *Trupetostroma*; and *Pseudostromatoporella* for *Stromatoporella*. Removal of the eight junior synonyms brings the total genera included in their Figure 12 to 75, far fewer than the 120 in our Figure 1.

(3) Their inclusion of *Pulchrilamina* was appropriate for the time; however, WEBBY (2012) removed this genus from the *Stromatoporoidea*, effectively lowering the genus total of their Figure 12 to 74, only 62% of known Paleozoic stromatoporoid genera.

(4) Only 13 of the generic ranges of MORROW et al. (2011, fig. 12) are correct in relation to those reported by WEBBY et al. (2012; Fig. 1 herein). Some of these range differences are (correct range in parentheses): (a) *Lineastroma* Givetian to Frasnian (Middle Silurian); (b) *Ecclimadictyon* Middle Ordovician to Givetian (Upper Ordovician to Upper Silurian); (c) *Stromatocerium* Middle Ordovician to Famennian (Upper Ordovician); (d) *Clathrodactyon* Middle Ordovician to Famennian (Upper Ordovician to Givetian); (e) *Actinostroma* Upper Ordovician to Frasnian (Lochkovian to Frasnian); (f) *Salairiella* Upper Silurian to Frasnian (Pragian to Frasnian); and (g) *Habrostroma* Lochkovian to Eifelian (Upper Silurian to Frasnian).

(5) *Synthetostroma* appears twice on their Figure 12: Pragian to Frasnian; and Givetian to Frasnian, which is correct.

(6) Recently, NESTOR (2011) renamed two genera, as their original descriptions rendered them nomina nuda: *Gerronostroma* is now *Gerronostromaria*; and *Intexodictyon* is now *Intexodictyides*.

Two central themes in MORROW et al.'s (2011) analysis, based on their Figure 12, are that: (1) originations decreased in the Devonian relative to earlier times; and (2) an important factor

contributing to a stromatoporoid genus' survival of the Frasnian-Famennian mass extinction is its origination in the Ordovician.

Genus originations per series from the Ordovician and Silurian range from a low of 12 in the Middle Ordovician to a high of 15 in the Lower Silurian, yielding a median of 13 per series. Devonian series yield higher generic origins per series, with 25 for the Lower Devonian, 19 for the Middle Devonian, and 10 for the Upper Devonian. When viewed at the stage level, Devonian genus originations prior to the Frasnian-Famennian mass extinction are 12 for the Lochkovian, eight for the Pragian, five for the Emsian, 15 for the Eifelian, four for the Givetian, and three for the Frasnian. The relatively high totals for the Lower Silurian and Eifelian both represent biotic recoveries following major geological events, the end-Ordovician mass extinction for the first, and the extreme sea-level lowstand associated with the end of SLOSS' (1963) Tappan Sequence for the second. There are two Devonian sequences of diminishing genus originations, one extending from the Lochkovian (12) through Emsian (5), and the other from the Eifelian (15) through Frasnian (3).

MORROW et al.'s (2011) Figure 12 masks the Lower Devonian decrease in originations, with four in the Lochkovian, three in the Pragian, and 13 in the Emsian. Their decrease in originations continues from the Emsian high of 13, followed by 10 in the Eifelian, and three in the Givetian—they report no Frasnian originations. Therefore, data reported here indicate a later start to the decrease in originations, Givetian rather than Eifelian. Whether or not the onset of the latter origination decrease is related to the Givetian Taghanic Onlap, and its resultant mixing of Old World Realm and Eastern Americas Realm stromatoporoids as postulated by STOCK (2005), requires further detailed study.

MORROW et al. (2011, p. 618) stated (numbers in brackets based on WEBBY et al., 2012; see Fig. 1 herein):

An analysis of a range chart of Paleozoic stromatoporoid genera (Fig.12) derived from a literature survey as well as from the Paleobiology Database (<http://paleodb.org>) indicates that the end-Famennian extinction pulse (the so-called Hangenberg Event) was a major crisis for those stromatoporoid genera [that] made their first appearances in the Ordovician. Of the 22 [25] genera to which this distinction applies, 14 [12] survived the end-Ordovician mass extinction and of those, eight long-ranging genera survived to the Givetian. During the extended Late Devonian crisis, a single genus makes its last appearance in the Givetian, one in the Frasnian, and six in the Famennian. Two of these six extinction resistant

stromatoporoid sponges are *Labechia* and *Stylostroma*, which are both found at the Dugway Range site. For stromatoporoid genera that evolved after the end-Ordovician mass extinction, the end-Frasnian event is more severe. Sixty-three [Ninety-seven] stromatoporoid genera make their first appearance in the Silurian and [Early-Middle] Devonian and of these, only 39 [43] were still extant in the Givetian. Of these 39 [43] taxa, six [14] make their last appearance in the Givetian, 21 [22] in the Frasnian, and 12 [seven] in the Famennian.

Also to be taken into account are five genera restricted to the Frasnian, and seven genera restricted to the Famennian.

As for prior forms surviving to the Famennian, perhaps it is not their time of origination (Ordovician), but their systematic affinity. Thirteen genera of order Labechiida, three of order Clathrodictyida, one each of orders Stromatoporellida and Amphiporida, and two genera of uncertain ordinal and familial affinities were present in the Famennian. In addition to the 22 labechiid genera originating in the Ordovician, three clathrodictyid genera originated in the Ordovician as well; however, *Ecclimadictyon* became extinct in the Late Silurian, *Stelodictyon* in the Lochkovian, and *Clathrodictyon* in the Givetian, which does nothing to support the Ordovician origination case for survival to the Famennian. Labechiid stromatoporoids dominated in the Middle and Late Ordovician, but were a minor component of stromatoporoid faunas from the Early Silurian through the Frasnian. Their predominance in the Famennian, 12 of 19 genera, including all seven Famennian originations, suggests that a currently unknown characteristic innate in the labechiids explains their post-extinction success.

Most of the problems encountered by MORROW et al. (2011) came from the lack of consideration of available information. The summary paper on Paleozoic stromatoporoids by STEARN et al. (1999) was not cited, so it must be assumed that MORROW et al. (2011) did not consult that reference. The same can be said of NESTOR & STOCK'S (2001) summary of Upper Ordovician-Lower Silurian stromatoporoid generic ranges. Although MORROW et al. cited STOCK (2005), they did not include information on the geologic ranges of Devonian stromatoporoid genera from his Table 1. It is not clear if the authors could have had access to STEARN'S (2011) and NESTOR'S (2011) publications on the systematic paleontology — including geologic ranges — of genera in stromatoporoid orders Stromatoporellida, Stromatoporida, Syringostromatida, Amphiporida, and Clathrodictyida, and genera of uncertain affinities, before they submitted their manuscript.

Presentation here of a figure showing genus ranges based on work available to MORROW et al., but not included, would result in another imperfect potential icon; instead, our Figure 1 is based on the latest available information (WEBBY et al. 2012).

The other factor contributing to MORROW et al.'s (2011) incorrect information is a dependence on the Paleobiology Database (<http://paleodb.org>), which itself is heavily dependent for stromatoporoids on the compendium of SESPKOSKI (2002). A critique of SESPKOSKI'S publication is not appropriate here, save it to say that it is far from our Figure 1. The Paleobiology Database states that it uses STEARN et al. (1999) as its source for higher levels of classification of the stromatoporoids, another place where MORROW et al. were exposed to this publication.

The source of MORROW et al.'s (2011) misinformation can be explained in some cases, but for others it remains unknown — two examples are given here. The Upper Ordovician origination of *Actinostroma* presented by MORROW et al. (2011, fig. 12), contrasted with the Lochkovian origination in our Figure 1, seems to come from the Paleobiology Database, which apparently took its information from a cited 1980 faunal list of fossils from Qing Province, China. The Givetian-Frasnian range of *Lineastroma* of MORROW et al. (2011, fig. 12) contrasts with the Middle Silurian (Wenlock) range in our Figure 1. The Paleobiology Database contains a page on *Lineastroma*, but no stratigraphic distribution is given. The late Jared MORROW, although first among the authors, no doubt had little to nothing to do with MORROW et al.'s (2011) Figure 12.

Acknowledgments

STOCK thanks Colin W. STEARN, Barry D. WEBBY, and Heldur NESTOR for discussing the stromatoporoid-related matters of this paper with him, and for encouraging him to write this paper; however, the conclusions are solely those of the authors. SANDBERG thanks Gilbert KLAPPER for reviewing his contribution.

References

- BILLER, E.J. 1976a. *Stratigraphy and petroleum possibilities of lower Upper Devonian (Frasnian and lower Famennian) strata, southwestern Utah*. - Unpublished M.Sc. thesis, Colorado School of Mines, Golden, Colorado, 105 p.
- BILLER, E.J. 1976b. *Stratigraphy and petroleum possibilities of lower Upper Devonian (Frasnian and lower Famennian) strata, southwestern Utah*. - U.S. Geological Survey Open-File Report, **76-343**, 105 p.
- JOHNSON, J.H. & PFENDER, J. 1939. *Parallelopora goldfussii* from the Devonian near Cody, Wyoming. - *Journal of Paleontology*, **13**: 515-516.
- KRIVANEK, J G. 2006. *Reef recovery following the Late Devonian mass extinction: evidence from the Dugway*

- Range, west-central Utah*. - M. S. thesis, University of South Florida, Tampa, Florida, Theses and Dissertations Paper **2595**, 64 p., <http://scholarcommons.usf.edu/etd/2591>.
- MORROW, J.R., HARRIES, P.J. & KRIVANEK, J.G. 2011. Reef recovery following the Frasnian-Famennian (Late Devonian) mass extinction: evidence from the Dugway Range, west-central Utah. - *Palaios*, **26**: 607-622.
- NESTOR, H. 2011. Part E, Revised, Volume 4, Chapter 16C: Clathrodictyida. - *Treatise Online*, **26**, 15 p., <http://paleo.ku.edu/treatiseonline>.
- NESTOR, H. & STOCK, C.W. 2001. Recovery of the stromatoporoid fauna after the Late Ordovician extinction. - *Bulletin of the Tohoku University Museum*, **1**: 333-341.
- POOLE, F.G. & SANDBERG, C.A. 1977. *Mississippian paleogeography and tectonics of the Western United States*. - In: STEWART, J. H., STEVENS, C. H., & FRITSCH, A. E. (Eds.), *Paleozoic paleogeography of the Western United States*, Society of Economic Paleontologists and Mineralogists, Pacific Section, Pacific Coast Paleogeography Symposium **1**, p. 67-85.
- POOLE, F.G. & S SANDBERG, C.A. 1991. Mississippian paleogeography and conodont biostratigraphy of the Western United States. - In: COOPER, J.D. & STEVENS, C.H. (Eds.), *Paleozoic paleogeography of the Western United States - II*, v. 1. Los Angeles, CA, Pacific Section, Society of Economic Paleontologists and Mineralogists, Book **67**, p. 107-136.
- SANDBERG, C.A. & ZIEGLER, W. 1973. Refinement of standard Upper Devonian conodont zonation based on sections in Nevada and West Germany. - *Geologica et Palaeontologica*, **7**: 97-122.
- SEPKOSKI, J.J., jr.R. 2002. A compendium of fossil marine animal genera. - *Bulletins of American Paleontology*, **363**, 560 p.
- SLOSS, L.L. 1963. Sequences in the cratonic interior of North America. - *Geological Society of America Bulletin*, **74**: 93-111.
- STEARNS, C.W. 2011. Part E, Revised, Volume 4, Chapter 16E: Stromatoporellida, Stromatoporida, Syringostromatida, Amphiporida, and genera with uncertain affinities. - *Treatise Online*, **19**, 61 p., <http://paleo.ku.edu/treatiseonline>.
- STEARNS, C.W., WEBBY, B.D., NESTOR, H. & STOCK, C. W. 1999. Revision and terminology of Palaeozoic stromatoporoids. - *Acta Palaeontologica Polonica*, **44**: 1-70.
- STOCK, C.W. 2005. Devonian stromatoporoid originations, extinctions, and paleobiogeography: how they relate to the Frasnian-Famennian extinction. - In: OVER, D.J., MORROW, J.R. & WIGNALL, P.B. (Eds.), *Understanding Late Devonian and Permian-Triassic Biotic and Climatic Events: Towards an Integrated Approach*. - *Developments in Palaeontology and Stratigraphy*, **20**, Elsevier, Amsterdam, p. 71-92.
- STOCK, C.W. & SANDBERG C.A. submitted. The putative stromatoporoid *Parallelopora goldfussii* BARGATZKY described by JOHNSON and PFENDER (1939) from the Upper Devonian (Famennian) of Wyoming is neither Devonian nor a stromatoporoid. - *Journal of Paleontology*.
- WEBBY, B.D. 2012. Part E., revised, Volume 4, Chapter 17: Class Uncertain, Order Pulchrilaminida, new order. - *Treatise Online*, **30**, 9 p., <http://paleo.ku.edu/treatiseonline>.
- WEBBY, B.D., STEARN, C.W. & NESTOR, H. 2012. Part E, Revised, Volume 4, Chapter 12: Biostratigraphy of the Paleozoic Stromatoporoidea. - *Treatise Online*, **32**, 22 p., <http://paleo.ku.edu/treatiseonline>.
- ZIEGLER, W. & SANDBERG, C.A., 1994. Conodont phylogenetic zone concept. - *Newsletters on Stratigraphy*, **30**: 105-123.

	Ordovician			Silurian			Devonian						
	Lower	Middle	Upper	Lower	Middle	Upper	Loch	Prag	Ems	Eif	Giv	Fras	Fam
<i>Priscastroma</i>	X												
<i>Sinodictyon</i>	X												
<i>Thamnobeatricea</i>	X	X											
<i>Aulacera</i>	X	X											
<i>Ludictyon</i>	X	X	X										
<i>Pseudostyloctyon</i>	X	X	X	X	X	X							
<i>Lophiostroma</i>	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Rosenella</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Cystostroma</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Labechia</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Labechiella</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Pachystylostroma</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Stratodictyon</i>		X											
<i>Stromatocerium</i>		X											
<i>Cystistroma</i>		X											
<i>Cryptophragmus</i>		X											
<i>Dematostroma</i>		X											
<i>Radiostroma</i>		X											
<i>Alleynodictyon</i>		X											
<i>Plumatalinia</i>		X											
<i>Taymyrostroma</i>		X											
<i>Ecclimadictyon</i>	X		X	X	X								
<i>Stelodictyon</i>	X	X	X	X	X		X						
<i>Clathrodactyon</i>	X	X	X	X	X		X	X	X	X	X		
<i>Stylostroma</i>	X	X	X	X	X		X	X	X	X	X	X	X
<i>Forolinia</i>		X											
<i>Pleostylostroma</i>		X											
<i>Rosenellinilla</i>		X	X										
<i>Pachystroma</i>		X	X										
<i>Eostromatopora</i>		X	X										
<i>Actinodictyon</i>		X	X	X									
<i>Desmostroma</i>		X	X	X									
<i>Vikingia</i>		X	X	X									
<i>Densastroma</i>		X	X	X									
<i>Intexodictyoides</i>		X	X	X			X	X	X				
<i>Syringostromella</i>		X	X	X			X	X	X				
<i>Oslodictyon</i>		X	X	X			X	X	X	X	X		
<i>Petridiostroma</i>		X	X	X			X	X	X	X	X		
<i>Plectostroma</i>		X	X	X			X	X	X	X	X	X	
<i>Geronostromaria</i>		X	X	X			X	X	X	X	X	X	X
<i>Cystocerium</i>			X										
<i>Gerronodictyon</i>			X										
<i>Lineastroma</i>			X										
<i>Neobeatricea</i>			X	X									
<i>Pseudolabechia</i>			X	X									
<i>Pichiostroma</i>			X	X									
<i>Actinostromella</i>			X	X			X						
<i>Araneosustroma</i>			X	X			X						
<i>Yabeodictyon</i>			X	X			X	X	X				
<i>Parallelostroma</i>			X	X			X	X	X				
<i>Simplexodictyon</i>			X	X			X	X	X	X			
<i>Stromatopora</i>			X	X			X	X	X	X	X	X	
<i>Clavidictyon</i>			X	X			X	X	X	X	X	X	X
<i>Plexodictyon</i>				X									
<i>Bicolumnostratum</i>				X									
<i>Crumplestroma</i>				X									
<i>Clathrodityella</i>				X									
<i>Perplexostroma</i>				X									
<i>Praeidiostroma</i>				X									
<i>Acosmostroma</i>				X									
<i>Labechiina</i>				X			X	X	X				

				<i>Hermatostromella</i>	X	X	X	X								
				<i>Paramphipora</i>	X	X	X	X	X	X						
				<i>Schistodictyon</i>	X	X	X	X	X	X	X					
				<i>Habrostroma</i>	X	X	X	X	X	X	X					
				<i>Amphipora</i>	X	X	X	X	X	X	X	X	X			
				<i>Belemnostroma</i>	X											
				<i>?Zeravshanella</i>	X	X	X									
				<i>Atopostroma</i>	X	X	X	X								
				<i>Lamellistroma</i>	X	X	X	X								
				<i>Coenellostroma</i>	X	X	X	X	X							
				<i>Coenostroma</i>	X	X	X	X	X							
				<i>Columnostroma</i>	X	X	X	X	X							
				<i>Syringostroma</i>	X	X	X	X	X							
				<i>Tienodictyon</i>	X	X	X	X	X	X						
				<i>Hammatostroma</i>	X	X	X	X	X	X	X					
				<i>Actinostroma</i>	X	X	X	X	X	X	X					
				<i>Atelodictyon</i>	X	X	X	X	X	X	X	X	X			
				<i>Coenostelodictyon</i>	X	X	X	X								
				<i>Tubuliporella</i>	X	X	X	X								
				<i>Parallelopora</i>	X	X	X	X	X							
				<i>Pseudoactinodictyon</i>	X	X	X	X	X	X						
				<i>Stromatoporella</i>	X	X	X	X	X	X						
				<i>Dendrostroma</i>	X	X	X	X	X	X						
				<i>Stictostroma</i>	X	X	X	X	X	X						
				<i>Salarella</i>	X	X	X	X	X	X						
				<i>Nexillamina</i>	X											
				<i>Glyptostromoides</i>	X	X	X	X								
				<i>Neosyringostroma</i>	X	X	X	X								
				<i>Pseudotrurpetostroma</i>	X	X	X	X								
				<i>Bifariostroma</i>	X	X	X	X	X			X				
				<i>?Cubodictyon</i>	X											
				<i>Syringodictyon</i>	X											
				<i>Paschkoviella</i>	X											
				<i>Pseudoactinostroma</i>	X											
				<i>Climacostroma</i>	X	X										
				<i>Taleastroma</i>	X	X										
				<i>Eostachyodes</i>	X	X										
				<i>Clathrocoilona</i>	X	X	X									
				<i>Hermatostroma</i>	X	X	X									
				<i>Idiostroma</i>	X	X	X									
				<i>Ferestromatopora</i>	X	X	X									
				<i>Stachyodes</i>	X	X	X									
				<i>Anostylostroma</i>	X	X	X	X					X			
				<i>Trupetostroma</i>	X	X	X	X					X			
				<i>?Pseudostromatopora</i>	X	X	X	X					X			
				<i>Hermatoporella</i>	X	X										
				<i>Synthetostroma</i>	X	X										
				<i>Arctostroma</i>	X	X										
				<i>Euryamphipora</i>	X	X										
				<i>Bullulodictyon</i>	X											
				<i>Styloporella</i>	X											
				<i>Novitella</i>	X											
				<i>Vietnamostroma</i>	X								X			
				<i>Platiferostroma</i>	X								X			
				<i>Parastylostroma</i>	X								X			
				<i>Eopennastroma</i>	X								X			
				<i>Pennastroma</i>	X								X			
				<i>Spinostroma</i>	X								X			
				<i>Pararosenella</i>	X								X			
				Total Genera	12	23	27	37	44	40	44	49	56	51	39	20

Fig. 1. Compilation of stratigraphic ranges of Paleozoic stromatoporeid genera from the Treatise Online (WEBBY et al., 2012). The Middle Ordovician represents the Darriwillian Stage; the Upper Ordovician includes the Sandbian, Katian, and Hirnantian Stages; the Lower Silurian represents the Llandovery Series; the Middle Silurian represents the Wenlock Series; and the Upper Silurian includes the Ludlow and Pridoli Series. An X marks a chronostratigraphic unit within the geologic range of a genus.

MISIDENTIFIED AND POORLY DOCUMENTED FOSSILS FROM WYOMING SKEW THE GLOBAL RECORD OF FAMENNIAN STROMATOPOROID OCCURRENCES

C.W. STOCK¹ & C.A. SANDBERG²

¹Department of Geological Sciences, University of Alabama, Tuscaloosa, Emeritus, 31220 Florence Road, Conifer, Colorado 80433-7515, cstock@geo.ua.edu

²U.S. Geological Survey, Box 25046, MS 939, Federal Center, Denver, Colorado 80225-0046, sandberg@usgs.gov

Introduction

JOHNSON & PFENDER (1939) described a fossil they identified as a stromatoporoid, *Parallelopora goldfussii* BARGATZKY, 1887 [sic], from a reputed outcrop of the Upper Devonian (Famennian) Three Forks Formation near Cody, Wyoming. If this occurrence were indeed from the Three Forks Formation, it would have to be from the lower, Logan Gulch Member (SANDBERG 1967), which is a sabkha deposit of early Famennian age (SANDBERG et al., 1989). The JOHNSON & PFENDER occurrence was considered to be the sole record of Famennian stromatoporoids in the United States prior to a conodont-dated Middle *crepida* Zone occurrence in Utah reported by MORROW et al. (2011). JOHNSON & PFENDER did not collect the specimen themselves, but were given it by a person, who was not identified as being a trained geologist. For their formational identification, they did not credit this individual, but a “Project.” This so-called “Project” is actually the Yellowstone-Beartooth Research Association, founded in 1936 by Princeton University geology professors for a field station in Red Lodge, Montana. Consequently, the 1939 authors were unaware of what later proved to be a geologically complex collection site that could not be corroborated as Three Forks Formation.

Current state of Famennian stromatoporoid research

The Famennian Age (Late Devonian) represents an important time in geologic history, between the Frasnian-Famennian (F-F) and Devonian-Carboniferous (D-C) mass extinctions. Sixty-six percent of Frasnian stromatoporoid genera became extinct at the F-F event, and all genera became extinct at the D-C event. Famennian stromatoporoids in North America are extremely rare, with two published occurrences in Alberta, Canada (STEARNS 1961, 1988) and two in the United States (JOHNSON & PFENDER 1939, MORROW et al. 2011).

Most reports of Famennian stromatoporoids from Eurasia are more than a half-century old and are unreliably dated. For example, YAVORSKY (1947, p. 33) described a species of *Stictostroma* (misidentified as *Stromatoporella*) from “Kazakhstan, eastern wing of the Sary-Adyr syncline. Upper strata of Upper Devonian.” However, *Stictostroma* did not survive the Frasnian according to STEARN (2011). Another example is RIABININ (1955, p. 9), who described a species of *Actinostroma* from “Southern Timan, River Izhema ... Izhemsk layer Upper Devonian, ... lower Famennian Stage.” [STOCK translation]. Riabinin’s *Actinostroma* might be *Labechia*. However, *Actinostroma* did not survive into the Famennian, whereas *Labechia* did (STOCK 2012; WEBBY 2012). It is critical that the insufficient and/or incorrect literature on Famennian stromatoporoids be totally reevaluated. However, our preliminary re-examination of the literature discloses few, if any, reliably dated Famennian stromatoporoid occurrences other than from the latest Famennian (so-called Strunian or Etroeungt fauna). The early Famennian North American occurrences thus are exceptional.

Location, age, and provenance

To establish the most likely true age of the illustrated specimen, it is first necessary to establish the location of the collection site. JOHNSON & PFENDER (1939, p. 515) stated: “The material was obtained from the top of a small ridge near Paint Creek on the north side of Pat O’Hara mountain, about 20 miles [33.4 km] northeast of Cody, Park County, Wyoming, approximately in T. 54 or 55 W., R. 104 W.” Pat O’Hara Mountain is the most plausible locality for the collection site. However, based on this geographic location, four errors, in parentheses, were made in their directions: Pat O’Hara Mountain is 9.6 km south of (not near) Paint Creek and separated from it by another drainage, it is 33.4 km northwest (not northeast) of Cody, and it is in T. 54 N. (not T. 54 or 55 W.), R. 104 or 105 W. (not R. 104 W.).

Having established the location of their “... outcrop of the fossil-bearing horizon [which] is small, being only a few feet wide on a steep slope” (p. 515), we conclude that the specimens illustrated by JOHNSON & PFENDER (1939) are not Devonian and unequivocally not Famennian. Significantly, the quality of the illustrated sections is such that the specimens must be preserved as calcite rather than dolomite. Next, let us consider the provenance of the rock from which they were recovered. Pat O’Hara Mountain is located within the path of the Heart Mountain detachment thrust, which has been recognized and mapped by PIERCE (1957). This thrust, which originated as a bedding plane thrust, cut across bedding at Dead Indian Hill on the west, and rode out eastward for at least 50 km into the

Bighorn Basin over rocks as young as Tertiary. The rocks involved in the thrust plate are the Ordovician Bighorn Dolomite, Devonian Jefferson and Three Forks Formations, and Mississippian Madison Limestone. Both Devonian formations are pervasively dolomitized, and neither contains any thin limestone interbeds that could have yielded the supposed Famennian fossils, either in footwall or upper plate of the Heart Mountain thrust, in this part of Wyoming (SANDBERG 1967, SANDBERG et al. 1989). Similarly, the underlying Bighorn Dolomite is pervasively dolomitized and its lithologies and fossil content rule it out as a possible host for the subject fossil.

The Madison Limestone is the only probable source for JOHNSON & PFENDER'S (1939) fossils. Because of its massive bedding, greater resistance to erosion, and greater thickness exceeding that of the Devonian and Ordovician formations combined, the Madison accounts for most rocks in debris fields of the thrust plate capping Pat O'Hara Mountain and the McCullough Peaks, east of Cody. In fact the monolith comprising Heart Mountain, from which the thrust is named, is Madison Limestone, resting on Eocene Willwood Formation. Most of the Madison Limestone, the age of which extends from latest Devonian to early Meramecian (Middle Mississippian) in northern Wyoming and southern Montana, is open-marine limestone, except for the Devonian to Mississippian basal member, which is mainly black shale and siltstone in this part of Wyoming (SANDBERG & KLAPPER 1967). However, the highest part of the Madison and lower part of the overlying Amsden Formation, both of which are early Meramecian in age, do contain restricted marine (hypersaline or brackish) limestone beds that could have yielded the subject fossils. This observation is based on SANDBERG'S study of evaporite-solution breccias in well cores from the highest part of the Madison in the Elk Basin oilfield, which crosses the Wyoming-Montana state line, in the Bighorn Basin, north of Cody. As a result of our structural, stratigraphic, and lithogenetic analyses of provenance, we conclude that the age of the supposed Famennian fossil is most likely Meramecian (Middle Mississippian).

Reinterpretation of supposed Famennian fossil

JOHNSON & PFENDER (1939) did not supply specimen numbers nor a repository for their specimens, so our discussion of their biologic affinity is based on only their written and photographic descriptions. The geologic age range of stromatoporoids is Middle Ordovician (Darrivillan) to Late Devonian (Famennian), according to WEBBY et al. (2012). Hence, the Middle Mississippian specimens to which JOHNSON & PFENDER compared their supposed Famennian fossil, are probably younger homeomorphs of

stromatoporoids. Some evidence of an astrorhiza is present in their tangential section (pl. 60, fig. 4), and their longitudinal sections (pl. 60, figs. 2, 3), although inverted, show evidence of astrorhizal columns, which they referred to as "relatively coarse zooidal tubes" (p. 516). Their specimens, having horizontally continuous laminae and short pillars, bear no resemblance to *Parallelopora* BARGATZKY 1881 (not 1887), which has long, orthoreticular pillars, vertical autotubes, and no regular laminar structures. The internal macrostructure of the skeleton is similar to that of the hypercalcified sponge *Kyklopora* BOGOYAVELENSKAYA 1982, which is known from the Upper Mississippian (Serpukhovian) of the Donetsk Basin of Russia (NESTOR 2011). *Kyklopora* may be congeneric with the Wyoming specimens.

Attempts to supplement original data

J. Harlan JOHNSON was employed by the Colorado School of Mines (CSM) for his entire career. We contacted the CSM Museum curator, and were told that JOHNSON'S collection had been given to the University of Kansas (KU) Museum. Next, we contacted the curator at the KU Museum, who told us that there are no specimens of *Parallelopora goldfussii* in their JOHNSON collection. There is a chance that the specimens were given to Princeton University. However, over 40 years ago Princeton divested itself of its paleontology collection and donated their stromatoporoid types to the U. S. National Museum (USNM). We contacted the USNM and were informed that no specimens of *P. goldfussii* are in their Princeton collection.

SANDBERG, as part of a regional U. S. Geological Survey project, worked 10 years studying the Devonian and Mississippian rocks of northern Wyoming, and published (1967) on the important stratigraphic sections. On the basis of this knowledge, we did not seriously consider a visit to the type locality, to collect more specimens. As noted above, JOHNSON & PFENDER (1939, p. 515) were told that the fossil-bearing outcrop was "a few feet" [less than 2 m] wide "on a steep slope." Small outcrops in mountainous areas are ephemeral, easily modified by burial in scree deposits, removal by landslide, or other physical phenomena. Essentially, we were faced with a classic "needle in a haystack" search, not worth the time and money it would take to accomplish.

References

- BARGATZKY, A. 1881. Die Stromatoporen des rheinischen Devons. - *Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westfalen*, **38**: 233-304.

- BOGOYAVLENSKAYA, O.V. 1982. Stromatopory pozdnego devona—rannego karbona. - *Paleontologicheskii Zhurnal*, **1982** (1): 33-38. [translated in *Paleontological Journal*, **15**: 29-36.]
- JOHNSON, J.H. & PFENDER, J. 1939. *Parallelopora goldfussii* from the Devonian near Cody, Wyoming. - *Journal of Paleontology*, **13**: 515-516.
- MORROW, J.R., HARRIES, P.J. & KRIVANEK, J.G. 2011. Reef recovery following the Frasnian-Famennian (Late Devonian) mass extinction: evidence from the Dugway Range, west-central Utah. - *Palaios*, **26**: 607-622.
- NESTOR, H. 2011. Part E, Revised, Volume 4, Chapter 16C: Clathrodictyida. - *Treatise Online*, No. **26**, 15 p. <http://paleo.ku.edu/treatiseonline>.
- PIERCE, W.G., 1957. Heart Mountain and South Fork detachment thrusts of Wyoming. American Association of Petroleum Geologists Bulletin, **41**: 591-626.
- RIABININ, V.N. 1955. Verkhnedevonskie Stromatoporoidea Timana. - In: Stratigrafiya paleozoiskikh otlozhenii Timana i zapadnogo Stelona Urala, *Trudy Vsesoznogo nefnogo Nauchno-Issledovatel'skogo Geolgo-Raznedochnogo Instituta* (VNIGRI), novaya seriya, **90**: 5-39.
- SANDBERG, C.A., 1967. Measured sections of Devonian rocks in northern Wyoming. - *Wyoming Geological Survey, Bulletin*, **52**, 93 p.
- SANDBERG, C.A., KLAPPER, G. 1967. Stratigraphy, age, and paleotectonic significance of the Cottonwood Canyon Member of the Madison Limestone in Wyoming and Montana. - *U.S. Geological Survey, Bulletin*, **1251-B**: 70 p.
- SANDBERG, C.A., POOLE, F.G. & JOHNSON, J. G. 1989. Upper Devonian of Western United States. - In: McMILLAN, N. J., EMBRY, A. F. & GLASS, D. J. (EDS.), Devonian of the World. - *Canadian Society of Petroleum Geologists Memoir* **14** (1): 183-220.
- STEARNS, C.W. 1988. Stromatoporoidea from the Famennian (Devonian) Wabamum Formation, Normandville oilfield, north-central Alberta, Canada. - *Journal of Paleontology*, **62**: 411-419.
- STEARNS, C.W. 2011. Part E, Revised, Volume 4, Chapter 16E: Stromatoporellida, Stromatoporida, Syringostromatida, Amphiporida, and genera with uncertain affinities. - *Treatise Online*, **19**: 1 p. <http://paleo.ku.edu/treatiseonline>.
- STOCK, C.W. 2012. Part E, Revised, Volume 4, Chapter 16D: Actinostromatida. - *Treatise Online*, **42**: 12 p. <http://paleo.ku.edu/treatiseonline>.
- WEBBY, B.D. 2012. Part E, Revised, Volume 4, Chapter 16B: Labechiida. - *Treatise Online*, **41**: 53 p. <http://paleo.ku.edu/treatiseonline>.
- WEBBY, B.D., STEARNS, C.W. & NESTOR, H. 2012. Part E, Revised, Volume 4, Chapter 12: Biostratigraphy of the Paleozoic Stromatoporoidea. - *Treatise Online*, **32**: 22 p. <http://paleo.ku.edu/treatiseonline>.
- YAVORSKY, V.I. 1947. Nekotorye paleozoiskie i mezozoiskie Hydrozoa, Tabulata i Algae (On some

Paleozoic and Mesozoic Hydrozoa, Tabulata and Algae). - *Monografii po Paleontologii*, SSSR, **20**(1): 44 p.

SDS FORUM

TOWARDS THE FORMAL VOTING ON FAMENNIAN SUBSTAGES

R.T. BECKER

SDS has formally voted, and with clear majority, on four Famennian substages, to be named Middle, Upper, and Uppermost Famennian. This decision is NOT subject to any further discussion. TMs now have to decide on the precise substage levels and this decision will be the base for manuscripts that have to be prepared for publication in *Lethaia*. Subsequently, formal proposals, INCLUDING A CHOSEN GSSP, have to be submitted to ICS for ratification.

Criteria and some facts for the Substage Vote

1. Preference should be given to conodont levels but substage boundaries should best be recognizable with several methods (e.g., bio-, event, sequence or chemostratigraphy) and by several faunal groups. Relevant data on Famennian isotope stratigraphy (excluding the Hangenberg Crisis interval) were published by KAISER et al. (2006), JOACHIMSKI et al. (2009), and MYROW et al. (2011).
2. Currently our data on neritic faunas are incomplete, characterized by significant regional and endemic signatures, and provide no high-resolution alternative zonation that has been applied internationally. But substage levels preferably should include an option for pelagic-neritic correlation, for example with the help of shallow-water conodonts, brachiopods, eustasy/sequence stratigraphy etc.
3. A correlation into terrestrial environments will be of greatest importance but the precise correlation with the miospore zonation still has problems to be filled by new data (for details see many past Newsletter contributions by M. STREEL and co-authors, as well as by MELO & LOBOZIAK 2003, FILIPIAK 2004, MARYNOWSKI et al. 2010, HIGGS et al. 2013 etc).
4. In addition to many previous publications, important data on the suitability of the Upper *expansa* Zone (= *Bi. ultimus* Zone), and on the practical synchronous entry of *Pa.*

gonioclymeniae, *Ps. trigonicus*, and *Bi. ultimus* were given by KAISER et al. (2009).

5. Problems of the Lower (= *Bi. stabilis stabilis* Zone) and Middle (= *Bi. aculeatus* Zone) *expansa* Zones and strong evidence against a eustatic rise **at the base** of the Lower *expansa* Zone are emphasized by HARTENFELS & BECKER (2009) and HARTENFELS (2011). The major eustatic deepening (global Dasberg Event) occurred at the base of the classical Upper Devonian V (Dasbergian of old German chronostratigraphy, base of *Costaclymenia* = *Endosiphonites* Genozone), high in the *stabilis* or Lower *expansa* Zone. This is also likely for (parts of?) western North America (e.g., for the transgressive level of *Costaclymenia bowsheri* in the Box Member of the Percha Shale).
6. The problems and substage options around the *Annulata* Events were summarized by HARTENFELS et al. (2009) in SDS Newsletter 24, with a wealth of additional data in HARTENFELS (2011). The wide-spread and chronostratigraphic potential of the *Annulata* Events was recently emphasized by new records and data from Poland (RACKA et al. 2010), Bulgaria (BONCHEVA et al. 2011) and Moravia (WEINER 2012)
7. The entry of *Scaphignathus velifer* and of *Pa. rugosa trachytera* fall in a long period of low global sea-level, which diminishes the correlation potential of the base of the *velifer* = Uppermost *marginifera* Zone and of the Lower *trachytera* Zone in many regions. North Africa has in general a rather restricted conodont record in the middle/Upper Famennian. Boundaries of classical ammonoid zones do not coincide with conodont zone boundaries: The oldest *Pseudoclymenia*, defining UD III-B, slightly predate the entry of *Scaphignathus* at Enkeberg (KORN & ZIEGLER 2002). First *Prolobites* and clymeniids that define UD III-C slightly predate first *Pa. rugosa trachytera*.
8. The major eustatic rise of the Lower *marginifera* Zone did not peak at its base (= *Acrimeroceras* level) but slightly above the zonal base (= base of *Maeneceras* Zone; BECKER 2004, partly repeated, because of original low distribution, in SDS Newsletter 24; BECKER & HOUSE 2009).
9. Advances in the stratigraphical value of microvertebrates and foraminiferes should be recognized despite the still incomplete correlation with ammonoids and conodonts.

Famennian papers and SDS Newsletter contributions whose data and views should be considered for the formal substage voting

(From youngest contributions going backwards. There is no guarantee for completeness and – in the absence of global zonations – there is only a limited number of publications on neritic fossil groups):

- BECKER, R.T., ABOUSSALAM, Z.S., HARTENFELS, S., EL HASSANI, A. & FISCHER, T. 2013. The Givetian – Famennian at Oum el Jerane (Amessoui Syncline, southern Tafilalt). – *Document de l'Institut Scientifique, Rabat*, **27**: 61-76.
- HARTENFELS, S., BECKER, R.T., ABOUSSALAM, Z.S., EL HASSANI, A., BAIDER, L., FISCHER, T. & STICHLING, S. 2013. The Upper Devonian at El Khraouia (southern Tafilalt). – *Document de l'Institut Scientifique, Rabat*, **27**: 41-50.
- SAVAGE, N.M. 2013. *Late Devonian conodonts from northwestern Thailand*. – 48 pp., Eugene (Bourland Printing).
- WEYER, D. & BARTZSCH, K. 2013. Zur Stratigraphie des Breternitz-Members (Obere Clymenien-Schichten, Oberdevon) von Saalfeld (Schwarzburg-Antiklinorium, Thüringisches Schiefergebirge). – *Freiberger Forschungshefte*, **C542** (psf 20): 1-54.
- DE VLEESCHOUWER, D., RAKOCINSKI, M., RACKI, G., BONSD, D.P.G., SOBIEN, K. & CLAEYS, P. 2013. The astronomical rhythm of Late-Devonian climate change (Kowala section, Holy Cross Mountains, Poland). – *Earth and Planetary Science Letters*, **365**: 25-37.
- HIGGS, K.T., PRESTIANNI, C., STREEL, M. & THOREZ, J. 2013. High resolution miospore stratigraphy of the Upper Famennian of eastern Belgium, and correlation with the conodont zonation. – *Geologica Belgica*, **16** (1/2): 84-94.
- HARTENFELS, S. & BECKER, R. T. 2012. Conodont age and correlation of the transgressive *Gonoclymenia* and *Kalloclymenia* Limestones (Famennian, Anti-Atlas, SE Morocco). – *Terra Nostra*, **2012** (3): 67.
- WEINER, T. 2012. New data on the *Annulata* Events in the Moravian Karst (Famennian, Czech Republic). – *Terra Nostra*, **2012** (3): 192.
- MA, X.-P., ZONG, P. & SUN, Y.-L. 2011. The Devonian (Famennian) sequence in the western Junggar area, northern Xinjiang, China. – *SDS Newsletter*, **26**: 44-49.
- GRECHISHNIKOVA, I. A. & LEVITSKII, E. S. 2011. The Famennian-Lower Carboniferous Reference Section Geran-Kalasi (Nakhichevan Autonomous Region, Azerbaijan). – *Stratigraphy and Geological Correlation*, **19** (1): 21-43.
- MYROW, P. M., STRAUSS, J. V., CREVELING, J. R., SICARD, K. R., RIPPERDAN, R., SANDBERG, C. A. & HARTENFELS, S. 2011. A carbon isotopic and sedimentological record of the latest Devonian (Famennian) from the Western U.S. and Germany. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **306**: 147-159.

- BAHRAMI, A., CORRADINI, C. & YAZDI, M. 2011. Upper Devonian-Lower Carboniferous conodont biostratigraphy in the Shotori Range, Tabas area, Central-East Iran Microplate. – *Bolletino della Società Paleontologica Italiana*, **50** (1): 35-53.
- BAHRAMI, A., GHOLAMALIAN, H., CORRADINI, C. & YAZDI, M. 2011. Upper Devonian conodont biostratigraphy of Shams Abad section, Kerman Province, Iran. – *Rivista Italiana di Paleontologia e Stratigrafia*, **117** (2): 199-209.
- GIBSHMAN, N. B. & NIKOLAEVA, S. V. 2011. Ammonoid and foraminiferal faunas in the Famennian of western Kazakhstan: research summary and sedimentary settings. – *SDS Newsletter*, **26**: 58-64.
- BONCHEVA, I., SACHANSKI, V. & BECKER, R. T. 2011. Sedimentary and faunal evidence for the Late Devonian Kellwasser and *Annulata* events in the Balkan Terrane (Bulgaria). – *Berichte des Institutes für Erdwissenschaften, Karl-Franzen-Universität Graz*, **16**: 26-28.
- HARTENFELS, S. 2011. Die globalen *Annulata*-Events und die Dasberg-Krise (Famennium, Oberdevon) in Europa und Nord-Afrika – hochauflösende Conodonten-Stratigraphie, Karbonat-Mikrofazies, Paläoökologie und Paläodiversität. – *Münstersche Forschungen zur Geologie und Paläontologie*, **105**: 17-527. (extended english abstract in *SDS Newsletter*, **26**: 78-81)
- RACKA, M., MARYNOWSKI, L., FILIPIAK, P., SOBSTEL, M., PISARZOWSKA, A. & BOND, D. P. G. 2010. Anoxic *Annulata* Events in the Late Famennian of the Holy Cross Mountains (Southern Poland): Geochemical and palaeontological record. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **297** (3/4): 549-575.
- MARYNOWSKI, L., FILIPIAK, P. & ZATON, M. 2010. Geochemical and palynological study of the Upper Famennian Dasberg event horizon from the Holy Cross Mountains (central Poland). – *Geological Magazine*, **147** (4): 527-550.
- HARTENFELS, S. & BECKER, R. T. 2009. Timing of the global Dasberg Crisis – implications for Famennian eustasy and chronostratigraphy. – *Palaeontographica Americana*, **63**: 71-97.
- KAISER, S. I., BECKER, R. T., SPALETTA, C. & STEUBER, T. 2009. High-resolution conodont stratigraphy, biofacies, and extinctions around the Hangenberg Event in pelagic successions from Austria, Italy, and France. – *Palaeontographica Americana*, **63**: 99-143.
- SANDBERG, C. A., MORROW, J. R. & POOLE, F. G. 2009. Burbank Hills, Utah, provide a paradigm for Middle and Late Devonian event stratigraphy. – *Palaeontographica Americana*, **63**: 223-224.
- MATYJA, H. 2009. Famennian event stratigraphy (western Pommerania, northwestern Poland) – implications for a proposed substages division. – *Palaeontographica Americana*, **63**: 219-220.
- MARSHALL, J. E. A. & ASTIN, T. R. 2009. Why the terrestrial upper Famennian is important to the SDS. – *Palaeontographica Americana*, **63**: 217-218.
- JOACHIMSKI, M. M., BREISIG, S., BUGGISCH, W., TALENT, J. A., MAWSON, R., GEREKE, M., MORROW, J. R., DAY, J. & WEDDIGE, K. 2009. Devonian climate and reef evolution: Insights from oxygen isotopes in apatite. – *Earth and Planetary Science Letters*, **284**: 599-609.
- BECKER, R.T. 2009. Ammonoids and the Definition of Middle and Uppermost Famennian Substages. – *SDS Newsletter*, **24**: 49.
- HARTENFELS, S., BECKER, R.T. & TRAGELEHN, H. 2009: Marker conodonts around the global *annulata* events and the definition of an Upper Famennian Substage. – *SDS Newsletter*, **24**: 40-48.
- OVER, D.J., LAZAR, R., BAIRD, G.C., SCHIEBER, J. & ETTENSOHN, F.R. 2009. *Protosalvinia* Dawson and associated conodonts of the Upper *trachytera* Zone, Famennian, Upper Devonian, in the Eastern United States. – *Journal of Paleontology*, **83** (1): 70-79.
- GHOLAMALIAN, H., GHORBANI, M. & SAJADI, S.-H. 2009. Famennian conodonts from Kal-e-Sardar section, eastern Tabas, Central Iran. – *Rivista Italiana di Paleontologia e Stratigrafia*, **115** (2): 141-158.
- ARTYUSHKOVA, O.V. & MASLOV, V.A. 2008. Detailed correlation of the Devonian deposits in the South Urals and some aspects of their formation. – *Bulletin of Geosciences*, **83** (4): 391-399.
- 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 isotopes and conodont biofacies in southern Europe. – *Geological Journal*, **43**: 241-260.
- DERYCKE, C., SPALETTA, C., PERRI, M.C. & CORRADINI, C. 2008. Famennian chondrichthyan microremains from Morocco and Sardinia. – *Journal of Paleontology*, **82** (5): 984-995.
- TSYGANKO, B.S. 2008. Famennian Substage Boundaries. – *SDS Newsletter*, **23**: 68-69.
- STREEL, M. 2008. Comments on “Reiteration of proposal for the only two Famennian substage boundaries that are globally recognizable and coincident with major transgressions, by C.A. SANDBERG, document submitted to Eureka Meeting, Nevada, September 2007”. – *SDS Newsletter*, **23**: 60-64.
- CORRADINI, C. 2008. Revision of Famennian-Tournaisian (Late Devonian – Early Carboniferous) conodont biostratigraphy of Sardinia, Italy. – *Revue de Micropaléontologie*, **51**: 123-132.
- 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.
- BECKER, R. T. & HARTENFELS, S. (2008): The Dasberg Event in the Rhenish Massif, Carnic Alps, and Anti-Atlas (Tafilalt, Maider) – Implications for Famennian eustatics and chronostratigraphy. – *SDS Newsletter*, **23**: 40-44.
- STREEL, M. 2008. Upper and Uppermost Famennian miospore and conodont correlation in the Ardenne-Rhenish area. – *SDS Newsletter*, **23**: 35-39.

- MA, Xueping & SUN, Yuanlin. 2008. Brachiopod faunal successions and the subdivision of the Famennian in South China. – *SDS Newsletter*, **23**: 32-34.
- MARSHALL, J.E. 2008. Minutes of the SDS Business Meeting, Eureka Opera House, Eureka, Nevada, USA, 17th September 2007. – *SDS Newsletter*, **23**: 11-19.
- SANDBERG, C.A. 2007. Comment on proposed Uppermost Famennian „Substage“. – *SDS Newsletter*, **22**: 41-43. [first available at Leicester Meeting]
- STREEL, M. 2007. West Gondwanan and Euramerican climate impact on early Famennian to latest Viséan miospore assemblages. – *SDS Newsletter*, **22**: 53-57.
- STREEL, M. 2006. Comment by CM Maurice STREEL on “Comment on Proposed Uppermost Famennian “substages” by TM Charles A. SANDBERG”. – *SDS Newsletter*, **22**: 49-52.
- STREEL, M., MAZIANE-SERRAJ, MARSHALL, J.E. & THOREZ, J. 2007. Reference section for neritic facies at the transition Late to Latest Famennian. – *SDS Newsletter*, **22**: 34-40.
- STREEL, M. et al. 2007. Missing figures to Newsletter No 21, 17-20. – *SDS Newsletter*, **22**: 13-16.
- 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.
- MARYNOWSKI, L., RAKOCINSKI, M. & ZATON, M. 2007. Middle Famennian (Late Devonian) interval with pritized fauna from the Holy Cross Mountains (Poland): Organic geochemistry and pyrite framboid diameter study. – *Geochemical Journal*, **41**: 187-200.
- RANDON, C., DERYCKE, C., BLIECK, A., PERRI, M.C. & SPALLETTA, C. 2007. Late Devonian – Early Carboniferous vertebrate microremains from the Carnic Alps, northern Italy. – *Geobios*, **40**: 809-826.
- KAISER, S. I., BECKER, R. T., EL HASSANI, A. 2007. Middle to Late Famennian successions at Ain Jemaa (Moroccan Meseta) – implications for regional correlation, event stratigraphy and syndimentary tectonics of NW Gondwana. – *Geological Society of London, Special Publications*, **278**: 237-260.
- DZIK, J. 2006. The Famennian „Golden Age“ of conodonts and ammonoids in the Polish part of the Variscan Sea. – *Palaeontologia Polonica*, **63**: 1-359.
- KAUFMANN, B. 2006. Calibrating the Devonian Time Scale: A synthesis of U-Pb ID-TIMS ages and conodont stratigraphy. – *Earth-Science Reviews*, **76**: 175-190.
- KAISER, S. I., STEUBER, T. & BECKER, R. T. 2006. Environmental change during the Late Famennian and Early Tournaisian (Late Devonian-Early Carboniferous): implications from stable isotopes and conodont biofacies in southern Europe. – *Geological Journal*, **43**: 241-260.
- BUGGISCH, W. & JOACHIMSKI, M.M. 2006. Carbon isotope stratigraphy of the Devonian of Central and Southern Europe. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **240**: 68-88.
- STREEL, M., BRICE, D. & MISTIAEN, B. 2006. Strunian. – *Geologica Belgica*, **9** (1/2): 1055-109.
- WORONCOWA-MARCINOWSKA, T. 2006. Upper Devonian goniatites and co-occurring conodonts from the Holy Cross Mountains: Studies of the Polish Geological Institute collections. – *Annales Societatis Geologorum Poloniae*, **76**: 113-160.
- WEBSTER, G.D., BECKER, R.T. & MAPLES, C.G. 2005. Biostratigraphy, paleoecology, and taxonomy of Devonian (Emsian and Famennian) crinoids from southeastern Morocco. – *Journal of Paleontology*, **79** (6): 1052-1071 [with update on Mrakib section].
- CAPKINOGLU, S. 2005. Famennian conodonts from the Ayineburnu Formation of the Istanbul Zone (NW Turkey). – *Geologica Carpathica*, **56** (2): 113-122.
- BRICE, D., LEGRAND-BLAIN-M. & NICOLLIN, J.-P. 2005. New data on late Devonian and early Carboniferous brachiopods from NW Sahara; Morocco, Algeria. – *Annales de la Societe Geologique du Nord*, **12**: 1-45.
- STREEL, M., BELKA, Z., DREESEN, R., DURKINA, A.V., GROOS-UFFENORDE, H., HANCE, L., HARTKOPF-FRÖDER, C., HAYDUKIEWICZ, J., KORN, D., SPALETTA, M.C., PIECHA, M. & SPALETTA, C. 2005. Relation of the neritic microfaunas and continental microfloras with the conodont and other pelagic faunas within the latest part of the Famennian. – *SDS Newsletter*, **21**: 17-20.
- STREEL, M. 2005. Subdivision of the Famennian into four substages and correlation with the neritic and continental miospore zonation. – *SDS Newsletter*, **21**: 14, 16-17.
- BECKER, R.T. 2005. Minutes of the SDS Business Meeting, Rabat, 1st of March 2004. – *SDS Newsletter*, **21**, 3-8.
- 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.
- BECKER, R.T. 2004. Ammonoid definitions of Upper Devonian substages. – *Document of the International Subcommission on Devonian Stratigraphy, Annual Business Meeting, 32nd IGC, Florence 2004*, 6 p.
- GEREKE, M. 2004. Das Profil Kahlleite Ost – die stratigraphische Entwicklung einer Tiefschwelle im Oberdevon des Bergaer Sattels (Thüringen). – *Geologica et Palaeontologica*, **38**: 1-31.
- FILIPIAK, P. 2004. Miospore stratigraphy of Upper Famennian and Lower Carboniferous deposits of the Holy Cross Mountains (central Poland). – *Review of Palaeobotany and Palynology*, **128**, 291-322.
- NICOLLIN, J.-P. & BRICE, D. 2004. Biostratigraphical value of some Strunian (Devonian, uppermost Famennian) Productidina, Rhynchonellida, Spiriferida, Spiriferinida brachiopods. – *Geobios*, **37**: 437-453.

- CASIER, J.-G., MAMET, B., PRÉAT, A. & SANDBERG, C.A. 2004. Sedimentology, conodonts and ostracods of the Devonian-Carboniferous strata of the Anseremme railway bridge section, Dinant Basin, Belgium. – *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre*, **74**: 45-68.
- BECKER, R.T., ASSHOURI, A.R. & YAZDI, M. 2004. The Upper Devonian Annulata Event in the Shotori Range (eastern Iran). – *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, **231**: 119-143.
- STREEL, M., AVKHI MOVITCH, V.I., BERKOWSKI, B., DRESEN, R., DURKINA, A.V., HANCE, L., HERBIG, H.-G., KORN, D., MAMET, B., MAZIANE-SERRAJ, N., MISTIAEN, B., THOREZ, J., WEBER, H.M., WEYER, D. 2003. Biostratigraphic correlation at the late or/and latest Famennian from Western, Central and Eastern European sections. State of the art. – *SDS Newsletter*, **19**: 50-56.
- PIECHA, M. & SCHINDLER, E. 2003. The Frasnian and Famennian subdivisions – results of German Late Devonian Working Group session 2001. – *SDS Newsletter* **19**, 47-48.
- 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*, **1**: 36-46.
- BECKER, R.T. 2003. Famennian ammonoid zones of the eastern Anti-Atlas – implications for substage definition. – *SDS Newsletter*, **19**: 20-24.
- 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., BARCA, S. & SPALLETTA, C. 2003. Late Devonian-Early Carboniferous conodonts from the “Clymeniae limestones” of SE Sardinia (Italy). – *Courier Forschungsinstitut Senckenberg*, **245**: 227-253.
- MELO, J.H.G. & LOBOZIAK, S. 2003. Devonian – Early Carboniferous miospore biostratigraphy of the Amazon Basin, Northern Brazil. – *Review of Palaeobotany and Palynology*, **124**: 131-202.
- 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.
- GINTER, M., HAIRAPETIAN, V. & KLUG, C. 2002. Famennian chondrichthyans from the shelves of North Gondwana. – *Acta Geologica Polonica*, **52**: 169-215.
- TRAGELEHN, 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.
- KORN, D. 2002. Historical Subdivisions of the Middle and Late Devonian Sedimentary Rocks in the Rhenish Mountains by Ammonoid Faunas. – *Senckenbergiana lethaea*, **82** (2): 545-555.
- KORN, D. & ZIEGLER, W. 2002. The ammonoid and conodont zonation at Enkenberg (Famennian, Late Devonian; Rhenish Mountains). – *Senckenbergiana lethaea*, **82** (2): 453-462.
- MAZIANE-SERRAJ, N., HIGGS, K.T. & STREEL, M. 2002. Biometry and paleoenvironment of *Retispora lepidophyta* (Kedo) Playford 1976 and associated miospores in the latest Famennian nearshore marine facies, eastern Ardennes (Belgium). – *Review of Palaeobotany and Palynology*, **118**: 211-226.
- LOBOZIAK, S. & MELO, J.H.G. 2002. Devonian miospore successions of Westwrm Gondwana: update and correlation with Southern Euramerican miospore zones. – *Review of Palaeobotany and Palynology*, **121**: 133-148.
- GRAHN, Y. & MELO, J.H.G. 2002. Chitinozoan biostratigraphy of the Late Devonian formations in well Caima PH-2, Tapajos River area, Amazonas Basin, northern Brazil. – *Review of Palaeobotany and Palynology*, **118**: 115-139.
- KALVODA, J. 2002. Late Devonian – Early Carboniferous Foraminiferal Fauna: Zonations, Evolutionary Events, Palaeobiogeography and Tectonic Implications. – *Folia, Geologia*, **39**: 213 pp.
- 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.
- 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. 2001. The Uppermost Famennian around the World (definition, biostratigraphical and sedimentological context). – *SDS Newsletter*, **18**: 55-61.
- PIECHA, M. & SCHINDLER, E. 2000. Substage subdivisions of the Frasnian and Famennian and redefinition of the German Late Devonian „Stages“ (Stufen). – *SDS Newsletter*, **17**: 15.
- STREEL, M. & LOBOZIAK, S. 2000. Correlation of the proposed conodont based Upper Devonian substage boundary levels into the neritic and terrestrial miospore zonation. – *SDS Newsletter*, **17**: 12-14.
- BECKER, R.T., BOCKWINKEL, J., EBBIGHAUSEN, V. & HOUSE, M.R. 1999. Jebel Mrakib, Anti-Atlas (Morocco), A potential Upper Famennian substage boundary stratotype section. – *SDS Newsletter*, **16**: 14-22 (subsequently – in 2000 - formally published, with figures, in *Notes et Mémoires du Service Géologique*, **399**: 75-86.)
- BECKER, R. T. 1999. Working Group on Famennian Substages. – *SDS Newsletter*, **16**: 7-8.
- GINTER, M. & IVANOV, A. 2000. Stratigraphic distribution of chondrichthyans in the Devonian on the East European Platform margin. – *Courier Forschungsinstitut Senckenberg*, **223**: 325-339.

- BECKER, R.T. & HOUSE, M.R. 2000. Devonian ammonoid zones and their correlation with established series and stage boundaries. – *Courier Forschungsinstitut Senckenberg*, **220**: 113-151.
- STREEL, M., CAPUTO, M. V., LOBOZIAK, S., & MELO, J. H. G. 2000. Late Frasnian-Famennian climates based on palynomorph analyses and the question of the Late Devonian glaciations. – *Earth Science Reviews*, **52**: 121-173.
- CAPKINOGLU, S. 2000. Late Devonian (Famennian) conodonts from Denizliköyü, Gebze, Kocaeli, northwestern Turkey. – *Turkish Journal of Earth Sciences*, **9**: 91-112.
- RZHONSNITSKAYA, M. A. 1998. Proposals for an International substages subdivision of the Devonian stages. – SDS Newsletter **15**, 53-61.
- STREEL, M., BRICE, D., DEGARDIN, J.-M., DERYCKE, C., DRESEN, R., GROESSENS, E., HANCE, L., LEGRAND-BLAIN, M., LETHIERS, F., LOBOZIAK, S., MAZIANE, N., MILHAU, B., MISTIAEN, B., POT, E., ROHART, J.-C., SARTENAER, P., THOREZ, J., VACHARD, D. & BLIECK, A. 1998. Proposal for a Strunian Substage and a subdivision of the Famennian Stage into four Substages. – SDS Newsletter, **15**: 47-52.
- STREEL, M. & LOBOZIAK, S. 1998. Proposal of boundaries for subdivision of the Famennian Stage: miospore implications. – SDS Newsletter, **15**: 46-47.
- SANDBERG, C.A. & ZIEGLER, W. 1998. Comments on proposed Frasnian and Famennian Subdivisions. – SDS Newsletter, **15**: 43-46.
- BECKER, R.T. 1998. Prospects for an International Substage Subdivision of the Famennian. – SDS Newsletter, **15**: 14-17. [missing the table originally attached to the Bologna Document]
- ZIEGLER, W. & SANDBERG, C.A. 1997. Proposal of boundaries for a Late Frasnian Substage and for subdivision of the Famennian Stage into three Substages. – SDS Newsletter, **14**: 11-12.

SPECIES LIST OF *POLYGNATHUS* - CORRECTIONS AND ADDITIONS

R.T. BECKER

SDS Newsletter 27 included a compilation of species names, which have been established within the genus *Polygnathus* or which were assigned to the genus after their first description. A range of corrections and additions follow:

Additions

[without judgement of subjective synonymy or generic placing; now approaching 700 names]

- Po. baratovi* BARDASHEV & BARDASHEVA 2012 [Upper Givetian]
Po. barskovi STREL'CHENKO in STREL'CHENKO & KRUCHEK 2013 [Lower Famennian]

- Po. bifarius* (KHALYMBADZHA & MINGALEEV 1994) Famennian, [erected in *Polydentatus*]
Po. biserialis (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Polydentatus*]
Po. burretti SAVAGE 2013 [Upper Frasnian]
Po. chegodaei STREL'CHENKO in STREL'CHENKO & KRUCHEK 2013 [Lower Famennian]
Po. hongqingensis WANG in GONG et al. 2012 [Upper Frasnian]
Po. confragosus (KHALYMBADZHA & MINGALEEV 1994) [lower Famennian, erected in *Planipolygnathus*]
Po. crassus COOPER 1931 [Lower Carboniferous; unreplaced junior homonym of *Po. crassus* HINDE 1879]
Po. cunearis (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Planipolygnathus*]
Po. curvatus SMITH 1904 [Ordovician]
Po. discurrocostatus (MATYJA, TOMAS, LIPIEC & TURNAU 2001) [erected as *Neopolygnathus*]
Po. explanatus (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Planipolygnathus*]
? *Po. faizievi* BARDASHEV & BARDASHEVA 2012 [Upper Givetian]
Po. fossularis (KHALYMBADZHA & MINGALEEV 1994) [lower Famennian, erected in *Planipolygnathus*]
Po. communis hanensis SAVAGE 2013 [uppermost Famennian]
Po. inaequilateralis STREL'CHENKO in STREL'CHENKO & KRUCHEK 2013 [lower Famennian; a new homonym of *Po. inaequilateralis* YOUNGQUIST & PATTERSON 1949]
Po. incurviorus (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Polydentatus*]
Po. mashkovae latus AKSENOVA 1987 [lower Emsian; unreplaced homonym of *Po. lata* WITTEKINDT 1966 and of *Po. mehli latus* JOHNSTON & HIGGINS 1981]
Po. lanceolatus SMITH 1904 [Ordovician; therefore, *Po. lanceolata* BRANSON 1934 is an unreplaced homonym]
Po. leleshusi BARDASHEV & BARDASHEVA 2012 [Upper Givetian]
Po. malaniensis KIRILISHINA 2006 nom. nud. [Upper Frasnian]
Po. medioclivorus (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Polydentatus*]
Po. minus SMITH 1904 [Ordovician]
Po. communis namdipensis SAVAGE 2013 [upper Famennian]
Po. nataliae (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Polydentatus*]
Po. nodoornatus (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Polydentatus*]
Po. parvus SMITH 1904 [Ordovician]
Po. pauperatus SMITH 1904 [Ordovician]

- Po. pectinaceus* (KHALYMBADZHA & MINGALEEV 1994) [lower Famennian, erected in *Polydentatus*]
- Po. communis phaphaensis* SAVAGE 2013 [upper Famennian]
- Po. extralobatus phoensis* SAVAGE 2013 [upper Famennian]
- Po. priformis* (KHALYMBADZHA & MINGALEEV 1994) [Famennian, erected in *Polydentatus*]
- Po. postaspelundi* KIRILISHINA 2006 nom. nud. [Upper Frasnian]
- Po. nodocostatus productus* (STREL'CHENKO in STREL'CHENKO & KRUCHEK 2013 [lower Famennian; erected as *Polynodosus*]
- Po. pseudocostatus* KLAPPER & VODRÁZKOVÁ 2013 [lower Eifelian]
- Po. pseudosiratchoicus* KIRILISHINA 2006 nom. nud. [Upper Frasnian]
- Po. pustulatus* (KHALYMBADZHA & MINGALEEV 1994) [Famennina, erected in *Polydentatus*]
- Po. rarus* AKSENOVA 1987 [lower Emsian; therefore, *Po. rarus* BALINSKI 1995 is an unreplaced homonym]
- Po. quadrifarius* (KHALYMBADZHA & MINGALEEV 1994) [Famennian, type-species of *Polydentatus*]
- Po. crassulus salapiensis* SAVAGE 2013 [Upper Famennian]
- Po. scabrosus* (KHALYMBADZHA & MINGALEEV 1994) [Famennina, erected in *Planipolygnathus*]
- Po. semeni* STREL'CHENKO in STREL'CHENKO & KRUCHEK 2013 [lower Famennian]
- Po. submutabilis* (KIRILISHINA 2006 nom. nud.) [lower Famennian, listed as *Neopolygnathus*]
- Po. tridenticulata* COOPER 1931 [Lower Carboniferous]
- Po. undosus* (KHALYMBADZHA & MINGALEEV 1994) [lower Famennian, erected in *Planipolygnathus*]
- Po. varymarginatus* KIRILISHINA 2006 nom. nud. [Upper Frasnian]
- Po. vorontsovae* (KUZ'MIN 1996) [introduced as *Neopolygnathus*, lower Famennian]

Corrections

- Po. eberleini* was found as a quotation on the internet, without reference to its authorship. In fact it refers to the Pragian *Ozarkodina eberleini* SAVAGE 1977, which was never placed in *Polygnathus* in taxonomic studies.
- Po. lagowiensis* HELMS & WOLSKA 1967 [type-species of *Planipolygnathus* KHALYMBADZHA & MINGALEEV 1994; *Lagovignathus* DZIK 2006 is, therefore, an objective synonym]
- Po. magidis* [published in 1991]
- Po. inornatus rostratus* RHODES, AUSTIN & DRUCE 1969 [established as a subspecies, not as a full species]

Comments

The named polygnathids in the rather early work on conodonts by SMITH (1904) were obviously overlooked by subsequent Devonian/Carboniferous workers since they are based on Ordovician material. This led to a homonym in BRANSON (1934). Today, SMITH's taxa do not belong to *Polygnathus*. Additional species may have been named in Lower Palaeozoic publications or may be "hidden" in poorly quoted Russian and Chinese papers. I would highly welcome advice and further additions to the still growing list.

Most authors still prefer not to subdivide the genus, as it was advocated in last year's compilation. This may be one of the reasons why the two genera *Planipolygnathus* and *Polydentatus* of KHALYMBADZHA & MINGALEEV (1994) have hardly been mentioned after their introduction. I like to re-emphasize to restrict *Polygnathus* to forms that resemble the type-species, which is characterized by a small basal pit under the anterior platform. Early or derived polygnathids with central and/or large basal cavity should be removed from the genus in order to keep a clear differential diagnosis from genera such as *Schmidtoognathus*, *Pseudopolygnathus*, *Siphonodella*, etc. Also, taxa that have an apparatus with very distinctive elements apart from the Pa should not be kept in *Polygnathus*. For example, we just reported (BECKER & ABOUSSALAM 2013) that the highly characteristic *Avignathus* element is not restricted to the top Middle/Upper Frasnian "*Po.*" *decorosus*. It co-occurs in early Middle Frasnian samples with other *Polygnathus*-type Pa elements that have a small, short platform.

The necessity of this name list is underlined by the latest introduction of a homonym in STREL'CHENKO & KRUCHEK (2013). Another problem is created in more recent time by the online placing of Ph.D. Theses or their abstracts, which include new names. They often remain nomina nuda for a long time or, potentially, forever.

References

- BALINSKI, A. 1995. Brachiopods and conodont biostratigraphy of the Famennian from the Debnik Anticline, southern Poland. – *Palaeontologia Polonica*, **54**: 3-88.
- BARDASHEV, I.A. & BARDASHEVA, N.P. 2012. *Platform conodonts from the Givetian-Frasnian boundary /Middle-Upper Devonian*. – 91 pp., Dushanbe ("Donish" Publishing House).
- BECKER, R.T. & ABOUSSALAM, Z.S. 2013. Middle Givetian – Middle Frasnian event stratigraphy at Mdoura-East (Western Tafilalt). – In: BECKER, R.T., EL HASSANI, A. & TAHIRI, A. (Eds.), International Field Symposium "The Devonian and Lower Carboniferous of northern Gondwana", Field

- Guidebook, *Documents l'Institut Scientifique, Rabat*, **27**: 143-150.
- BRANSON, E.B. 1934. Conodonts from the Hannibal Formation of Missouri. – *The University of Missouri Studies*, **8** (4): 301-343.
- COOPER, C.L. 1931. New conodonts from the Woodford Formation of Oklahoma. – *Journal of Paleontology*, **5**: 240-243.
- DZIK, J. 2006. The Famennian “Golden Age” of conodonts and ammonoids in the Polish part of the Variscan Sea. – *Palaeontologia Polonica*, **63**: 1-360.
- GONG, L.-M., WANG, C.-Y., WANG, C.-S., HU Y.-X., TANG, Y.-Y., HU, P. & WANG, Q.-D. 2012. Devonian conodonts in SE area of Chongqing city and its geological significance. – *Acta Micropalaeontologica Sinica*, **2012** (3): 282-298.
- HELMS, J. & WOLSKA, Z. 1967. New Upper Devonian conodonts from Poland and Germany. – *Acta Palaeontologica Polonica*, **12**: 227-238.
- JOHNSTON, I.S. & HIGGINS, A.C. 1981. Conodont faunas from the Lower Carboniferous rocks of Hook Head County Wexford. – *Journal of Earth Sciences, Royal Dublin Society*, **4**: 83-96.
- KHALYMBADZHA, V.G. & MINGALEEV, I.M. 1994. Novye famenskie polignatidnye conodonty iz zilarijskoi serii vostochnogo sklona Uzhnogo Urala. - *Byulleten Moskovskogo Obshchestva Ispytatelei Prirody otdel Geologicheskii*, **69** (3): 81-98.
- KIRILISHINA, E.M. 2006. *Conodonts of the Upper Frasnian and Lower Famennian Deposits of the Voronezh Antecline*. – Dissertation, MGU, Moscow, Extended Abstract, 26 pp. [in Russian, available on the internet].
- KLAPPER, G. & VORDÁZKOVÁ, S. 2013. Ontogenetic and intraspecific variation in the late Emsian – Eifelian (Devonian) conodonts *Polygnathus serotinus* and *P. bultyncki* in the Prague Basin (Czech Republic) and Nevada (western U.S.). – *Acta Geologica Polonica*, **63** (2): 153-174.
- KUZ'MIN, A.V. 1996. The origin of the genus *Neopolygnathus* VORONTZOVA (Conodonta). – *Daba un Mzejs*, **1996** (6): 39-41 [not yet seen].
- MATYJA, H., TOMAS, A., LIPEC, M. & TURNAU, E. 2001. Stratygrafia dewonsko-karbonskiej serii weglanowej w rejonie Rajbrotu – Tarnawa. – *Prace Państwowego Instytutu Geologicznego*, **174**: 5-205.
- RHODES, F.H., AUSTIN, R.L. & DRUCE, E.C. 1969. British Avonian (Carboniferous) conodont faunas and their value in local and intercontinental correlation. – *Bulletin of the British Museum (Natural History), Geology, Supplement*, **5**: 313 pp. + 31 pls.
- SAVAGE, N.M. 1977. Lower Devonian conodonts from the Karheen Formation, southeastern Alaska. – *Canadian Journal of Earth Sciences*, **14** (2): 278-284.
- SAVAGE, N.M. 2013. *Late Devonian conodonts from northwestern Thailand*. – 48 pp., Eugene (Bourland Printing).
- SMITH, J. 1904. On the Occurrence of Conodonts in the Arenig-Llandeilo Formations of the Southern Uplands of Scotland. - *Transactions of the Natural History Society of Glasgow, New Series*, **7** (1): 235-252 + pls. V-IX.
- STREL'CHENKO, T.V. & KRUCHEK, S.A. 2013. Lower Famennian Conodont-Based Stratigraphy of the Pripyt Trough. – *Stratigraphy and Geological Correlation*, **221** (2): 150-170.
- YOUNGQUIST, W.L. & PATTERSON, S.H. 1949. Conodonts from the Lower Mississippian Prospect Hill Sandstone of Iowa. – *Journal of Paleontology*, **23**: 57-73.

DEVONIAN MEETINGS

Pre-Cenozoic Climates International Workshop 
- when data and modeling meet

Géosciences Environnement Toulouse
Observatoire Midi-Pyrénées- Université Paul Sabatier

June 17-19th 2013
Toulouse, France

Second Circular

Welcome to PC²IW

'Pre-Cenozoic climates' is a multidisciplinary workshop that broadly addresses the pre-Cenozoic climatic phenomena and processes. The purpose of the workshop is to extend our understanding of the natural variations that take place within the earth's climate system in deep times by bringing together specialists from diverse fields including sedimentology, paleontology, geochemistry (data-community) and numerical modeling (model-community).

It is with great pleasure that we invite you to Toulouse. We are confident that you will have a truly memorable and rewarding stay in the "Ville Rose".

Objectives

This workshop aims at exploring climate reconstructions and processes throughout the pre-Cenozoic time. In recent years, the number of available data has grown exponentially, including paleontological, sedimentological, isotopic, and geochemical data. Two questions arise: (1) is there a unified picture of the pre-Cenozoic climates and environmental evolution emerging from this large amount of data, and (2) how can we promote dialogue between numerical models, which deliver large amounts of climatic and environmental parameters, and geological observations? The workshop offers data- and model-workers an opportunity to discuss the strengths and weaknesses of the geological proxies and numerical models, to share their vision about the reconstruction of pre-Cenozoic climates, and to debate about emerging scientific questions such as:

- *50 years of reconstruction of the paleoclimate: what has been learned? What is true, what is wrong?*
- *What can be learned from the pre-Cenozoic world for the future? (Is there something to learn?)*
- *By how much does differ the past from the modern Earth system, in terms of stability, sensitivity...?*
- *How to integrate non-quantitative data in climate reconstruction?*
- *Do we have access to the absolute temperatures of the past world?*
- *Are biodiversity trends reliable climatic markers?*

Organized by

Yves GODDÉRIIS (pc2iw@get.obs-mip.fr)

Bernard ANDREU, Markus ARETZ, Guillaume DERA, Yannick DONNADIEU, Vanessa LEBEDEL, Carine LÉZIN
 Melina MACOUMIN, Elise NARDIN, Delphine ROUBY, Anne-Marie COUSIN.

Géosciences Environnement Toulouse
 Observatoire Midi-Pyrénées, CNRS, Université Paul Sabatier
 14 avenue Edouard Belin
 F-31400 Toulouse

<http://pc2iw.sciencesconf.org/>





ICPSEA3

Second
Circular

A joint ICPSEA3 / IGCP 596 conference hosted by PETRONAS University of Technology (UTP) and the Geological Society of Malaysia (GSM) - **October 7th-9th 2013**. The Third International Conference on the Palaeontology of South East Asia (ICPSEA3 2013) aims to become an established regular regional congress. This triennial meeting will be leaving Thailand for the first time to be held in Peninsular Malaysia.



This meeting is open to anyone working on the flora and fauna of South East Asia and South China. We are also open to any palaeontologist based in the region studying flora and fauna overseas.

This meeting welcomes contributions from palaeontologists, biostratigraphers, geologists and biologists interested in both ancient biota and the origin of the present day mega fauna and flora in the region and its interaction with the complex tectonic and geologic history of South East Asia.

For the first time we encourage those working within the petroleum industry to attend and contribute to the planned meeting.

Venue:

The conference sessions will be held in the Chancellor Complex of UTP, near the heritage city of Ipoh, Perak, 200km north of the Malaysian capital Kuala Lumpur. Additional events and most accommodation will be within the city of Ipoh itself.

Congress Office and Contact:

Dr Aaron W. Hunter,
info@icpsea3.org

Conference website for more information and updates:
www.ICPSEA3.org

We currently invite proposals to convene symposia on any subject relating to the fossil fauna and flora of South East Asia, South China and surrounding regions. For the workshops and short courses we encourage those proposals that might be of interest to the Petroleum Industry such as micropalaeontology.

So far the following special symposia are proposed:

- Climate Change and biodiversity patterns in Mid-Palaeozoic.. Terrestrial Palaeoecosystems of Southeast Asia.**
- Geoscientific challenges in the 21st century - the successful YES (Young Earth Scientists) Network.**
- Biostrat-Resource exploration and development - a challenge in the 21st century.**
- Geoscience research into carbonate sequences in Southeast Asia.**

For individual pre-registration please send an e-mail to the address above.

Conference schedule and excursions:

- 30th September -4th October 2013 - Pre-conference excursion to Devonian/Carboniferous boundary section and the impressive UNESCO world heritage site at Ha Long Bay in Vietnam.
- 5th-6th October - Registration open, Impiana Hotel, Ipoh.
- 7th-9th October 2013 - Symposia and Workshops.
- 8th October 2013 - Mid-Conference excursion to the Chinese Cave Temples of Ipoh.
- 10th-13th October 2013 - Post-conference excursion to Silurian/Devonian rocks of Perlis, Langkawi & southern Thailand

info@icpsea3.org

Call for Symposia and Workshops



Scientific committee

- Dr Aaron W. Hunter (PETRONAS University of Technology, Ipoh, Malaysia)
- Dr Peter Koenigshof (Senckenberg Institute, Frankfurt am Main, Germany)
- Dr Meor Hakif Amir Hassan (University of Malaya, Kuala Lumpur, Malaysia)
- Dr Mongkol Udchachon (Mahasarakham University, Thailand)
- Prof Dr Ta Hoa Phuong (University of Science Hanoi, Vietnam)



info@icpsea3.org



ICPSEA3

Second
Circular
OMPBG

New Deadlines

Conferences registration opens 1st July

Call for workshops extended 15th July

Deadline for submission of abstracts 15th August

Registration/Payment deadline 15th September



1. Pre conference excursion to Vietnam

This trip is limited to 16 people (Fees include transport & catering)
Funding available from Hanoi University for young scientists.
Please contact tahoaphuong@gmail.com for details of recommended hotels and costs or check our website.

2. Conference fees

Regular Conference fee: Regular US\$200 (RM630) /locals US\$100 (RM315)

Student Conference fee US\$100 (RM315) /US\$50 (RM150)

Pre-Conference Excursion US\$250

Post- Conference Excursion US\$500 (to be confirmed)

Please visit our website to register

Conference fee: includes transport from the Ipoh hotels to the university, conference lunches, conference dinner at the lost world of Tambun, and the mid conference field trip, abstract proceedings and field guide.

3. Transportation & Accommodation

All delegates will stay in the city of Ipoh, Perak, which can be reached by:

1. Train from KLIA - KLIA express to KL Sentral, then ETS Train to Ipoh
 2. Bus from KLIA - Ipoh express bus Starshuttle/Yoyo
 3. Taxi from KLIA
 4. Direct flight - Firefly Singapore to Ipoh Airport
(refer to website from price estimates and schedule links)
- Taxi services are available from Ipoh train/bus station and airport to accommodation.

Conference organisers will provide transfers to/from UTP and our suggested hotels

Our Recommended List of Hotels are:

Impiana Hotel - <http://ipohhotels.impiana.com.my>

French Hotel - <http://www.frenchhotel.com.my>

Ecotel - <http://www.ecotel.com.my>



ICPSEA3 Second Circular **OMPBG**

Excursions and Fieldtrips Further Details.....



1. Pre conference excursion to Vietnam registration now open!....only limited places available.

1st day (September 30th - 2013): Arrival in Hanoi, Vietnam (we would suggest to make a reservation at Hanoi Imperial hotel; reservation is up to the participants, we can only make suggestions but one hotel for all participants would be good in order to save time) and visiting the Old Town (optional, depending on arrival time).

2nd day (October 1st - 2013): early morning travel from Hanoi to Ha Long City (about 4-5 hours by mini buses); lunch in Ha Long City. Afternoon: rent a boat for visiting Ha Long Bay (UNESCO world heritage site), then go to Cat Ba Island (dinner and stay over night on cat ba Island) suggested hotels Catba Sunrise Hotel or Hung Long Hbour Hotel

3rd day (October 2nd - 2013): Morning visit the D/C boundary section and walk around a Carboniferous section. In the afternoon travel to Hanoi (stay overnight in Hanoi - Hanoi Imperial Hotel). 4th day (October 3rd - 2013): flight to Malaysia.

2. Main Conference Schedule - 7th-9th October

5th-6th October - Registration open, Impiana Hotel, Ipoh.

7th-9th October 2013 - Symposia and Workshops.

8th October 2013 - Mid-Conference excursion to the Chinese Cave Temples of Ipoh.

3. Post Conference Excursion to Palaeozoic Rocks of North-West Peninsular Malaysia - 10th-13th October registration opening soon....

10th October AM: Depart Ipoh for Alor Star. PM: Upper Palaeozoic of North Kedah Stay: Seri Malaysia Hotel, Kangar

11th October AM: Silurian-Devonian Utan Aji sections, Perlis. PM Ferry to Langkawi Stay: Bayview Hotel, Kuah

12th AM: boat trip to the Silurian-Devonian sections of Langgun island PM: Oriental Village and Cable Car.

13th AM: Cambrian sections in NW Langkawi: PM Ferry to mainland-Return to Ipoh.

info@icpsea3.org



Geophysical and Geochemical Techniques: A Window on the Palaeozoic World

Joint meeting IGCP-580 & IGCP-596, CALGARY, CANADA

**Meeting, core workshop, & field excursion
Geological Survey of Canada Calgary and Core Research Centre**

27 Aug. – 1 Sept. 2013

VENUE

The fifth IGCP 580 (Application of magnetic susceptibility as a palaeoenvironmental proxy) meeting will be held in Calgary, Canada, in conjunction with the IGCP 596 (Climate change and palaeobiodiversity patterns in the Mid-Palaeozoic) meeting. We intend to bring together scientists that apply geophysical and geochemical methods on sedimentary rocks from different time slices with an emphasis on the Palaeozoic. The meeting will be held 27 August to 1 September, 2013.

Calgary is an ideal location for our IGCP meeting given its proximity to the amazing exposures of the Canadian Rockies. Calgary is located in the southern part of the province of Alberta, Canada, in an area of foothills and prairie, approximately 80 km (50 mi) east of the front ranges of the Canadian Rockies. Situated on the banks of the Bow River, Calgary has a vibrant downtown area, is home to the University of Calgary, a regional office of the Geological Survey of Canada, the Alberta Research Council, and the Energy Resources Conservation Board's (ERCB) Core Research Center, with one of the largest subsurface drill core collections in the world.

The IGCP-580/596 meeting will entail a two-day technical conference, held on the campus of the Geological Survey of Canada, a one-day core workshop at the ERCB Core Research Center, and a field excursion to excellent outcrops in the area around Canmore, along the mountain front, west of Calgary. Depending on participant interest we may arrange an additional field excursion to Banff and Jasper National Parks.

ORGANIZATION

Organizing committee: Michael WHALEN (University of Alaska Fairbanks), Kirk OSADETZ and Pavel KABANOV (Geological Survey, Calgary), John WEISSENBARGER (Husky Energy), Ken POTMA (Esso), Peter KOENIGSHOF (Senckenberg Institute), Thomas SUTTNER and Erika KIDO (University of Graz) and Anne-Christine DA SILVA (University of Liège).

CONTACT INFORMATION

IGCP 580 Meeting, Michael WHALEN, Department of Geology and Geophysics, University of Alaska Fairbanks, Fairbanks, AK 99775, Phone : 907-474-5302, Fax : 907-474-5163

Web: <http://www2.ulg.ac.be/geolsed/MS/meeting.htm>

Email: mtwhalen@gi.alaska.edu

IGCP-580 / 596

More information on both projects and on the meetings:

IGCP-580: <http://www2.ulg.ac.be/geolsed/MS/index.html>

IGCP-596: <http://www.senckenberg.de/IGCP-596>

SCIENTIFIC PROGRAMME

Contributions to every topic related to the application of geophysics, magnetism and geochemistry in stratigraphic correlation, cyclostratigraphy, palaeoenvironmental studies and other fields are welcome.

FIELD EXCURSION

A two-day field excursion, with return to Calgary lodging in between, will be held on 31 August and 1 September, 2013. Both days will be spent in the general vicinity of Canmore, Alberta, about an hour drive to the west of Calgary. Day 1 will visit Frasian outcrops that provide an excellent overview of the internal paleontologic, stratigraphic and sedimentological features of the Devonian reef complexes. Participants will examine the Frasnian upper part of the Cairn Formation and the lower part of the Southesk Formation. The entire section is dolomitized, although many primary depositional features are still visible. On day 2 of the field trip along Jura Creek we will examine the Famennian portion of the section represented by the middle to upper Palliser Formation and lower Exshaw Formation. Time permitting we will also examine lower Carboniferous outcrops in the area.

Fees for the field trip: 125 can\$ (lodging in Calgary not included)

GRANTS

Grants are offered mainly to participants from less developed countries. To apply for a grant (May 15, 2013), please send an email (mtwhalen@gi.alaska.edu) with your affiliation and a brief description of your interest in IGCP-580 or IGCP-596.

REGISTRATION

For registration, please send the REGISTRATION FORM with your abstract to: mtwhalen@gi.alaska.edu and cc to ac.dasilva@ulg.ac.be

Registration fees:

- Conference and core workshop: \$150 canadian
- Social dinner: \$ 50 canadian
- Field excursion: \$125 canadian

Registration – Submission of abstracts – Application for grants – Payment – 15 May 2013



4TH INTERNATIONAL PALAEOLOGICAL CONGRESS



**September 28 - October 3, 2014
MENDOZA, ARGENTINA**

**The history of life:
A view from the Southern Hemisphere**



On behalf of the Organizing Committee we cordially invite you to attend the 4th International Palaeontological Congress, to be held in Mendoza, Argentina, from September 28 to October 3, 2014, hosted by the Centro Científico Tecnológico CONICET Mendoza and partner organizations.

The International Palaeontological Congress (IPC) is a global meeting devoted to Palaeontology throughout the world. It convenes every four years under the aegis of the International Palaeontological Association. Following three previous editions in Sydney (2002), Beijing (2006) and London (2010), it will now come to the American continent for the first time. The 4th IPC will explore the courses Palaeontology may take as the 21st century ushers in profound and long lasting technological changes.

The meeting will be held in Mendoza, an attractive and easily accessible city in central western Argentina. It will offer a wide range of professional and recreational opportunities to participants of all backgrounds. Mendoza is renowned for its location at the foothills of the Andes, not far from Mount Aconcagua, the highest peak in the Western Hemisphere or even outside the Himalayas. Mendoza Province at large provides many tourist

attractions and is well known as one of the foremost wine-producing regions in the world.

Local organizers are planning a comprehensive congress with an intellectually stimulating scientific program. The meeting will provide opportunities for participants to present and share experiences, explore new research directions and debate topics with specialists from across the globe. A varied array of meeting styles including a combination of plenary lectures, symposia on leading issues, interactive workshops, technical sessions and short courses, promises to provide sessions of interest for all attendants.

Delegates will have the opportunity to enjoy diverse conference excursions to rich and well-known Argentine palaeontological sites. These field trips will not only include visits to important scientific localities but also to regional tourist attractions. The schedule of field trips covers superbly exposed sedimentary successions representing a great diversity of marine and continental palaeoenvironments and encompasses nearly the whole Phanerozoic stratigraphic record.

We look forward to welcoming you to Mendoza! Contact us:

<http://www.ipc4mendoza2014.org.ar/>

DEVONIAN PUBLICATIONS

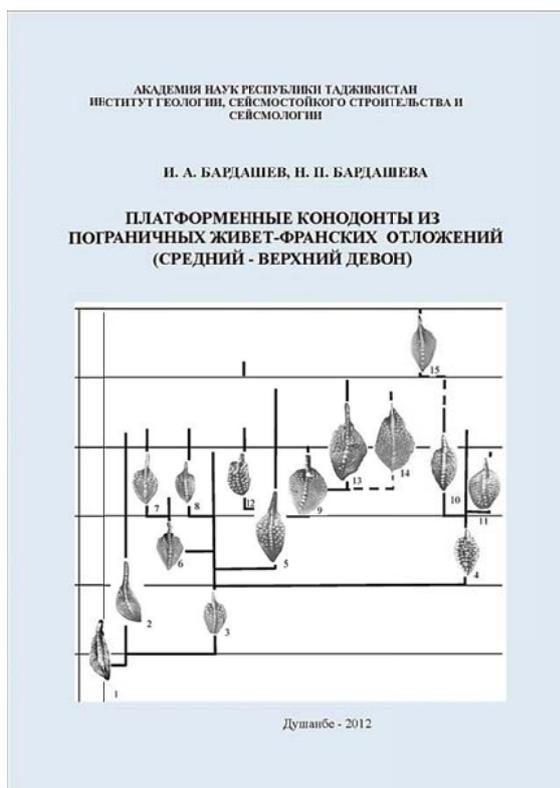
[Reports of publications in this section do not imply any evaluation of their content. There is a focus on Devonian work, which was published with limited circulation and which may escape the general attention. Please submit such references to the Editor. Reviews and comments on publications are welcomed in the SDS Documents and SDS Forum sections.]

PLATFORM CONODONTS FROM THE GIVETIAN-FRASNIAN BOUNDARY (MIDDLE-UPPER DEVONIAN)

I.A.. BARDASHEV & N.P. BARDASHEVA

Institute of Geology, Seismic Building and Seismology,
Academy of Science, 14 B.Rahimzoda st., Dushanbe
734003, Republic of Tajikistan, ibardashev@gmail.com

[90 pp., including, 7 pls., English translation
available by V.P. GLAVCHEVA, „Donish”
Publishing House, Dushanbe 2012]



Abstract

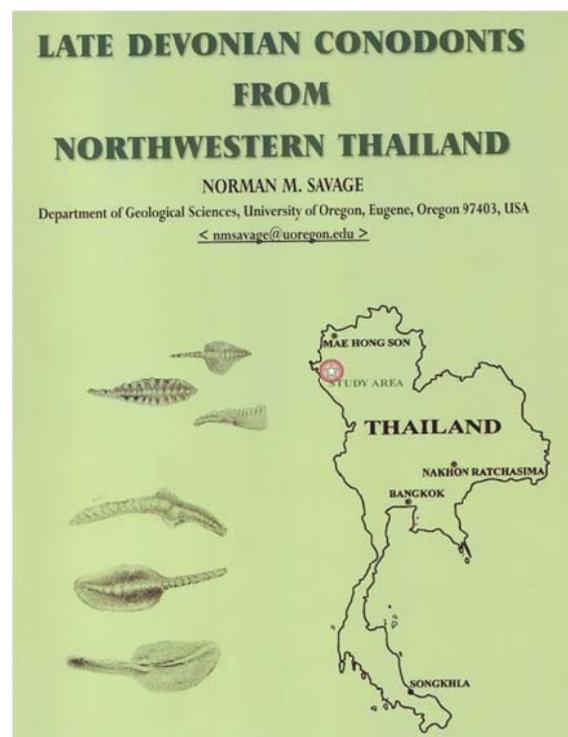
The Genus *Klapperina* LANE, MÜLLER and ZIEGLER, 1979 from the Givetian–Frasnian boundary interval is revised. Based on distinct features, the genus is subdivided into four groups of species, each forming a separate genus. The species with distinct central node representing a progressive lineage are left in *Klapperina*. Species forming the conservative

lineage, without a distinct central node, are grouped under *Muellerina* n.gen. Species with a small asymmetrical basal pit, rather than an L-shaped or triangular basal cavity, are excluded from the latter and assigned to *Laneina* n.gen. Species having a large basal pit with asymmetrical flanges, which were not related directly to *Klapperina*, *Muellerina* and *Laneina*, are grouped in *Zieglerina* n.gen.

Fifty-three taxa are described, of which thirty-four are new: *Klapperina alexandri*, *Kl. chediae*, *Kl. dronovi*, *Kl. gorevae*, *Kl. kononovae*, *Kl. mariae*, *Kl. maximi*, *Kl. ovnatanovae*, *Kl. uyenoi*, *Laneina*, *L. aboussalamae*, *L. babkini*, *L. beckeri*, *Mesotaxis korenae*, *Muellerina*, *M. canadaensis*, *M. idrisovi*, *M. orri*, *M. overi*, *M. sabirovi*, *M. walliseri*, *Polygnathus baratovi*, *Po. faizievi*, *Po. lelehusi*, *Zieglerina*, *Z. deimlingi*, *Z. monikae*, *Z. nuda*, *Palmatolepis aristovi*, *Pa. elenae*, *Pa. gatovskyi*, *Pa. petrae*, *Pa. reimersi*, *Pa. sepkoskii*, and *Pa. slavai*.

The phylomorphogenesis of the genera *Polygnathus*, *Klapperina*, *Laneina*, *Mesotaxis*, *Muellerina*, *Zieglerina*, and most ancient *Palmatolepis*, including the *Pa. transitans* MÜLLER group, are discussed.

The Lower *hermanni-cristatus* and Upper *hermanni-cristatus* zones are renamed as the *hermanni* and *cristatus* zones, respectively; the Upper *disparilis* Zone is designated as *dengleri* Zone, and the Upper *falsiovalis* Zone is renamed as *ovalis* Zone.



[January 2013, 48 pp., Bourland Printing, Eugene, Oregon, USA, ISBN 978-0-578-11919-9; contact: nmsavage@uoregon.edu]

Abstract

A near-vertical section almost eleven metres thick near the town of Mae Sariang, northwestern Thailand, has yielded conodont faunas of late Frasnian to late Famennian age. The section appears to include the Upper Kellwasser, Enkeberg, and the lower part of the Hangenberg events, as indicated by the conodonts and $\delta^{13}\text{C}$ isotope excursions. The faunas are mostly cosmopolitan but include several new species. The $\delta^{18}\text{O}$ isotope data are unreliable because of diagenetic overprint. The 80 conodont faunas from Mae Sariang suggest the presence of the Late *rhenana*, *linguiformis*, *triangularis*, *crepida*, *rhomboidea*, *marginifera*, *trachytera*, *postera*, *expansa*, and *praesulcata* zones. Anoxic shales are not present in the Mae Sariang section, nor are they present in the late Frasnian to early Famennian section 350 km to the south at Thong Pha Phum (SAVAGE et al. 2006). There is some evidence of volcanic input at Mae Sariang but mostly during Upper Kellwasser time. There is also evidence of some hydrothermal activity in the sediments during most of the Famennian, and especially towards the latest Famennian. Geochemistry indicates the near-bottom seawater was mostly oxidic, with anoxia only notable during the Upper Kellwasser interval. There is almost no correlation of conodont abundances and geochemistry so that the effect of transgressions and regressions from climatic causes was most likely the major stress on the conodont animals. An outer-shelf, starved basin setting is probable.

New taxa: *Palmatolepis khaensis*, *Pa. marki*, *Pa. subperlobata lapoensis*, *Polygnathus burretti*, *Po. communis hanensis*, *Po. communis namdipensis*, *Po. communis phaphaensis*, *Po. crassulus salapensis*, *Po. extralobatus phoensis*, *Pseudopolygnathus granulosus laepensis*, *Ps. granulosus salawinensis*, *Ps. maepoensis*, *Siphonodella banraiensis*.

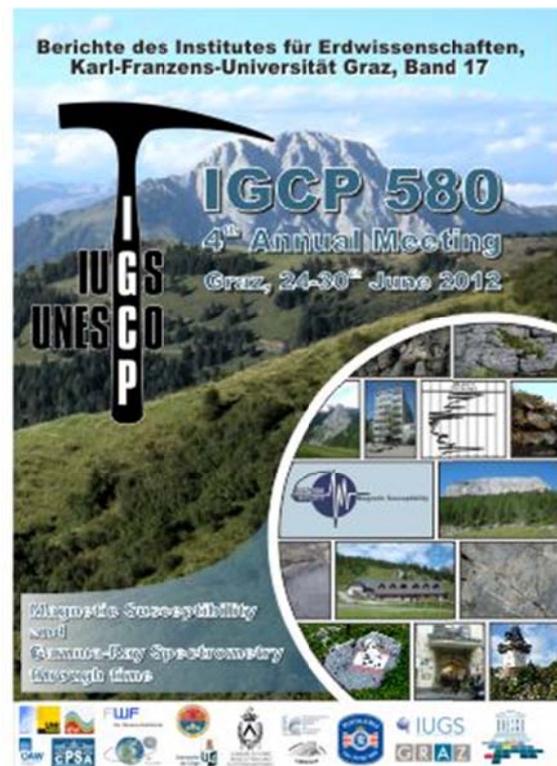
MAGNETIC SUSCEPTIBILITY AND GAMMA-RAY SPECTROMETRY THROUGH TIME GRAZ, 24TH-30TH JUNE 2012

KIDO, E., SUTTNER, T.J., PILLER, W.E., DA SILVA, A.C., CORRADINI, C. & SIMONETTO, L. (Eds.)

Devonian Contributions

CORRADINI, C., CORRIGA, M.G., SUTTNER, T.J., KIDO, E., VODRÁŽKOVÁ, S., KOPTÍKOVÁ, L., DA SILVA, A.C., PONDRELLI, M. & SIMONETTO, L. Facies development and MS across the Silurian/Devonian boundary in the Lake Wolayer area (Carnic Alps, Italy and Austria).

DA SILVA, A.C., DEKKERS, M.J., DE VLEESCHOUWER, D., CLAEYS, P., BOULVAIN, F. The use of magnetic susceptibility in Palaeozoic rocks as a tool for correlations and paleoclimatic reconstructions: merits and pitfalls.



DA SILVA, A.C., WHALEN, M., SLIWINSKI, M., DEVLEESCHOUWER, X., PETICLERC, E., BOULVAIN, F., BERTOLA, C., PRASANNAKUMAR, V., WANG, J., ZENGHUI, G. & CHEN, D. Preliminary results on the magnetic susceptibility records along the Frasnian-Famennian Fuhe section, China.

GRABOWSKI, J., NARKIEWICZ, M. & DE VLEESCHOUWER, D. Environmental context of the earliest tetrapod trackways: clues from MS and petrological studies (Eifelian, Holy Cross Mts., Poland).

KIDO, E., SUTTNER, T.J., PONDRELLI, M., CORRADINI, C., CORRIGA, M.G., SIMONETTO, L., VODRÁŽKOVÁ, S. & KOPTÍKOVÁ, L. Geochemical and geophysical records of the Middle Devonian sequence in the Carnic Alps.

KOPTÍKOVÁ, L., HLADIL, J., SLAVÍK, L., FRÝDA, J., MANDA, Š., ČÁP, P. & VODRÁŽKOVÁ, S.

Petrophysical record of the Middle Devonian Basal Choteč event in different palaeogeographical settings (Perigondwanan Perunica microcontinent, Laurussia and Zeravshan-Gissar Mountain Region in Central Asia): a reflection of global palaeoclimatic changes?

PAS, D., DA SILVA, A.C., CORNET, P., BULTYNCK, P., KÖNIGSHOF, P. & BOULVAIN, F. Sedimentary development of a continuous Middle Givetian to Lower Carboniferous section from the fore-reef fringe of the Brilon reef-complex (Rheinisches Schiefergebirge, Germany).

PAS, D., DA SILVA, A.C., CORNET, P., SUTTNER, T.J., KÖNIGSHOF, P., BOULVAIN, F. & BULTYNCK, P. Multi-disciplinary research on long-term Middle to Upper Devonian fore-reef successions from Germany and Austria.

SOBIEŃ, K. & RAKOCINSKI M. Is magnetic susceptibility a reliable proxy for detrital supply? - A case study of the Upper Devonian carbonates from the Holy Cross Mountains.

SUTTNER, T.J., KIDO, E., CHEN, X.-Q., WATERS, J.A., MAWSON, R. & FRÝDA, J. Magnetic susceptibility across the Frasnian–Famennian boundary at the Boulongour Reservoir (Northwest Xinjiang–Uygur Autonomous Region, China).

WHALEN, M., DA SILVA, A.C., SLIWINSKI, M., DEVLEESCHOUWER, X., PETICLERC, E., BOULVAIN, F., BERTOLA, C., PRASANNAKUMAR, V., WANG, J., ZENGHUI, G. & CHEN, D. - Geochemical, magnetic susceptibility, and carbon isotopic records across the Frasnian–Famennian boundary at Fuhe, China.

WÓJCIK, K. Lower–Middle Devonian boundary successions in the Holy Cross Mountains (central Poland): magnetic susceptibility as a tool for a short to long distance correlation.

Abstracts:

http://erdwissenschaften.uni-graz.at/publikationen/zeitschrift/band17/index_de.php



INTERNATIONAL FIELD SYMPOSIUM “THE DEVONIAN AND LOWER CARBONIFEROUS OF NORTHERN GONDWANA” – ABSTRACTS BOOK

EL HASSANI, A., BECKER, R.T., & TAHIRI, A. (Eds.)

[*Document de l’Institut Scientifique*, Rabat, **26**: 1-134, 2013; Adams Graphics, Rabat, ISBN 0251-4249]

Content

ABOUSSALAM, Z.S., BECKER, R.T., EICHHOLT, S. & EL HASSANI, A. Conodont biostratigraphy and the timing of facies changes at Ain-as-Seffah (Oued Cherrat Zone, Moroccan Meseta). (p. 11-13)

- ALEKSEEVA T.V ALEKSEEV A.O., KABANOV P.B. & ALEKSEEVA V.A. Carboniferous paleosols and paleolandscapes of East European Craton (southern Moscow Basin, Russia). (p. 14-15)
- ALEKSEEVA, T., KABANOV, P., ALAKSEEV, A. & ALEKSEEVA, V. Devonian paleosols of Voronezh region (European Russia): geochemistry, mineralogy, paleoenvironments. (p. 16-17)
- ARETZ, M. & DENAYER, J. Viséan corals from the transverse Jebel Begaa to Gara El Itima (eastern Tafilalt, Morocco). (p. 18-19)
- ARTYUSHKOVA, O.V. Conodont characteristics of the Emsian-Eifelian deposits in the Sakaska section (the South Urals). (p. 20-22)
- BAHRAMI, A., BONCHEVA, I., YAZDI, M. & KHAN-ABADI, E. Carboniferous in Central East Iran Microplate. Mississippian/Pennsylvanian boundary interval. (p. 23-24)
- BAKHAREV, N.K., IZOKH, N.G. & YAZIKOV, A.Y. New Data on the stratigraphy of the Lower and Middle Devonian of Salair (West Siberia, Russia). (p.25-27)
- BROCKE, R., FATKA, O., LINDEMANN, R.H., SCHINDLER, E., VER STRAETEN, C.A. New biostratigraphic insights from the early Mid-Devonian Choteč Event. (p. 28)
- BUDIL, P. Phacopid trilobites across the Zlíchovian/Dalejan, Dalejan/Eifelian and Eifelian/Givetian boundaries in the Prague Basin (Barrandian area, Czech Republic). (p. 29-30)
- CARPENTER, D.K., MARSHALL, J.E., BEERLING, D.J., & WELLMAN, C.H. Charcoal, Forests, and Earth's Palaeozoic geochemical oxygen cycle. (p. 31-32)
- DECOMBEIX, A.-L. Evolutionary changes in gymnosperm-type trees at the Devonian-Carboniferous boundary: significance of the Gondwanan record of plants. (p. 33-34)
- DENAYER, J. Strunian rugose and tabulate corals from Northwestern Turkey. (p. 35-36)
- EICHHOLT, S., BECKER, R.T. & STICHLING, S. Microfacies and Devonian reef development in the Oued Cherrat Zone (Aïn Khira South and Aïn-as-Seffah), Moroccan Meseta. (p. 37-39)
- ERNST, A. Lower Devonian bryozoan faunas of Spain. (p. 40-41)
- EVANS, S.D., OVER, D.J., DAY, J.E. & HASENMUELLER, N.R. The Devonian/Carboniferous boundary and the holotype of *Siphonodella sulcata* (HUDDLE, 1934) in the upper New Albany Shale, Illinois Basin, southern Indiana. (p. 42-43)
- FERROVÁ, L., FRÝDA, J., LUKEŠ, P. & FRÝDOVÁ, B. New data on the Daleje Event from the Barrandian (Bohemia) as a key for progress in Emsian stratigraphy. (p. 44-45)
- FRÝDA, J., RACHEBOEUF, P.R., FRÝDOVÁ, B., FERROVÁ, L. & MERGL, M. Quo vadis, *Platyceras*? – New protoconch data reveals a diphyletic origin of platyceratid gastropods. (p. 46-47)
- HARTENFELS, S. & BECKER, R.T. El Gara South – new data on Famennian ammonoid and conodont faunas and the *Annulata* Events in the Rheris Basin (northern Tafilalt, Morocco). (p. 48-51)
- HELLING, S. & BECKER, R.T. Lower Devonian trilobites from a Carboniferous olistostrome near Aït Issa (Tinerhir area, southern margin of the Variscan Zone, SE Morocco). (p. 52-54)
- HERBIG H.-G. & ARETZ, M. The Mississippian of the Jerada Massif (NE Morocco). (p. 55-59)
- HOGANCAMP, N. & OVER, D.J. The nature, range, and utility of stratigraphic distributions of morphotypes of *Polygnathus linguiformis linguiformis* (HINDE), Middle Devonian, northern Appalachian Basin. (p. 60-61)
- HÜNEKE, H. Facies and sediment architecture of Upper Devonian limestones at Gara de Mrirt, Eastern Moroccan Central Massif: Resedimentation in response to block faulting. (p. 62-64)
- IZOKH, N.G. & ANDREEVA, E.S. Uppermost Famennian Conodonts From Kuznetsk Basin (South Of West Siberia). (p. 65)
- JANSEN, U. Early Devonian brachiopod faunas, facies and bioevents of the Rhenish Massif. (Germany) (p. 66)
- KLUG, C., NAGLIK, C., DE BAETS, K., MONNET, C. & KORN, D. Intraspecific variability of Devonian ammonoids. (p. 67)
- KÖNIGSHOF, P., DA SILVA, AC., PAS, D., SUTTNER, T.J., KIDO, E. & JANSEN, U. Shallow water facies setting around the Kačák Event – a multidisciplinary approach. (p. 68)
- KUMPAN, T., BABEK, O., KALVODA, J. & FRÝDA, J. Multi-proxy stratigraphic analysis of the Devonian-Carboniferous boundary sections in the Central, Western and Southern Europe: a pathway to the better interregional correlations. (p. 69-71)
- KUMPAN, T. & KALVODA, J. Conodont and foraminiferal biostratigraphy of the Late Famennian and Early Tournaisian in the Moravian Karst (Moravo-Silesian Zone, Czech Republic). (p. 72-74)

- KURILENKO, A.V. Crinoids of the Silurian - Devonian boundary beds of Transbaikal. (p. 75-76)
- LAKIN J.A., MARSHALL, J.E.A. & TROTH, I. Strunian Glaciation and the Devonian-Carboniferous boundary in the high palaeolatitude record from Bolivia. (p. 77)
- LIAO, J-C. & VALENZUELA-RÍOS, J.I. The Givetian Conodont subdivision in the Spanish Central Pyrenees and its global correlation. (p. 78-79).
- MAHBOUBI, A., GIRARD, C., CORNÉE, J.J., BECKER, R.T. & FEIST, R. Late Devonian sequences and biostratigraphy of the South Marhouma region, Beni Abbès, SW Algeria - Preliminary results. (p. 80)
- MARSHALL, J.E.A., LAKIN, J.A. & FINNEY, S.M. Terrestrial Climate and Ecosystem Change from the Devonian-Carboniferous boundary to the earliest Viséan interval in East Greenland. (p. 81-82)
- MAVRINSKAYA, T. & SLAVÍK, L. Lochkovian conodont biostratigraphy in the South Urals. (p. 83)
- MERGL, M., FERROVÁ, L. & VODRÁŽKOVÁ, S. „Living fossils“ in the Devonian: micromorphic organophosphatic brachiopods. (p. 84-85)
- MEYER-BERTHAUD, B. Contribution of the Famennian plants from Anti-Atlas (Morocco) to the analysis of plant-climate interactions during the Devonian. (p. 86-87)
- MININA, O.R., NEBERIKUTINA, L.N. & ARISTOV, V.A. Upper Devonian and Lower Carboniferous of Western Transbaikalia. (p. 88-89)
- MOTTEQUIN, B., MARION, J.-M. & BRICE, D. Preliminary data on plicathyridines (Brachiopoda) from the Frasnian of southern Belgium and the Middle East (Afghanistan, Iran). (p. 90-92)
- NARKIEWICZ, K., BULTYNCK, P. & NARKIEWICZ, M. Revision of the conodont species *Icriodus orri* KLAPPER & BARRICK and its significance for the Eifelian biostratigraphy. (p. 93-95)
- NIKOLAEVA, S.V., KIM, I.A. & KARIMOVA, F.S. Eifelian ammonoids from the Central Kyzylkumy Desert (Uzbekistan). (p. 96-98)
- NOWAK, H., BECKER, R.T., ABOUSSALAM, Z.S. & HARTENFELS, S. Facies development and death of the Devonian Wülfrath Reef (northern Rhenish Massif, Germany). (p. 99-102)
- OBUT, O.T. & IZOKH, N.G. Devonian-Carboniferous Radiolarians and Conodonts from the South of the Char Ophiolite Zone. (p. 103-104)
- POTY, E., MOTTEQUIN, B. & DENAYER, J. An attempt of time calibration of the Lower Tournaisian (Hastarian Substage) based on orbitally forced sequences. (p. 105-107)
- ROELOFS, B., TRINAJSTIC, K. & TURNER, S. The use of conodont and vertebrate biostratigraphy in determining key boundaries in Late Devonian to Early Carboniferous sections, Canning Basin, Western Australia. (p. 108)
- SCHEMM-GREGORY, M. & HENRIQUES, M.H. The brachiopod reference collections of the Science Museum (Coimbra, Portugal): a legacy for the advance of Devonian stratigraphy and global correlation. (p. 109-110)
- SCHEMM-GREGORY, M. & PIÇARRA, J.M. The Lower Devonian of Portugal – an attempt for brachiopod biostratigraphical correlation. (p. 111-112)
- SCHINDLER, E., YALÇIN, M.N., YILMAZ, İ., WILDE, V.¹, WEHRMANN, A., WEDDIGE, K., SAYDAM-DEMIRAY, D.G., ÖZKAN, R., NAZIK, A., JANSEN, U., BROCKE, R. & BOZDOĞAN, N. The Devonian of the Turkish Taurides – new biostratigraphic insights. (p. 113-116)
- SLAVÍK, L., HLADIL, J., KOPTÍKOVÁ, L. & ČEJCHAN, P. Subdivision of the "Original Pragian" - new data from the type area. (p. 117-118)
- SOBIEN, K. & RAKOCINSKI, M. Sea level versus climate in the Famennian deposits of the southern Poland – an insight from rock magnetic measurements. (p. 119)
- TAGARIEVA, R.C. Famennian conodont zonation in the Barma and Makarovo deposits at the Kuk-Karauk-I Section (South Urals). (p. 120-122)
- VALENZUELA-RÍOS, J.I., SLAVÍK, L., CALVO, H.I., HUŠKOVÁ, A., LIAO, J-C.I. & KOPTÍKOVÁ, L. Correlation of the middle Lochkovian (Lower Devonian) conodont successions in peri-Gondwana key localities. (p. 123-124)
- VALENZUELA-RÍOS, J.I. & CALVO, H. Conodonts around middle/upper Lochkovian (Lower Devonian) from the section Segre 4 in the Central Spanish Pyrenees (p. 125-126)
- VER STRAETEN, C.A., BAIRD, G.C., BRETT, C.E., KIRCHGASSER, W.T., EBERT, J.R., OVER, D. J. & ZAMBITO, J.J. The classic New York Devonian: Toward a new stratigraphic synthesis and chronostratigraphic chart. (p. 127)
- YAZIKOV, A.Y., BAKHAREV, N.K., IZOKH, N.G., GONTA, T.V., OBUT, O.T., ANASTASIEVA, S.A., SARAIEV, S.V. & SOBOLEV, E.S. The Devonian and Carboniferous of Lena River Delta (Arctic Russia, Yakutia, Northern Kharaulakh). (p. 128-129)

YAZIKOV, A.Y. Evolution of Devonian brachiopods from the Altai-Sayan folded area and the Saltation Theory of Speciation. (p. 130-131)

ZAMBITO, IV J.J., BRETT, C.E., BAIRD, G.C., JOACHIMSKI, M.M. & OVER D.J. The Middle Devonian Global Taghanic Biocrisis in the type region, northern Appalachian Basin, USA: New Insights from paleoecology and stable isotopes. (p. 132-134)

Additional abstracts distributed at the meeting

BULTYNCK, P. Regional particularities of latest Pragian to earliest Eifelian conodont succession from the northern Tafilalt and the eastern Dra Valley (Moroccan Anti-Atlas) (1 p.)

DEVLESCHOUWER, X., DELLEVIGNE, A., YANS, J., PETITCLERC, E. & SPASSOV, S. New insights to the Givetian/Frasnian boundary (Belgium): multi-proxy geochemical evidence of drowning of the latest Givetian carbonate platform and increased detrital influx at the earliest Frasnian. (2 p.)

INTERNATIONAL FIELD SYMPOSIUM “THE DEVONIAN AND LOWER CARBONIFEROUS OF NORTHERN GONDWANA” – FIELD GUIDEBOOK

BECKER, R.T., EL HASSANI, A. & TAHIRI, A.
(Eds.)

[*Document de l'Institut Scientifique, Rabat, 27: 1-150, 2013; Adam Graphic, Rabat, ISBN 978-9954-20-668-3, ISSN 0251-4249*]

Content

Programme (p. 1-8)

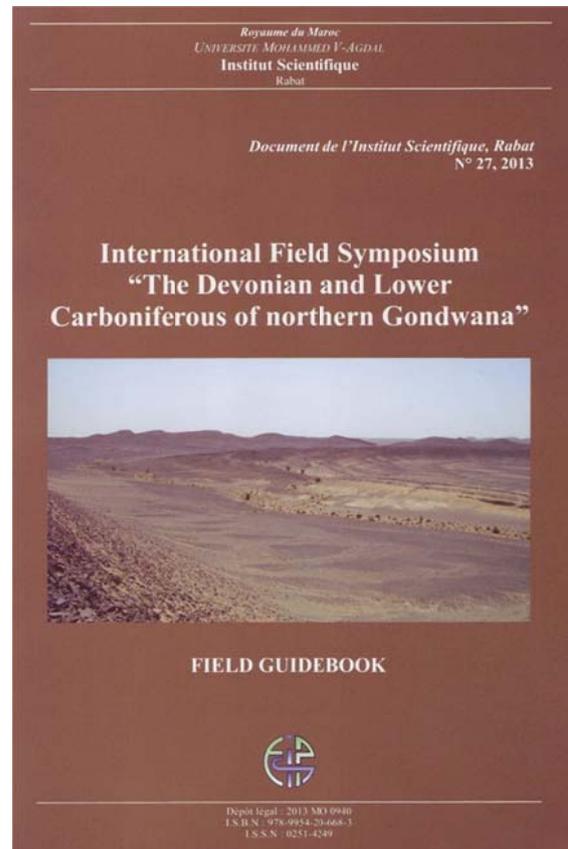
EL HASSANI, A. Introduction. (p. 9-10)

RYTINA, M.-K., BECKER, R.T., ABOUSSALAM, Z.S., HARTENFELS, S., HELING, S., STICHLING, S. & WARD, D. The allochthonous Silurian-Devonian in olistostromes at the southern Variscan Front (Tinerhir region, SE Morocco) – preliminary data. (p. 11-21)

WARD, P.D., BECKER, R.T., ABOUSSALAM, Z.S., RYTINA, M. & STICHLING, S. The Devonian at Oued Ferkla (Tinejdad region, SE Morocco). (p. 23-29)

BECKER, R.T., ABOUSSALAM, Z.S., BAIDER, L., EL HASSANI, A. & STICHLING, S. The Lower and Middle Devonian at El Khraouia (southern Tafilalt). (p. 31-40)

HARTENFELS, S., BECKER, R.T., ABOUSSALAM, Z.S., EL HASSANI, A., BAIDER, L., FISCHER, T. & STICHLING, S. The Upper Devonian at El Khraouia (southern Tafilalt). (p. 41-50)



KLUG, C., KORN, D., NAGLIK, C., FREY, L. & DE BAETS, K. The Lochkovian to Eifelian succession of the Amessoui Syncline (Southern Tafilalt). (p. 51-59)

BECKER, R.T., ABOUSSALAM, Z.S., HARTENFELS, S., EL HASSANI, A. & FISCHER, T. The Givetian – Famennian at Oum el Jerane (Amessoui Syncline, southern Tafilalt). (p. 61-76)

KAISER, S.I., BECKER, R.T., HARTENFELS, S. & ABOUSSALAM, Z.S. The middle Famennian – Middle Tournaisian at El Atrous (Amessoui Syncline, southern Tafilalt). (p. 77-86)

ARETZ, M., DENAYER, J. & MOTTEQUIN, B. Preliminary data on Viséan (Carboniferous) corals and brachiopods from the strata between the Djebel Begaa and the Gara El Itima (eastern Tafilalt, Morocco). (p. 87-94)

KORN, D., EBBIGHAUSEN, V. & KLUG, C. The Early Carboniferous succession in the vicinity of Gara el Itima. (p. 95-101)

TAHIRI, A., BELFOUL, A. & BAIDER, L. Chaotic deposits in the Lower Carboniferous formations of the Merzouga area (Tafilalet, Eastern Anti

Atlas, Morocco): geodynamic importance. (p. 103-108)

BECKER, R.T., HARTENFELS, S. ABOUSSALAM, Z.S., TRAGELEHN, H., BRICE, D. & EL HASSANI, A. The Devonian – Carboniferous Boundary at Lalla Mimouna (northern Maider) – a progress report. (p. 109-120)

KORN, D., BOCKWINKEL, V. & EBBIGHAUSEN, V. Famennian and Tournaisian strata of the Aguelmous Syncline. (p. 121-127)

ABOUSSALAM, Z.S. & BECKER, R.T. Lower Emsian Stratigraphy at Jebel Ihrs (western Tafilalt Platform). (p. 129-141)

BECKER, R.T. & ABOUSSALAM, Z.S. Introduction to the Givetian – Frasnian event stratigraphy at Mdoura-East (western Tafilalt Platform). (p. 143-150).

BEITRÄGE ZUR PALÄONTOLOGIE DES UNTERDEVONS LUXEMBURGS (3)

FRANKE, C. (Ed.)

Ferrantia, **68**, 2012, 147 pp., online under:
<http://www.mnhn.lu/ferrantia>.

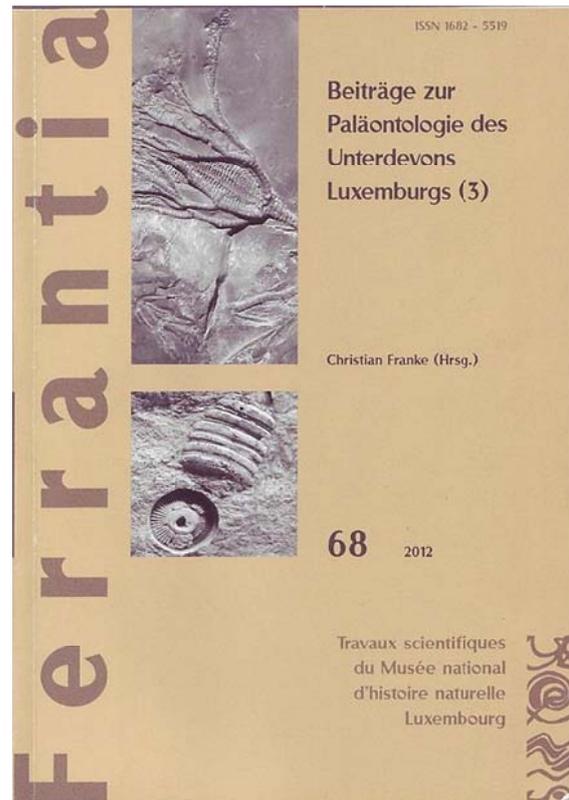
Content

FRANKE, C. Marine Fauna der Wiltz-Schichten (Ober-Emsium, Unter-Devon) der Mulde von Wiltz und der Daleider Mulden-Gruppe (Luxemburg, Deutschland). Teil 2: Crinoidea. (p. 5-64)

BECKER, G. & FRANKE, C. Über Ostracoden in Luxemburg und West-Eifel – das Ardenno-rheinische Unter-Devon im Spannungsfeld zwischen Oldred-Kontinent und Gondwana – ein Beitrag zur Biogeographie des Variszikums. (p. 65-116)

MÜLLER, P. Neue Daten zu *Spiniscabrella* und *Scabrella* (*Scabrella*) aus dem Unter-Devon von Deutschland, Luxemburg und Marokko. (p. 117-132)

FRANKE, C. Marine Fauna der Wiltz-Schichten (Ober-Emsium, Unter-Devon) der Mulde von Wiltz und der Daleider Mulden-Gruppe (Luxemburg, Deutschland). Teil 3: Craniida. (p. 133-147).



BASENY DEWOŃSKIE POŁUDNIOWO-WSCHODNIEJ POLSKI

NARKIEWICZ, M. (Ed.)

[*Prace Państwowego Instytutu Geologicznego*, **196**, 2011: 1-318; in Polish with English summaries]

NARKIEWICZ, M. Lithostratigraphy, depositional systems and transgressive-regressive cycles in the Middle Devonian to Frasnian of the Lysogóry-Radom Basin (south-eastern Poland). (p. 7-52)

NARKIEWICZ, M. Lithostratigraphy, depositional systems and transgressive-regressive cycles in the Middle Devonian to Frasnian of the Lublin Basin (south-eastern Poland). (p. 53-146)

NARKIEWICZ, K. Conodont biostratigraphy of the Middle Devonian in the Radom-Lublin area (south-eastern Poland). (p. 147-192)

NARKIEWICZ, K. & BULTYNCK, P. Conodont biostratigraphy of the Upper Devonian in the Lublin area (south-eastern Poland). (p. 193-254)

TURNAU, E. Palynostratigraphy of the Devonian deposits in the Radom-Lublin area (south-eastern Poland). (p. 255-288)

NARKIEWICZ, K., NARKIEWICZ, M. & TURNAU, E.
Devonian depositional development of the
Lysogóry-Radom and Lublin Basins (south-
eastern Poland). (p. 289-318)

For full pdf versions of articles see:

www.pgi.gov.pl/pl/wydawnictwa-geologiczne-pig-pib/seryjne/prace-naukowo-badawcze-pig/4150-prace-pig-tom-196-2011.html

The volume was published early in 2012 by the Polish Geological Institute in the series of *Prace Geologiczne*. It contains six papers summarizing stratigraphical and sedimentary aspects of the Lysogóry-Radom and Lublin basins (ŁRB and LB). Both are targets of intense petroleum exploration, the Lublin Basin became recently subject of a particular interest as a prospective area of the Lower Silurian shale gas.

The opening paper by **M. Narkiewicz** describes the lithostratigraphic framework of the subsurface Emsian to lowermost Frasnian of the NE part of the ŁRB. Depositional systems are dominated by carbonate-terrigenous open-marine shelf facies. Accumulation of up to 1500 meters of the Middle Devonian sediments, partly irregular pattern of depositional events and basinal architecture confirm a considerable influence of synsedimentary basement-block movements. Their significance decreased by the end Givetian and in the early Frasnian, when carbonate platform system prevailed throughout the basin. Comparison with the outcrops of the northern Holy Cross Mts. reveals number of analogies in subsidence and depositional development which support inclusion of both the areas into a single basinal unit.

In the second report by **M. Narkiewicz**, the revised lithostratigraphy of the Middle and Upper Devonian is extended over the entire LB as a result of investigations of 19 key borehole sections. The depositional systems range from alluvial and marginal marine to a carbonate platform, shallow restricted shelf, evaporative lagoon, to deeper shaly-carbonate shelf basin. The Early Devonian corresponds to a single T-R megacycle, comprising terrigenous sediments from open marine shales to alluvial red-beds, controlled partly by synsedimentary block movements. The Middle Devonian to Early Frasnian stage comprises 7 T-R cycles with a total thickness <400 m, reflecting shallower-water environments in SE and NE parts of the basin, and erosion prevailing in NW. The Middle-Late Frasnian (3 T-R cycles) is characterized by tectonic subsidence pulse, predominance of open-marine carbonates, and a maximum basin extent. The Famennian corresponds to a single T-R cycle of exceptionally rapid sedimentation of nearly 2 km of open shelf carbonate-shaly deposits, passing upwards into marginal-marine and continental clastics.

K. Narkiewicz summarizes previous results of the conodont studies of the Middle Devonian in the ŁRB and LB, supplemented with new data. Altogether, the study was based on 92 samples from 10 borehole sections, which yielded ca. 1600 specimens assigned to 10 genera and 41 taxa of species and subspecies rank, including 10 found for the first time in Poland. Many taxa are profusely illustrated while several previous taxonomic and age determinations are verified or re-established. The conodonts belong mainly to shallow-marine biofacies dominated by *Polygnathus* and *Icriodus*, which prompted adoption of alternative biozonations. Integration of the conodont data with other micro- and macrofaunal as well as palynostratigraphic data, allowed to identify the Eifelian and Givetian stages, the latter subdivided into substages. Consequently, it was possible to constrain the Emsian/Eifelian, Givetian/Frasnian as well as the Lower/Middle and Middle/Upper Givetian boundaries.

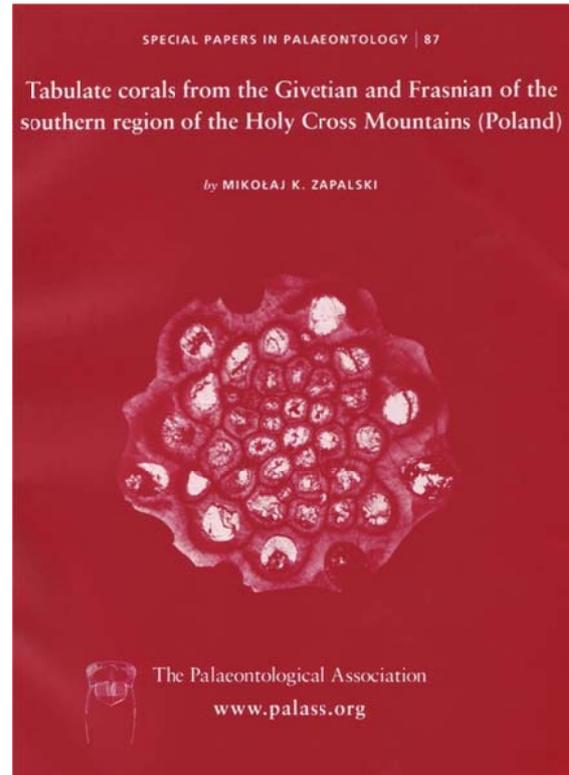
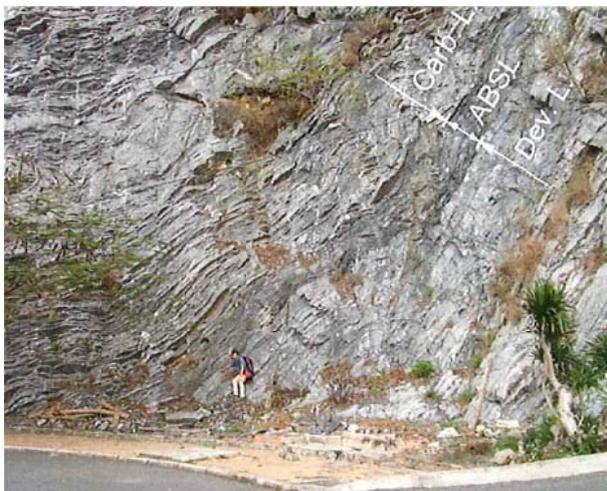
K. Narkiewicz and **P. Bultynck** present results of conodont investigations of the Upper Devonian in the LB based on samples from 15 boreholes, and documented in 11 tables and 12 photographic plates. The Frasnian conodont collection yielded 2139 specimens from 100 samples. They were ascribed to 9 genera and 81 lower-rank taxa, including 14 species found and described for the first time from Poland. The Lower Frasnian was documented in the uppermost part of the strata previously attributed entirely to the Givetian. The conodont biostratigraphy of the Frasnian sections allows to constrain also the age of particular members constituting the Modryń Formation. Upper formation boundary appears diachronous, in the range from the Lower Famennian to the uppermost Frasnian depending on the distribution of condensed facies at the F/F boundary.

E. Turnau summarizes the earlier studies of the Lower Devonian palynostratigraphy and documents in 11 tables and 5 plates new results on the Middle and Upper Devonian in both investigated basins. The identified miospore zones include the *apiculatus-proteus* (AP) Zone of the Emsian/Eifelian transition, the '*Geminospora*' *extensa* (Ex) Zone, Ex 3 Subzone, and the *Geminospora aurita* (Aur) Zone of the mid- to upper Givetian. Also the presence of the Den zone of the Givetian-Frasnian boundary interval has been ascertained. The Frasnian index species *Cristatisporites deliquescens* confirmed the presence of the lower Frasnian in one of key sections in the LB. Stratigraphical information provided by the study of phytoplankton is not as significant as the spore stratigraphy, but is consistent with it. Fluctuations of phytoplankton taxonomic diversity support some of the T-R cycles in the LB.

In the closing paper, **M. Narkiewicz, K. Narkiewicz** and **E. Turnau** synthesize the Devonian basinal development. The LRB is bounded in the south by the regional Holy Cross Fault. To NE it is neighbored by the LB along a narrow facies-gradient zone that was probably related to a basement fault active at least since the late Emsian onwards. LB continued to the Lviv Basin in SE, which was bordered from the east by the continental Ukrainian Massif. The latest Silurian open-shelf sedimentation graded in the middle-late Lochkovian into marginal marine clastics, partly unconformably overlain by mostly Pragian to mid-Emsian thick alluvial redbeds. Between late Emsian and early Frasnian rapid sedimentation in the LRB was controlled by basement blocks subsidence, whereas much thinner eustatically controlled T-R cycles developed under stable cratonic conditions of the LB. The Ic, Choteč, IIa (Taghanic) and IIb/c transgressions are relatively well-constrained, while the Id, IIc and the Rhinestreet events are more hypothetical. In the Middle Frasnian this pattern was overprinted by a subsidence pulse co-eval with the initial Pripyat Graben rifting. The Famennian saw a distinct depocentre development and strong lateral depositional variability controlled by a tectonic activity in NE flank of the basin, parallel with the main phase of the Pripyat Graben rifting.

NEW D/C BOUNDARY PAPER

KOMATSU, T., TAKASHIMA, R., NARUSE, H., TA Hoa Phuong, DANG Tran Huyen, NGUYEN Duc Phong, DINH Cong Tien, HO Tien Chung, TRAN Tan Van, KATO, S., MAEKAWA, T. & Glotov, Y. 2012. Devonian–Carboniferous transition in the Pho Han Formation on Cat Ba Island, northeastern Vietnam. - *The Journal of the Geological Society of Japan*, **118** (6): 5-6.



New volume on Devonian tabulate corals – April 2012, 45 £, ISSN 0038-6804

New taxa

Sapounofouskilites n. gen., *Striatopora sciuricauda* n.sp., *Alveolites? obtortiformis* n.sp., *Crassialveolites oliveri* n.sp., *Roseoporella heuvelmansi* n.sp., *Aulopora slosarskii* n.sp., and *Chaetosalpinx? plusquelleci* n.sp.

MEMBERSHIP NEWS

CM Olga V. ARTYUSHKOVA and the UFA GROUP

During the past year I started a mapping project in the north of the South Urals (western slope), bordering the Middle Urals, in order to deconvolute stratigraphic relationships of the Palaeozoic and especially of Devonian units across that region. The main aim of this work is to establish chronostratigraphic links of local units of different facies (sedimentary and volcano-sedimentary ones) to key divisions long recognized in the southern Ufimian Amphitheatre and elsewhere. Our goal is to identify the cherts's age in outcrops extending within the Mayaktau area. My assistants and I are working closely with Valery MOSEYCHUK, the Head of the geological survey (at Chelyabinsk), as well as with others.

This past July and August we examined the key outcrops known from previous investigations in the fifties of the last century. The most important outcome of the fieldwork was the confirmation of a condensed full Devonian section in the Mayaktau "allochthonous" structure. For the first time Early Devonian (early Emsian) and Frasnian deposits were discovered in siliceous and carbonate rocks. Also, new sensational finds of Upper Devonian conodonts were made in cherts in the southern part of the Nyazepetrovsk structure.

The new palaeontological data allows us to revise the subdivision of the Palaeozoic in that region. They are the base for a quite different, modern geological map.

Tatyana MAVRINSKAYA is continuing her work on Lochkovian to Pragian conodonts from the Mindigulovo section on the right bank of the Belaya River. In June 2012, field work was conducted in the Southern Urals, together with Nadya IZOCH. The trip was short and concentrated on the detailed re-sampling of the Lochkovian to lower Pragian. A manuscript on the new faunas from this stratigraphic interval was finished and presented for publishing (MAVRINSKAYA & SLAVIC in prep.). The carbonate succession from the Mindigulovo section is almost complete with only insignificant interruptions. The ranges of many cosmopolitan and widespread conodont taxa allow a refined zonal subdivision that mostly can be directly correlated with global conodont biozones.

Rezeda TAGARIEVA is working on her PhD project on conodont taxonomy and biodiversity across the F/F boundary in the western South Urals. She did a careful re-study of the F/F boundary interval in the South Urals sections. Last year, her research focused on the lower Famennian

succession, with the revelation of gaps above the F/F boundary.

Publications

Abstracts

ARTYUSHKOVA, O.V. & KONDRATENKO, V.F. 2012. *Discovery of Emsian conodonts Amydrotaxis murphyi in the Pre-Urals and South Urals.* – In: VISHNEVSKAYA, V.S., GOREVA, N.V. & FILIMONOVA, T.V. (Eds.), *Modern Micropaleontology, Proceedings of the XV All-Russian Micropaleontology Meeting, 12-16 September, 2012, Gelendzhik Moscow, 2012:* 194-197.

ARTYUSHKOVA, O.V. & MASLOV, V.A. 2012. *Correlative potential of the auxiliary stratigraphic volcanic-sedimentary units in the South Urals Devonian.* – In: ZHAMOIDA, A.I. (Ed.), *Palaeozoic of Russia: regional stratigraphy, paleontology, geo- and bioevents, Proceedings of the III All-Russian conference "Upper Palaeozoic of Russia: regional stratigraphy, paleontology, geo- and bioevents", 24-28 September, 2012, St.-Petersburg, VSEGEI:* 27-30.

TAGARIEVA, R.C. 2012. *Stratigraphic hiatuses at the Frasnian/Famennian boundary in South Ural's sections.* - In: *The 6th International Siberian Early Career GeoScientists Conference, Proceedings of the Conference, 9-23 June 2012, Novosibirsk, Russia:* 189-190 (IGM, IPPG SB RAS & NSU).

TAGARIEVA, R.C. 2012. *Barmian crisis at the Frasnian/Famennian boundary in the western sections of South Urals.* – In: BOGDANOVA, T.N. (Ed.), *Palaeontology and stratigraphical boundaries, Proceedings of LVIII session of Palaeontological Society RAS, 2-6 April, 2012, St.-Petersburg, VSEGEI:* 137-139.

TAGARIEVA, R.C. 2012. *Lower Famennian conodont zonation in Bol'shaya Barma section (western slope of South Urals).* – In: ZHAMOIDA, A.I. (Ed.), *Palaeozoic of Russia: regional stratigraphy, paleontology, geo- and bioevents, Proceedings of the III All-Russian conference "Upper Palaeozoic of Russia: regional stratigraphy, paleontology, geo- and bioevents", 24-28 September, 2012, St.-Petersburg, VSEGEI:* 224-226.

Papers

MAVRINSKAYA, T.M. & SLAVIC, L. 2013. *The correlation of the Early Devonian (Lochkovian – early Pragian) conodont faunas of the South Urals (Russia).* – *Bulletin of Geosciences*, **88** (2): 283-296.

TAGARIEVA, R.C. 2013 (2012 online). *Conodont biodiversity of the Frasnian-Famennian boundary interval (Upper Devonian) in the Southern Urals.* – *Bulletin of Geosciences*, **88** (2): 297-314.

CM Gordon C. BAIRD

Research and meeting - related activities for 2012:

Most of BAIRD'S field activity has been devoted to the examination and revision of end-Devonian stratigraphy in northern Ohio. Key colleagues include Joseph T. HANNIBAL of the Cleveland Museum of Natural History and John L. WICKS (J. L. WICKS Exploration, Wooster, Ohio). Reexamination of key Cleveland Shale sections led to a guidebook publication through the 41st Eastern Section of the American Association of Petroleum Geologists meeting in Cleveland, Ohio (September 2012).

A theme session of the topic of Devonian Shale (chaired by Gordon BAIRD, Chuck VER STRAETEN, and Jeff OVER) was held at the North-Central Regional Meeting of the Geological Society of America in Dayton, Ohio (April 23 – 24, 2012) on the following theme (see below): *Shales during the Devonian: Facies observed through new stratigraphic, sedimentologic, and paleoenvironmental perspectives*

Meeting – related activities for 2013:

Ongoing revisions of the overlying Bedford Formation succession will be presented in an upcoming field trip on “Stratigraphy and Depositional Setting of upper Devonian Ohio Black Shale Divisions and the Overlying Bedford/Berea Sequence in Northeastern Ohio: Dynamic End-Devonian Paleoclimatic Events, Sea-Level Changes and Tectonism interpreted from Outcrop, Core, and Wireline Logs” (with guidebook), scheduled for May 22 – 24, 2013 (AAPG Annual Convention, post conference field trip # 7). G. Baird, J. HANNIBAL, C. LAUGHREY and J. WICKS will be trip leaders.

The State University of New York College at Fredonia will host the 85th New York State Geological Association intercollegiate field conference, September 20 – 22, 2013. Several articles and associated field trips on Saturday and Sunday of that weekend will be devoted to the classic New York Devonian section.

Publications

Papers

- BAIRD, G.C., ZAMBITO, J.J. IV & BRETT, C.E. 2012. Genesis of unusual lithologies associated with the late Middle Devonian Taghanic Biocrisis in the type Taghanic succession of New York State and Pennsylvania. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 121-136.
- HANNIBAL, J. T., BAIRD, G.C., WICKS, J.L. & MACK, E.A. 2012. *Deposition and Geochemistry of the*

Upper Devonian Cleveland (black) Shale. - Guidebook, Eastern Section, American Association of Petroleum Geologists, 41st Annual Meeting: 31 p., Cleveland, Ohio.

- VER STRAETEN, C., BAIRD, G., KARABINOS, P., SAMSON, S. & BRETT, C.E. 2012. *Appalachian magmatism during the Ordovician and Devonian: perspectives from the foreland basin and the hinterland*. - In: RAYNE, T. W. (Ed.), Field Trip Guidebook for the 84th Annual Meeting for the New York State Geological Association: A7-1 – A7-60, Clinton, New York.
- ZAMBITO, J.J., IV, BRETT, C.E. & BAIRD, G.C., 2012. The *Late Devonian (Givetian) global Taghanic biocrisis in its type area (northern Appalachian Basin): Geologically rapid faunal transitions driven by local and global environmental changes*. - In: TALENT, J.A. (Ed.), *Earth and Life: Global Biodiversity, Extinction Intervals, and Biogeographic Perturbations Through Time*: 677 – 704, UNESCO, International Year of Planet Earth Series (Springer).
- ZAMBITO, J.J., IV, BRETT, C.E., BAIRD, G.C., KOLBE, S. E. & MILLER, A.I. 2012. New perspectives on transitions between ecological-evolutionary subunits in the “type interval” for coordinated stasis. - *Paleobiology*, **38** (4): 664-681.

Abstracts

- ZAMBITO, J.J., BRETT, C.E., & BAIRD, G.C. 2011. *Paleoecology, isotope geochemistry, and sedimentology of the Middle Devonian Taghanic Biocrisis in its type region*. - Annual Meeting, "Global environmental changes and extinction on a regional scale", Geological Society of America, Minneapolis.
- BAIRD, G.C., BRETT, C.E., KIRCHGASSER, W.T. & HANNIBAL, J.T. 2012. Potential measures of increasing paleostress conditions for marine biosphere in Givetian – Famennian shale – rich successions, New York and Ohio. - In: BAIRD, G.C., OVER, D.J. & VER STRAETEN, C. (presiders), *Shales during the Devonian: Facies observed through new stratigraphic, sedimentologic, and paleoenvironmental perspectives*, *Geological Society of America, North-Central Section Meeting, Dayton, Session T 22, Abstracts with Programs*, **44** (5): 7.

TM Carlton E. BRETT

Continued efforts to produce syntheses of work on Middle Devonian sequence stratigraphy, cycles, paleoenvironments and bioevents, with Gordon BAIRD (SUNY Fredonia) and several former graduate students, culminated in the publication and submission of a number of papers and dissertations. First, the special volume on *Time Specific Facies*, in honor of Otto H. WALLISER, edited by Annalisa FERRETTI, Kathleen HISTON, Pat MCLAUGHLIN and myself, was published on-line in *Palaeogeography, Palaeoclimatology, Palaeoecology* in latest 2012. This volume features several papers on TSFs in the Devonian. I also published two papers, in *Palaeo-3*

and *Palaios*, related to comparative facies and paleoecology of rhythmic trilobite beds from the Emsian of SW Morocco and elsewhere, based on work initiated in 2007 on a National Geographic grant. We are still working toward a compilation of updated articles and field guides from the North American Paleontological Conference, together with related fieldtrips conducted since that time as a book through Cincinnati Museum Center.

Much of my effort in the summer of 2012 was directed toward organizing, together with Brad CRAMER and running the FOERSTE Symposium for IGCP 591: *The Early to Middle Paleozoic Revolution*, here in the classic Cincinnati Arch region. The meeting was attended by about 50 researchers from some 12 different countries. Formal talk sessions were preceded by a two-day field trip, July 22-23 with about 20 stops in the Upper Ordovician (Sandbian-Katian) to Silurian long the southeastern side of the Cincinnati Arch of Kentucky and southern Ohio. The meeting held at the University of Cincinnati on July 24 and 25 featured some 25 talks and posters; a mid-meeting dinner cruise was held on a riverboat on the Ohio River. The post-meeting field trip featured two days of study of sections along Upper Ordovician to Devonian outcrop sections on the northwest side of the Arch in south western Ohio, Kentucky and southern Indiana.

All told, we examined about 40 outcrop sections in four states. These outcrop sections, together with overview chapters on the sequence stratigraphy, biostratigraphy, sedimentary processes and paleontology are discussed in three field guides (see references below). Road logs in these guides provide notations on well over 200 outcrop sections seen in passing during the various trips. Edited and updated versions of these field guides will be available on-line at the IGCP 591 website early in 2013 (For more details, visit the IGCP 591 website: <http://www.igcp591.org/meetings.php>). Although these guides are focused on Ordovician and Silurian stratigraphy, a number of Devonian sections are identified in roadlogs.

Publications

Journal Articles and Book Chapters

- BRETT, C.E. 2012. *Coordinated stasis reconsidered: A perspective at fifteen years*. – In: TALENT, J. (Ed.), *Global Biodiversity, Extinction Intervals and Biogeographic Perturbations through Time*: 23-36, Heidelberg, London, New York (Springer).
- BRETT, C.E., SMRECAK, T., PARSONS HUBBARD, K.M. & WALKER, S.E. 2012. Marine sclerobiofacies: Encrusting communities on shells through time and space. – In: TALENT, J. (Ed.), *Global Biodiversity, Extinction Intervals and Biogeographic Perturbations through Time*: 128-158, Heidelberg, London, New York (Springer).

- BRETT, C.E., CRAMER, B.D., MCLAUGHLIN, P.I., KLEFFNER, M. A., SHOWERS, W.J. & THOMKA, J.R. 2012. Revised Telychian-Sheinwoodian (Silurian) stratigraphy of the Laurentian mid-continent: Building uniform nomenclature along the Cincinnati Arch. - *Bulletin of Geosciences*, **87** (4): 733-753.
- BRETT, C.E., ZAMBITO, J.J., HUNDA, B. & SCHINDLER, E. 2012. Mid-Paleozoic trilobite Lagerstätten: Models of diagenetically enhanced obrution deposits. - *Palaios* **27**: 326-345.
- ELLWOOD, B.B., BRETT, C.E., TOMKIN, J.H. & MACDONALD, W.D. 2012. Visual identification and quantification of Milankovitch climate cycles in outcrop: an example from the Upper Ordovician Kope Formation, northern Kentucky. – In: HERRERO-BERVERA, E. & JOVANE, L. (Eds.), *Magnetostratigraphy: Not only a dating tool*, *The Geological Society, London, Special Publication*, London.
- ZAMBITO, J.J., IV, BRETT, C.E. & BAIRD, G.C. 2012. The Late Devonian (Givetian) global Taghanic biocrisis in its type area (northern Appalachian Basin): Geologically rapid faunal transitions driven by local and global environmental changes. - In: TALENT, J.A. (Ed.), *Earth and Life: Global Biodiversity, Extinction Intervals, and Biogeographic Perturbations Through Time*: 677 – 704, UNESCO, International Year of Planet Earth Series (Springer).
- ZAMBITO, J.J., IV, BRETT, C.E., BAIRD, G.C., KOLBE, S. E. & MILLER, A.I. 2012. New perspectives on transitions between ecological-evolutionary subunits in the “type interval” for coordinated stasis. - *Paleobiology*, **38** (4): 664-681.

Guidebook Articles

- BRETT, C.E., MCLAUGHLIN, P.I., SCHRAMM, T.J., SULLIVAN, N.B., and THOMKA, J.R. 2012. *Middle Paleozoic Sequence Stratigraphy and Paleontology of the Cincinnati Arch*. – In: BRETT, C.E., CRAMER, B.D & GERKE, T. L. (Eds.), Part 1. Central Kentucky and Southern Ohio, International Geoscience Programme (IGCP) Project, 2nd Annual Meeting and 1st FOERSTE Symposium, Guidebook, University of Cincinnati, Cincinnati, OH: 160 p.
- BRETT, C.E., CRAMER, B.D., DATILLO, B.F., MCLAUGHLIN, P.I., SCHRAMM, T.J. & THOMKA, J.R. 2012. *Middle Paleozoic Sequence Stratigraphy and Paleontology of the Cincinnati Arch*. – In: BRETT, C.E., CRAMER, B.D. & GERKE, T. L. (Eds.), Part 2. Northern Kentucky and SE Indiana, International Geoscience Programme (IGCP) Project, 2nd Annual Meeting and 1st FOERSTE Symposium, Guidebook, University of Cincinnati, Cincinnati, OH: 94 p.
- VER STRAETEN, C.A., BAIRD, G.C., KARABINOS, P., SAMSON, S. & BRETT, C.E. 2012. *Appalachian magmatism during the Ordovician and Devonian: Perspectives from the foreland basin, and the hinterland*. - 84th Annual New York State Geological Association, Field Trip Guidebook: A7-1- A7-60.

CM Denise BRICE

During the last years my research topics focused on the systematics, biostratigraphy, and paleobiogeography of Devonian brachiopods (Topic 1), principally related with the redefinition of the Devonian/Carboniferous boundary (Topic 2). My present studies concentrated on brachiopod faunas from latest Devonian “Strunian” in the Avesnois (N. France).

Publications

Topic 1

- BRICE, D., YAZDI, M., TORABI, H. & MALEKI, A. 2006. Devonian brachiopods from the Zefreh section (Central Iran). - *Annales de la Société Géologique du Nord*, **12** (2^{ème} série): 141-155.
- HUBERT, B., ZAPALSKI, M. K., NICOLLIN, J.P., MISTIAEN, B. & BRICE, D. 2007. Selected benthic faunas from the Devonian of the Ardennes: An estimation of palaeobiodiversity. - *Acta Geologica Polonica*, **57** (2): 223-262.
- ZAPALSKI, M.K., HUBERT, B., NICOLLIN, J.P. MISTIAEN, B. & BRICE, D. 2007. The palaeobiodiversity of stromatoporoids, tabulates and brachiopods in the Devonian of Ardennes. - *Bulletin de la Société Géologique de France*, 55-62.
- BRICE, D., BOUMENDJEL, K., RACHEBOPEUF, P. & MOTTEQUIN, B. 2011. Lower Devonian rhynchonellid brachiopods from the Ougarta area (western Sahara, Algeria). - *Bulletin of Geosciences*, **86** (1): 71-90.
- MISTIAEN B., BRICE, D., ZAPALSKI, M.K. & LOONES, C. 2012. *Brachiopods and their Auloporid Epibionts in the Devonian of Boulonnais (France): Comparison with other associations globally*. – In: TALENT J.A. (Ed.), *Earth and Life, Global Biodiversity, Extinction Intervals and Biogeographic Perturbations Through Time*: 155-188 (Springer).
- BRICE, D., PINTE, E. & MISTIAEN B. 2012. The global Taghanic Biocrisis (Givetian) on brachiopods of the Ferques inlier area (Boulonnais-France). - Centenary Meeting of the Paläontologische Gesellschaft, 24.09 – 29.09.2012, Museum für Naturkunde Berlin, Abstract, *Terra Nostra*, **2012** (3): 38.
- MISTIAEN, B., BRICE, D., LOONES, C. & DE SOUSA, A. 2012. Un affleurement temporaire exposant le contact entre les Formations de Beaulieu et de Ferques (Frasnien, Boulonnais). - *Annales de la Société géologique du Nord*, **19** (2^{ème} série): 1-9.
- CRÔNIER, C., FATIMA, Z. M., ANGELA, F. & BRICE, D. (in press). First occurrence of a phacopid trilobite faunule from the Upper Devonian of Saoura Valley, Algeria, and patterns of diversification during the late Devonian. - *Geological Magazine*.

Topic 2:

- NICOLLIN, J.P. & BRICE, D. 2004. Biostratigraphical value of some Strunian (Devonian, Uppermost Famennian) Productidina, Rhynchonellida, Spiriferida, Spiriferinida brachiopods. - *Geobios*, **37** (4): 437-453.

- BRICE, D., LEGRAND-BLAIN, M. & NICOLLIN, J.P. 2005. New data on Late Devonian and Early Carboniferous from NW Sahara. Morocco, Algeria. - *Annales de la Société géologique du Nord*, **12** (2^{ème} série): 1-45.
- BRICE, D., LEGRAND-BLAIN, M., NICOLLIN, J.-P. 2007. Brachiopod faunal changes across the Devonian-Carboniferous boundary in NW Sahara (Morocco, Algeria). – In: BECKER T. R. & KIRCHGASSER W. T. (Eds.), *Devonian Events and Correlations, The Geological Society, London, Special Publications*, **278**: 261-271.
- MOTTEQUIN B, BRICE D. & M. LEGRAND-BLAIN (in press). Biostratigraphic significance of brachiopods near the Devonian/Carboniferous boundary. - *Geological Magazine*.

CM Rainer BROCKE

Devonian activities in 2012 were primarily focused on two field seasons in Central and Southern Taurids of Turkey (with colleagues from Turkey and Senckenberg). We were able to sample new material from the Silurian/Devonian interval up to the Upper Devonian. First palynological results look promising and were shown during the field workshop “Paleozoic of Northern Gondwana and its Petroleum Potential” in Kayseri, Turkey.

Studies on the Choteč Event (in cooperation mainly with colleagues from the USA and the Czech Republic) and Lower Devonian soils in the Rheinisches Schiefergebirge are in progress.

Selected publications and abstracts 2012

- BROCKE, R., SCHULTKA, S. & SCHINDLER, E. 2012. 400 Millionen Jahre alte Böden in der Eifel - Als die Pflanzen sesshaft wurden. – *SENCKENBERG – natur • forschung • museum*, **142** (1/2): 52-57.
- SCHINDLER, E., BOZDOGAN, N., BROCKE, R., JANSEN, U., KARSLIOGLU, Ö., KOZLU, H., NALCIOGLU, G., NAZIK, A., ÖZKAN, R., SAYDAM-DEMIRAY, D.G., WEDDIGE, K., WEHRMANN, A., WILDE, V., YALÇIN, M.N. & YILMAZ, I. 2012. Facies development, global events, and lithology of stratigraphically constrained sequences in the Devonian of the Central and Eastern Taurides (Turkey). - *Turkish Association of Petroleum Geologists, Special Publication*, **6**: 10-11.
- WEHRMANN, A., BOZDOGAN, N., BROCKE, R., SCHINDLER, E., WILDE, V., YALÇIN, M.N. & YILMAZ, I. 2012. Sedimentary signatures of the North Gondwana margin in the Devonian (Taurides, Turkey): Reconstruction of depositional environments and hinterland processes. - *Turkish Association of Petroleum Geologists, Special Publication*, **6**: 7-9.

TM Carlo CORRADINI

My research is mainly devoted to conodont biostratigraphy in several North Gondwana regions (the Carnic Alps, Morocco, Sardinia, Montagne

Noire, Iran, etc.) from the Silurian to Lower Carboniferous, specially focusing on the Silurian/Devonian and the Devonian/Carboniferous boundaries. The latter are mainly related with the International Task Group on the redefinition of the Devonian/Carboniferous Boundary (led by M. ARETZ, Toulouse).

In the Carnic Alps a huge project on formal lithostratigraphic units of the pre-Variscan sequence of the Carnic Alps, coordinated by T. SUTTNER (Graz) and me, is in progress. It involves several colleagues from various countries and is open to everybody can give a contribution. Within this project, several sections from Silurian to Lower Carboniferous are in study in various areas of the Carnic Alps (with L. SIMONETTO, M. PONDRELLI, M.G. CORRIGA, C. SPALLETTA, T. SUTTNER, E. KIDO, and others).

Other projects in progress in the Carnic Alps deal with:

- Conodonts from several upper Silurian and Lower Devonian sections are under study with M.G. CORRIGA. Beside some new sections, some classical localities have been sampled, such as Costone Lambertenghi/Seekopf Sockel (SCHÖNLAUB 1980) and Cellon (WALLISER 1964). The lower Devonian part of the Cellon section was sampled, too. The Silurian/Devonian boundary interval of other sections (Rauchkofel Boden, Seewarte, etc.) shall be sampled next summer.

- The Kacak event is studied in some section in the central part of the Carnic Alps (with T. SUTTNER, E. KIDO, and others). Research deals with conodonts, microfacies, stable isotopes, magnetosusceptibility, gamma ray spectroscopy, and other fossil groups.

In Sardinia, research is mainly devoted to the Clymeniae Limestone of the southeastern part of the island, mainly looking for sections exposing the D/C boundary. In this respect, the Monte Taccu section (CORRADINI et al. 2003) has been resampled (with A. MOSSONI and C. SPALLETTA).

In Morocco, conodonts and crinoids from the upper Silurian and lowermost Devonian *Scyphocrinites* beds are under study (with M.G. CORRIGA and R. HAUDE).

In the Montagne Noire, research deals both with conodont stratigraphy across the S/D boundary (with M.G. CORRIGA and R. FEIST) and with the stratigraphy and facies in the Famennian and lowermost Tournaisian (with C. GIRARD, R. FEIST and others).

In Iran research is carried on in cooperation with A. BAHRAMI (Isfahan) and deals with conodonts and the stratigraphy of sections from the Middle Devonian to Lower Carboniferous in

different parts of the country. More precisely, from the Frasnian to Tournaisian in the southern part of the Shotori Range (Tabas area), Frasnian and Famennian of the Kerman province, and with the Givetian north of Isfahan.

Maria G. Corriga got a two years post-doc at Cagliari University. She is continuing her work on upper Silurian and Lower Devonian conodonts from several sections in various North Gondwana regions: Sardinia, the Carnic Alps, Montagne Noire, Spanish Pyrenees (with J.I. VALENZUELA-RIOS), Morocco. See above for details

Angelo Mossoni started a PhD on the Condruz and Enkeberg (Famennian) events, under my supervision. He is investigating sections in Sardinia, the Carnic Alps, and other regions. Beside conodont stratigraphy, he will study the interval of interest with geochemical and geophysical methods (the latter with under the supervision of A.C. DA SILVA, Liege).

Devonian papers/abstracts 2012

CORRADINI C. & CORRIGA M.G. 2012. A Pridoli-Lochkovian conodont zonation in Sardinia and the Carnic Alps: implications for a global zonation scheme. - *Bulletin of Geosciences*, **87** (4): 635-650. [DOI 10.3140/bull.geosci.1340]

CORRADINI C., CORRIGA M.G., SUTTNER T.J., KIDO E., VODRÁŽKOVÁ S., KOPTÍKOVÁ L., DA SILVA A.C., PONDRELLI M. & SIMONETTO L. 2012. Facies development and MS across the Silurian/Devonian boundary in the Lake Wolayer area (Carnic Alps, Italy and Austria). - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 13-14.

CORRADINI C., PONDRELLI M., CORRIGA M.G., SIMONETTO L., KIDO E., SUTTNER T.J., SPALLETTA C. & CARTA N. 2012. Geology and stratigraphy of the Cason di Lanza area (Mount Zermula, Carnic Alps, Italy). - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 83-103.

CORRADINI C., SCHÖNLAUB H.P., PONDRELLI M., SIMONETTO L., CORRIGA M.G., SUTTNER T.J. & KIDO E., 2012. A short overview on the Palaeozoic sequence of the Carnic Alps. - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 65-70.

CORRIGA M.G., CORRADINI C., PONDRELLI M. & SIMONETTO L. 2012. Lochkovian (Lower Devonian) conodonts from the Rio Malinfier section (Carnic Alps, Italy). - *Gortania Geologia, Paleontologia, Paleontologia*, **33**: 31-38.

KIDO E., SUTTNER T.J., PILLER W., DA SILVA A.C., CORRADINI C. & SIMONETTO L. (Eds.), 2012. IGCP 580, 4th Annual meeting, Graz 23-30 June 2012. - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 104 pp.

KIDO E., SUTTNER T.J., PONDRELLI M., CORRADINI C., CORRIGA M.G., SIMONETTO L. & VODRÁŽKOVÁ S.

2012. *Middle Devonian crisis and rugose corals in the Carnic Alps (Austria-Italy)*. - IGC 2012, Brisbane, Abstract CD.

KIDO E., SUTTNER T.J., PONDRELLI M., CORRADINI C., CORRIGA M.G., SIMONETTO L., VODRAZKOVA S. & KOPTIKOVA L. 2012. *Magnetic susceptibility and carbon isotopic record across the Eifelian-Givetian boundary in the Carnic Alps*. - In: 4th International Geologica Belgica Meeting 2012, Moving Plates and Melting Icecaps – Processes and Forcing Factors in Geology, Brussels 11-14/09/12, Abstract book: 43

KIDO E., SUTTNER T.J., PONDRELLI M., CORRADINI C., CORRIGA M.G., SIMONETTO L., VODRÁŽKOVÁ S. & KOPTIKOVÁ L. 2012. *Geochemical and geophysical records of the Middle Devonian section in the Carnic Alps*. - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, 17: 29-30.

TM Nadezhda G. IZOKH and the Novosibirsk Group

During the year 2012 our team continued the investigation of Devonian stratigraphy at the south of West Siberia and started to study the lower reaches of the Lena River, Russian Arctic region. The research group from the Trofimuk Institute of Petroleum Geology and Geophysics SB RAS includes Drs. N.K. BAKHAREV, N.G. IZOKH, O.T. OBUT, V.G. KHROMYKH, N.V. SENNIKOV, T.P. KIPRIYANOVA, O.A. RODINA, A.Y. YAZIKOV, PhD student T.A. SHCHERBANENKO, and O.P. IZOKH from the SOBOLEV Institute of Geology and Mineralogy SB RAS.

Different topics were under investigation:

TM Dr. Nadezhda G. IZOKH – conodonts,
 CM Dr. Nikolay K. BAKHAREV – ostracods,
 CM Dr. Olga T. OBUT – radiolarians,
 CM Aleksandr Y. YAZIKOV – brachiopods,
 CM Dr. Olga P. IZOKH – geochemistry
 Dr. Vladimir G. KHROMYKH – stromatoporoids
 Dr. Nikolay V. SENNIKOV – graptolites,
 Olga A. RODINA – fish remains,
 Tatiana A. SHCHERBANENKO – brachiopods,
 Master student Ekaterina S. ANDREEVA – conodonts,
 Undergraduate student Ivan V. SKORITSKY – conodonts.

The Devonian group from Novosibirsk works actively on the improvement of the Regional stratigraphic charts for the Devonian of Central Siberia. The All-Russian meeting dedicated to renovated stratigraphic charts for the Paleozoic of Central Siberia took place in November 2012 in the Trofimuk Institute of Petroleum Geology and Geophysics. Regional charts for the Devonian System of four large regions were discussed: Altai-Sayan Folded Area (east and west parts), West Siberia, Siberian Platform and Taimyr.

Main results obtained in 2012.

1. Brachiopods, conodonts, ostracods and fish remains were studied from the reference section of the Izyly and the lower part of the Vassino horizons of the Kuznetsk Basin. The age of the Izyly Horizon was specified to be early Frasnian. The Vassino Horizon is characterized by a Middle Frasnian conodont association with *Ancyrodella lobata* BRANSON & MEHL, *Polygnathus webbi* STAUFFER, *Po. alatus* KLAPPER & LANE, *Po. decorosus* STAUFFER, *Icriodus* aff. *expansus* BRANSON & MEHL, and *I. brevis angustulus* SEDDON (A.Y. YAZIKOV, N.G. IZOKH, N.K. BAKHAREV & O.A. RODINA).

2. The biodiversity of Upper Devonian radiolarian associations from the carbonate-siliceous Akbasai Formation, Kule Gorge section, south-western part of the Zeravshan-Gissar mountainous area, South Tien Shan, was investigated. Abundant and well-preserved radiolarians belong to 9 genera. *Trilonche*, *Astroentactinia*, *Haplentactinia*, *Radiobisphaera*, *Palaeoscenidium*, *Nazarovites*, *Moskovistella*, *Polyentactinia*, and *Spongoentactinella* were found together with Middle Frasnian conodonts of the *punctata* Zone, the uppermost Frasnian and F/F *linguiformis*-?lowermost *triangularis* zones, the lower Famennian *crepida* Zone, and of the middle Famennian *marginifera* Zone. The studied radiolarian associations are characterized mainly by spherical forms dominated by diverse spumellarians: abundant entactiniids, few haplentactiniids and rare polyentactiniids, as well as spiny palacantholithids and palaeoscenidiids. However, the lack ceratoikiscids that are characteristic for the Upper Devonian. (O.T. OBUT & N.G. IZOKH).

3. The phylogeny of Devonian brachiopods from the western part of the Altai-Sayan Folded Area was analyzed. It was found that evolutionary trends could be explained by the saltation theory of speciation, proven by the following: 1) for phylogenetically closely related, adaptively radiating complexes of species monomorphic species usually are initial and polymorphic - the final link; 2) species with an inversion polymorphism of the adaptive rank (i.e., providing a broad ecological and climate adaptation) have a much lower potential for speciation than restricted-adaptative monomorphic species.

For the first position it can be added that the appearance of the polymorphic descendant in the first stage leads to the disappearance of species ancestor, while in the second - to the extinction of entire lineage. (A.Y. YAZIKOV)

4. Devonian conodonts from the Salair, Kuznetsk Basin (south of West Siberia), and Yamal peninsula (Arctic Russia) were investigated.

The Eifelian Pesteryovo Formation represented by bedded and reef limestones cropping out in the Malaya Salairka Quarry was studied in the vicinity of Gurievsk town, NE Salair. A diverse conodont association was obtained. It is dominated by *Polygnathus costatus* and *Icriodus regularicrescens*. The conodont association includes *Polygnathus costatus partitus* KLAPPER, ZIEGLER & MASHKOVA, *Polygnathus costatus costatus* KLAPPER, *Polygnathus costatus oblongus* WEDDIGE, *Polygnathus pseudofolius* WITTEKINDT, *Polygnathus angusticostatus* WITTEKINDT, *Polygnathus* aff. *trigonicus* BISCHOFF & ZIEGLER, *Tortodus* sp., *Icriodus regularicrescens* BULTYNCK, and *Icriodus* sp. 2, characteristic for the *partitus-costatus-australis* zones. (N.G. IZOKH)

The Eifelian-Givetian boundary interval was investigated in sections near Prokopievsk town. The conodont association is different here, represented by *Polygnathus linguiformis klapperi* CLAUSEN, LEUTERITZ & ZIEGLER, *Polygnathus pseudofolius* WITTEKINDT, *Icriodus norfordi* CHATTERTON, *Icriodus platyobliquimarginatus* BULTYNCK, and *Icriodus* sp. (N.G. IZOKH)

Conodonts from the NE Salair are cosmopolitan species, being an evidence of broad relations of the Middle Devonian of the Salair Basin with other paleobasins. Middle Devonian conodonts radiation trends identified in the Eifel Mountains can be traced in the Salair paleobasin as well. (N.G. IZOKH & I.V. SKORITSKY).

Devonian conodont biofacies from the Shchuchiy Ledge, SW Yamal peninsula (Arctic Russia) were identified. Upper Emsian – Middle Famennian conodont associations were studied. Most widely distributed are polygnatid biofacies. (N.G. IZOKH).

Conodonts from the Upper Famennian Podonino Formation of the Kuznetsk Basin were investigated. Among them are *Icriodus costatus* THOMAS, *Pelekysgnathus* sp. (Pb elements), *Polygnathus delicatulus* ULRICH & BASSLER, *Polygnathus lenticularis* GAGIEV, *Polygnathus parapetus* DRUCE, *Polygnathus symmetricus* BRANSON, *Pseudopolygnathus postinodosus* RHODES, and *Siphonodella praesulcata* SANDBERG. This association is characteristic for the Famennian *praesulcata* Zone (N.G. IZOKH & E.S. ANDREEVA).

5. Isotopic-geochemical investigations of Frasnian carbonates from the Rudny Altai (South of West Siberia) were completed. Two negative excursions with shift amplitudes of 2 and 2.5 ‰ stand out among high $\delta^{13}\text{C}$ values of the obtained $\delta^{13}\text{C}$ curve. They are confined to the middle part of the *transitans* Zone and to the base of the *punctata* zone. The high values of $\delta^{13}\text{C}$ emerging during a wide timespan in the Upper Kamenevka Fm. section in the Rudny Altai may have been either

due to local peculiarities of the carbonate deposition, or account for the global nature. Widely distributed negative shifts of the $\delta^{13}\text{C}$ curve give evidence for the latter. Also, the presence of cosmopolitan fauna in the section, including zonal index conodonts, suggests the connection of waters in the basin with the world ocean. (O.P. IZOKH)

6. Lithological studies of the Middle–Late Devonian volcanosedimentary complex in the northwestern Rudny Altai were carried out. The analysis of sedimentologic processes, the manifestation and specific composition of volcanism, and petrographic and chemical compositions of sedimentary rocks permitted a reconstruction of paleogeographic and geodynamic settings, which confirmed the hypothesis of the island-arc nature of the Rudny Altai zone in the Middle–Late Devonian. Also, an alternative variant of its rift nature is considered. The rift buildings are referred to as local isolated complexes confined to positive paleovolcanic structures rising above the bottom in the fore-arc basin. The denudated part of the rift system is formed mainly by slope facies. Clastics of rift buildings, together with fragments of silicite and felsic-volcanics layers, compose widespread olistostrome breccias. A humid type of lithogenesis was established. Along with minor sea level fluctuations it favoured karst processes and the formation of red-colored and bauxite-like rocks. The coeval volcanics composing lava flows and tuff layers are mainly rhyolites and are often of ultrafelsic composition. (S.V. SARAIEV, T.P. BATURINA, N.K. Bakharev, N.G. IZOKH & N.V. SENNIKOV).



Fig. 1. Upper Frasnian-Lower Famennian section, exposure on Stolb Island, lower reaches of Lena River, Russian Arctic region.

Field trips

In 2012 field investigations in the Lena River basin, Russian Arctic region, were carried out. Continuous Devonian, Carboniferous and Permian succession were examined along the right bank of Lena River. Rock samples were collected for different analysis: microfauna (conodonts, ostracods, radiolarians), macrofauna (brachiopods,

ammonoids), for lithological and geochemical studies. Preliminary results for the age of Devonian strata exposed on Stolb Island were obtained. The analysis of brachiopods, conodonts, ammonoids, and ostracods reveal a Late Frasnian and Early Famennian age of strata. (A.Y. YAZIKOV, N.K. BAKHAREV, N.G. IZOKH & E.S. SOBOLEV).

Publications

Papers

SARAEV, S.V., BATURINA, T.P., BAKHAREV, N.K., IZOKH, N.G. & SENNIKOV, N.V. 2012. Middle-Late Devonian island-arc volcanosedimentary complexes in northwestern Rudny Altai. – *Russian Geology and Geophysics*, **53**: 982–996.

YAZIKOV, A.Y., BAKHAREV, N.K., IZOKH, N.G., RODINA, O.A., SARAEV, S.V. & SHCHERBANENKO, T.A. 2012 (in press). *Age of the Izyly Horizon by paleontological data*. - Regional Stratigraphy of Upper Precambrian and Paleozoic of Siberia, Novosibirsk, SNIIGGIMC [in Russian].

Abstracts

IZOKH N.G. 2012. *Devonian conodont biofacies of the Shchuchiy Ledge (NW of the West Siberian Geosyncline)*. - Contributions of Interekspo Geo-Siberia-2012, VIII International conference “Subsurface management/ Mining, New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk, 10-20 April, 2012, SGGA, **1**: 48-49 [in Russian].

IZOKH, N.G., BAKHAREV, N.K. & YAZIKOV, A.Y. *Conodonts and brachiopods from type section of Belovo Horizon (Lower Devonian, north-eastern Salair)*. - Contributions of Interekspo Geo-Siberia-2012: VIII International conference “Subsurface management/Mining, New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk, 10-20 April, 2012, SGGA, **1**: 48-49 [in Russian].

OBUT, O.T. 2012. Upper Devonian radiolarians from the South Tien Shan (Uzbekistan Republic): progress report. - Proceedings of 13th INTERRAD, A conference on Fossil and Recent Radiolarians, 25-29 March 2012, *Radiolaria Newsletter*, **28**: 179-181.

SKORITSKY, I.S. & IZOKH, N.G. 2012. *Radiation of the Middle Devonian conodonts in NE Salair (South of West Siberia)*. - Contributions of 6th International Siberian Early Career GeoScientists Conference, Novosibirsk, June 9-23: 188. [in Russian]

YAZIKOV, A.Y. 2012. *Devonian brachiopods and saltation theory of speciation*. - Contributions of Interekspo Geo-Siberia-2012: VIII International conference “Subsurface management/ Mining, New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk, 10-20 April, 2012, SGGA, **2**: 42-26 [in Russian].

YAZIKOV, A.Y., BAKHAREV, N.K., IZOKH, N.G. & SHCHERBANENKO T.A. 2012. *Brachiopods, ostracods and conodonts of the Izyly Horizon (Upper Devonian*

of the Kuznetsk Basin margins). - Interekspo Geo-Siberia-2012: VIII International conference “Subsurface management/ Mining, New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk, 10-20 April, 2012, SGGA, **2**: 47-50. [in Russian].

YAZIKOV, A.Y., BAKHAREV, N.K., IZOKH, N.G. & SHCHERBANENKO, T.A. 2012. *Fauna and age of the Izyly Horizon (Upper Devonian, west margin of the Kuznetsk Basin)*. - Paleontology and stratigraphic boundaries, Contributions of LVIII session of Paleontological society of the RAS, 2-6 April, 2012, St.-Peterburg: 158-159 [in Russian].

CM Semen A. KRUCHEK and the BELARUSIAN DEVONIAN GROUP

Devonian deposits in the territory of the Belarus are intensively investigated by the Devonian Group and the most important publications are summarized below.

OBUKHOVSKAYA, V.Y., OBUKHOVSKAYA, T.G. & KRUCHEK, S.A. 2012

Sedimentological and biotic events within the territory of the Zhlobin and North-Pripyat regions in the Devonian and their palynological indicators. – *Lithosphere*, **1** (36): 31-46 (in Russian with English summary).

Abundant factual evidence obtained from the study of various Devonian facies deposits corresponding to an interval from the Late Emsian to the Early Famennian were generalized and used to construct a composite sections of the investigated areas, in accordance with the new Stratigraphic Chart of Devonian deposits of Belarus of 2010 (OBUKHOVSKAYA, KRUCHEK, PUSHKIN et al. 2005, 2010). The main sedimentation stages – Late Emsian, Eifelian, Givetian, Frasnian, and Famennian - caused by sea transgressions were considered. The substages and rhythms corresponding to stratigraphic subdivisions at the rank of horizons were distinguished in their composition. The most important lithological reference levels of stratigraphic subdivisions identified there are as follow: a basal member of assorted sandstones at the bottom of the Vitebsk Horizon, a dolomitic member with fauna remains at the bottom of the Kostiukovich Horizon, sandy members at the bottom of the Polotsk and Ubor Horizon, dark-coloured to black marl and clayey limestone members (Moiseyev beds) at the bottom of the Semiluki Horizon, a clayey-carbonate member at the bottom of the Anisimovka Horizon, anhydrite reference level “A” at the roof of the Tremliya Horizon and some others. There are local sedimentological events shown as breaks in sedimentation – Pre-Late-Emsian, Pre-Late-Frasnian, Pre-Famennian. The most significant changes of miospore associations were determined

to be confined to the bottom parts of the Vitebsk, Polotsk, Ubort and Turov Horizons. These levels are indirectly correlated with the most important changes in the macroflora composition in the bottom part of the *Hyenia*, *Swalbardia*, *Archaeopteris* and *Rhacophyton* zones. Palynological indicators represented by plant microfossils (miospores and acritarchs) are considered. These may be used to describe the boundaries of stratigraphic subdivisions in sections and to define levels that correspond to the global biotic events, such as Kačak, Taghanic, Alamo Impact, Kelwasser and, probably, Condroz, shown in composite sections together with the sea level variation curve in the context of transgressions and regressions.

PLAX D.P. & D.V. BARBIKOV. 2012

Eurypterid (Chelicerata, Eurypterida) findings in Famennian saliferous deposits of the Devonian of the Pripyat Trough (Starobin potassium salt deposit, Belarus). – In: WITZMANN, F. & M. ABERHAN, M. (Eds.), Centenary Meeting of the Paläontologische Gesellschaft, Programme, Abstracts, and Field Guides, 24.09-29.09.2012, *Terra Nostra*, **2012** (3): 135.

Six well-known findings of eurypterid remains were identified within the Starobin potassium salt deposit between 1976 and 2012. All of them occur in a clay-halite (potassic) deposit, namely in clayey interbeds of the Osovets beds of the Streshin regional stage, which is Famennian in age (OBUKHOVSKAYA, KRUCHEK, PUSHKIN et al., 2005; 2010). The first specimen of an eurypterid was found in 1976 and has a length of about 20 cm. The second finding is represented by a relatively well-preserved prosoma of an eurypterid with one pair of walking legs from the ventral surface and was found in 1981 or 1982. The third one, which was found in 2002, has a length of about 12 cm, but is not well preserved. In 2006 a leg of a sea scorpion was found followed by the fifth finding in 2008, which contained the ventral part of a well-preserved eurypterid, which has a length of 25 cm (PLAX, KRUCHEK & BARBIKOV 2008). A nearly complete sea scorpion was found recently in June 2012. This is the largest specimen ever found in these sediments and has a length of 34 cm. The specimens are kept in different institutions and a detailed description has not been finished yet. Preliminary studies of the taxonomy of four eurypterids have been done. The results suggest that the eurypterid remains found in the Famennian saliferous deposits belong to a new species and a new genus. Furthermore, the eurypterids are very likely endemic.

CM Elga MARK-KURIK

In 2012 a joint paper on “Devonian stratigraphy in Estonia: current state and problems”, written together with Anne PÖLDVERE (Geological Survey of Estonia) was published in the “*Estonian Journal of Earth Sciences*”, **61** (1): 33-37. A free ‘pdf’ version of the paper is available (see earth-2012-1-33-47.pdf).

Abstract: An updated version of the Devonian stratigraphical chart of Estonia with comments is presented. Estonian regional stratigraphical units are correlated with the standard conodont zonation and miospore zonation, used in the western part of the East European Platform. The fossil fish zonations, largely accepted in the Main Devonian Field, are discussed. Differences in the position of series and stage boundaries and age determination of regional units in the Baltic area, Belarus and NW Russia are dealt with. Two key markers for the correlation of the Middle Devonian of the Baltic area and Scotland, based mainly on placoderms, are described. Special attention is paid to occurrences of inarticulate brachiopods and finds of rare articulate brachiopods in siliciclastic rocks of the Baltic area, indicating their marine origin.

To make usage of the Devonian stratigraphical chart more comfortable for great many Estonian geologists, the paper was translated into native language. The slightly modified version of the paper was published in 2012: “*Proceedings of the Geological Survey of Estonia*”, **11** (1): 31-52. In a supplement to the paper, Anne PÖLDVERE shortly described all Devonian stratigraphical units in Estonia.

The paper “Asmuss and Aruküla caves” on the history vertebrate palaeontology was accepted by “*Annals of the Estonian Naturalists’ Society*” (paper in Estonian with English summary). Hermann Martin ASMUSS (1812 -1856), the professor of Tartu (Dorpat) University originated from a family from Lübeck. As a student he started to excavate fish fossils in old sand mines near Tartu. His excavations of the Middle Devonian fishes lasted from 1831 to 1856, and the result was an enormous collection. During his life he published only one paper but later his specimens were described by more than 10 paleontologists (W. GROSS, A. HEINTZ, D. V. OBRUCHEV, O. P. OBRUCHEVA, B. HALSTEAD-TARLO, V. KARATAJÜTĒ-TALIMAA, and others). The ASMUSS’ collections of the large arthrodires *Homostius* and *Heterostius* are among the most valuable specimens in the Tartu University Geology Museum.

A paper on a new Lower Devonian (?Pragian) actinolepidoid arthrodire from the NW of the Siberian Platform (Turukhansk region) was accepted to be published in “*Estonian Journal of Earth Sciences*”. And the joint paper by E. MARK-

KURIK, A. BLIECK, C. J. BURROW & S. TURNER on "Early Devonian fishes from coastal De Long Strait, central Chukotka, Arctic Russia" will be published in *Geodiversitas*.

A very interesting cooperation with British colleagues Zerina JOHANSON, Moya SMITH and others concentrates on the high level histological study on wound repair of the Devonian jawless fishes (psammosteids). Specimens for this research come from the Middle Devonian Gauja Formation of Estonia.

TM John E. MARSHALL

Last year was an interesting one in the UK as our funding agency (NERC) is now supporting two major projects on the Devonian and earliest Carboniferous. The earliest Carboniferous project concerns ROMER'S Gap- the interval where the early tetrapods apparently disappeared from the fossil record for some 15 million years. However, through the efforts of two collectors (primarily the late Stan WOOD with Tim SMITHSON) a number of specimens have been found from several new localities in the Scottish Borders. NERC have funded a Consortium Project to the sum of £2.2 million which is led by Jenny CLACK from Cambridge Zoology with the other institutions being Leicester University, Southampton University, the National Museum of Scotland and the British Geological Survey. This will involve an intensive study of a number of Tournaisian outcrop sections in the Scottish Borders plus a new 500 m borehole. These will be studied with integrated sedimentology, ostracods, palynology and isotopes to context the stratigraphy and environment of the new tetrapods. Several new tetrapod localities will be excavated that potentially reveal the entire ecosystem with not only tetrapods present but also fish, myriapods and plants. We started fieldwork on the project during the summer. This included a sampling week in Burnmouth where, in ceaseless rain, we made a detailed collection through the earliest Carboniferous.

As part of this project I returned to Greenland again during August to specifically investigate the palaeoclimatic expression of the Tournaisian. This was as part of CASP and together with Jon LAKIN (Southampton) and Sarah FINNEY (Conservator at the Sedgwick Museum, Cambridge who looked after the fish). We managed to study three sections and also collected an excellent new latest Famennian section. This was part funded by National Geographic.

The other new project is led by the University of Sheffield (Leake, BEERLING & WELLMAN with post-doc Jenny MORRIS) together with the Universities of Cardiff (BERRY) and Southampton

(MARSHALL) with colleagues in the USA (STEIN in Binghampton and the NYS Museum). This will investigate the progressive rise of plants through the Silurian to Devonian interval and particularly the impact of deeper palaeosol development on global biogeochemical cycles. We are investigating a time series of palaeosols in the eastern USA including a field campaign of drilling short cores beneath Devonian forests such as at Gilboa. We are also doing some longer time series work on the palynological expression of increased plant vegetative tissue and micro-charcoal (new PhD student David CARPENTER).

The other major fieldwork was to revisit Syktyvkar in Russia to work with Olga TEL'NOVA. We resampled at higher resolution the Frasnian/Famennian borehole that we drilled in 2009. We also returned to the field section at Sosnogorsk, Ukhta, to resample and reinvestigate selected levels from the upper part of the core. In the field we met Pavel BESNOV and Ervins LUKSEVICS who were excavating an earliest Famennian tetrapod locality. Again they were funded by National Geographic.

In October I returned to Bolivia together with PhD students Jon LAKIN, David CARPENTER and Ian TROTH (BG Brasil). We studied further sections on the Altiplano together with several in the Eastern Cordillera.

Other fieldwork was a brief visit to the ORS of the Inverness area in another attempt to recognise the base of the Taghanic Onlap south of the Great Glen Fault and then briefly to the early Carboniferous of the North Solway coast.

The major conference attended this year was the 100th Anniversary of the Paläontologische Gesellschaft at the invitation of IGCP 596. Sadly with snow-melt fieldwork commitments I didn't attend either the 13th IPC in Tokyo or the 34th IGC in Brisbane.

CM Bruno MISTIAEN

Since the last year, my Devonian projects stayed focused on reef builders (stromatoporoids and tabulate corals) and reefal environment, with several papers published, submitted or in preparation.

Some topics are in development, such as the examination of an abundant tabulate corals fauna from Afghanistan (Central Mountains and Axial Zone), together with E. PINTE (Lille) and M. (ZAPALSKI (Warsaw). Another current study concerns stromatoporoid faunas from several sections in Queensland, Australia, together with B. HUBERT (Lille), J. TALENT (Sydney) etc.

But one of the main projects is the revision of Strunian stromatoporoids from the Avesnois (in relation with the F/F and D/C crisis), first of all on the fauna of the historical outcrops: the Parc Quarry, Etroeuungt, in collaboration with D. BRICE.

Papers

BRICE, D., PINTE E. & MISTIAEN, B. 2012. The global Taghanic Biocrisis (Givetian) on brachiopods of the Ferques inliers area (Boulonnais-France). - *Terra Nostra*, **2012** (3): 38.

MISTIAEN, B., BRICE, D., LOONES, Ch. & DE SOUSA, A. 2012. Un affleurement temporaire exposant le contact entre les Formations de Beaulieu et de Ferques (Frasnien, Boulonnais) - A temporary outcrop showing the contact between the Beaulieu and Ferques Formations (Frasnien, Boulonnais) - *Annales de la Société Géologique du Nord*, **19** (2^{ème} série): 39-47, pl. V.

PINTE, E., HUBERT, B.L.M., CRÔNIER, C., MISTIAEN, B. & BOULVAIN, F. (submitted). The evolution of small organic buildups (reefs) in the Mont d'Hauris Fortifications (Hanonet Formation, Givet, France): environment, stromatoporoids and tabulate corals.

THE MÜNSTER DEVONIAN TEAM

TM R.T. BECKER

Since the 2012 Report, research concentrated on the joint DFG-CNRST (Maroc) project on the comparison of Middle Devonian to Tournaisian faunas and facies developments north (Rhenish Massif and Saxothuringia) and south (Moroccan Meseta, northern margin of Anti-Atlas) of the Prototethys. The project is conducted in close cooperation with Ahmed EL HASSANI, Lahsen BAIDDER, EL Mostafa BENFRIKA, Fouad EL KAMEL, Mohammed RAJI, and Abdelfatah TAHIRI. D. BRICE agreed to identify Upper Devonian brachiopods, B. MISTIAEN stromatoporoids, and A. MAY corals. Project field work in spring 2012 concentrated on the Rehamna and Jebilet region, starting from Marrakech. A variety of upper Emsian goniatites were collected in the NE Jebilet. They give close similarities with the Anti-Atlas regions, whilst the same interval is reefal or clastic in most other Meseta regions. Below, the Daleje Event is well-developed as a package of poorly fossiliferous, thick black shale. All other visited outcrops are in neritic to reefal facies.

During the autumn field trip we were joined for one week by Christoph HARTKOPF-FRÖDER in order to add palynostratigraphy dates. The first week was dedicated to the Devonian successions of the Coastal Block, Oued Cherrat Valley, Mdakra and Khatouat regions. Localities N and ENE of Benahmed yielded unsuspectedly rich Frasnian and upper Famennian goethitic/hematitic ammonoid faunas. The Upper Frasnian of Boudouda has

unique faunas that are astonishingly close to the famous German Buedesheim region (Eifel). The *Platyclymenia-Prionoceras* assemblages of the Oued Aricha have not been re-sampled since TERMIER & TERMIER (1951). The good new collections require a close comparison with the Tafilalt-Maider. The second part of the autumn field work led to the Azrou and Mrirt regions, as well as to Immouzer du Kandar tectonic window towards Fes (Fig. 1). We were impressed by the very massive conglomerates and breccias as evidence of polyphase Eovariscan re-working in many sections. Cannibalized conglomerates clearly show that there were at least two major tectonic episodes, one probably still in the Givetian, one in the Famennian.



Fig. 1. The Eovariscan breccia at Immouzer du Kandar

Prior to the Rehamna and Jebilet work, Sven and the research students (Fig. 2) brought a minibus (which just survived) to the eastern Anti-Atlas. This part of the field work concentrated on the northern Maider, "Southern Variscan Front" E of Tinerhir, and on the autochthonous Devonian near Tinejdad. At the same time additional sampling took place in sections selected for the revised mapping of the southern Tafilalt. Preparations for the 2013 Morocco Field Symposium required section labeling and re-sampling.



Fig. 2. The "Spring 2012 Morocco Team" from Münster, including Ahmed EL HASSANI, his wife, and our driver.

In summer 2012 our team organized a joint workshop with our Moroccan friends, including Harald TRAGELEHN, who contributed an update of

Devonian stratigraphy in Franconia and Thuringia. Pierre BULTYNCK also came over to look through our material for a joint paper on Emsian conodonts from the Anti-Atlas. After a symposium with presentations by all project members, including all research students, a field trip led to the Devonian of the Aachen region, Eifel Synclines (using the guidance of Jan BOHATÝ), and Bergisch Gladbach (guided by Hans-Martin WEBER and Christoph). Most Devonian workers are not aware that the precise position of the Kacak Event and Eifelian/Givetian boundary in the Eifel Mts. is still largely unclear. In the Aachen region new conodont sampling shall unravel reef extinctions and the age of the “Grenzschiefer” with more precision. Unfortunately, many outcrops degrade fast since old quarries are used as dumps for building waste.

Other Devonian research includes the continuation of work on the rich Upper Devonian ammonoid faunas from the Canning Basin (involving research students) and co-operation with MA Xueping on interesting Famennian ammonoids from Xinjiang (NW China). A long monograph of the globally richest Upper Givetian goniatite assemblage, from Hassi Nebech in the SE Tafilalt, has been completed with Jürgen BOCKWINKEL (as first author) and includes Volker EBBIGHAUSEN, who is much missed. We intend to continue the Upper Givetian focus by the description of the pharociceratid fauna from the NW Maider. In the same context falls the joint description of the highly interesting new faunas from the Rudny Altai, together with Kolya BAKHAREV. There are at least three new genera in the Triainoceratacea (Fig. 3).



Fig. 3. A new early member of the Triainoceratidae from the Frasnian of the Rudny Altai (BECKER & BAKHAREV in prep.).

A short contribution on lower Emsian goniatites from Victoria (with C. EARP) has to wait for an important new monograph on the famous Hunsrück Slate ammonoids. Together with Svetlana NIKOLAEVA, a significant nomenclatorial problem, the validity of the species names of the Polish S.V. SOBOLEV, has been tackled and submitted to the International Commission on Zoological

Nomenclature. Lower Carboniferous interests include additional rare goniatites and trilobites (given to Peter MÜLLER) from the Anti-Atlas, more Middle Tournaisian goniatites from El Atrous and Ain Aouda (Meseta), and the recovery of a second minute blastoid (for Jonny WATERS) from the Aguelmous Syncline. For activities at the D/C boundary see the Task Group Report in this issue.

CM Z.S. ABOUSSALAM

Intensive conodont sampling took place in the frame of the joint “Prototethys” project with our Moroccan friends. In the Meseta, primary tasks are the precise dating of reef growth and extinction, facies changes, and the timing of Eovariscan reworking events. Conodont faunas of Meseta localities are often relatively poor but even a few specimens were sufficient to show that various supposed Givetian reef limestones are in fact of Emsian or even Upper Viséan age. Some of these results were presented at the 100th Anniversary Symposium of the Paläontologische Gesellschaft in Berlin. The complex conodont stratigraphy of the small-sized reef at Ain-es-Seffah (Oued Cherrat Valley) will be presented during the Morocco Field Symposium. Many other new data are also available for the reef complexes of the Coastal Block (Fig. 4), Al Attamna area, Mdakra, Mechra Ben Abbou region, Ain Jemaa (N of Oulmes), Tiflet, and High Atlas (Talmakent). Non-reefal successions were sampled for conodonts near Benahmed, Azrou, Mirt, and in the Devonian of the Jebilet and Immouzer du Kandar window.

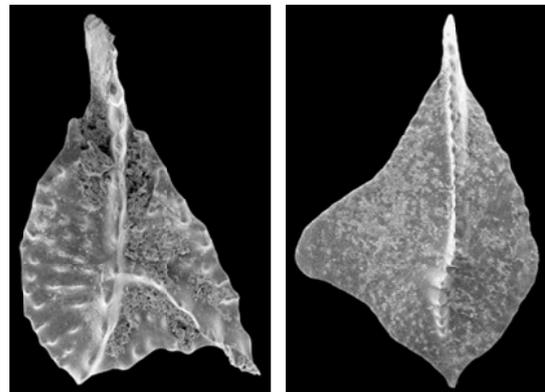


Fig. 4. Examples for new conodont records from the top Frasnian of Oulad Abbou (Coastal Block), western Meseta (*Ancyrognathus seddoni* and *Palmatolepis hassi*).

In the Rhenish Massif the stratigraphy at Blauer Bruch (Kellerwald) was further revised. Unfortunately, extreme condensation in the *hermanni* Zone excludes the section to become a GSSP candidate for the Upper Givetian substage. The Giebringhausen faunas are all identified but the manuscript needs further work. Samples from the

Aachen region, Wülfrath, Dornap, and Hagen-Birion reefs keep me busy, too.

In the Anti-Atlas research is continuing on Emsian (together with Pierre BULTYNCK), Eifelian-Givetian (Chotec and Taghanic Events), and Frasnian faunas. All M.Sc. and B.Sc. projects require conodont dating. For the revised mapping of the southern Tafilalt, both conodont plates and microfacies analyses were supplied. There are various new records of Lochkovian and Pragian taxa for southern Morocco.

CM S. HARTENFELS

continued field work in spring 2012 in the Tafilalt and Maider, with a focus on the upper and uppermost Famennian. IGCP 560 supported the attendance at the International Geological Congress in Brisbane, where the event facies of the Moroccan and German *Annulata* and Dasberg Events/Crises were reviewed. New data for the famous *Gonioclymenia* Limestone (Fig. 5) of the Tafilalt were presented together with Thomas at the 100th Anniversary Meeting (IGCP 596 Symposium) in Berlin. Consistently different conodont faunas proved that the *Kalloclymenia* Limestone is a distinctive, slightly younger unit. It contains the "siphonodelloid" groups, which were previously recognized at Lalla Mimouna. An update for the conodonts of the latter section will be given at the 2013 SDS Field Symposium. There are also new data on the *Annulata* Events in the Rheris Basin (northern Tafilalt, section El Gara), which yielded some rare and new ammonoids. Results will be presented together with Thomas.



Fig. 5. The *Gonioclymenia* Limestone at Jebel Kfiroun South, W of Taouz, southern Tafilalt, with giant-sized corroded specimens of *G. speciosa*.

Research in the Rhenish Massiv concentrated on the revision of the Ballberg section in the northern Sauerland. There are also Famennian conodont successions in wells and outcrops from above various reef sequences (of B.Sc/M.Sc. projects). In Franconia, co-operation with Harald TRAGELEHN continues. The previously announced, voluminous monograph of the extremely rich conodonts from Köstenhof (Schübelhammer) still requires more work on the text. A planned new DFG Project shall deal in detail with Famennian

conodont diversity fluctuations. Sections from the Montagne Noire, Pyrenees, and South China shall be involved, too. A concentration on cyclic successions shall contribute to a better estimate of the variable Famennian conodont zone durations, which, of course, is currently an important bias in diversity estimates.

Ph. Students

Stephan EICHHOLT continued his comparisons of Givetian/Frasnian reef biofacies, sedimentology, and palaeoecology between the Moroccan Meseta and the Rhenish Massiv. As a first step, the reefal development in the Oulmes region was documented (poster at Berlin IGCP Symposium). At the Morocco Field Meeting, results for the Oued Cherrat Valley will be presented. Field work in spring 2012 covered the Rehamna (Fig. 6), western Jebilet (Jebel Ardouz), and High Atlas (Talmakent). In the autumn more work was done on reefs of the Coastal Block and Mdakra regions. Reworked reef limestones in conglomerates and breccias of the Khtaouat, Azrou-Mrirt and Immouzer du Kandar Devonian were also sampled.

Stephan HELING continued his trilobite studies. He identified new Pragian-Emsian material for the revised mapping of the southern Tafilalt and collected in spring 2012 new, important Frasnian phacopids and cornuproetines at Bou Tchrafine. Results were presented at the Berlin IGCP 596 Meeting in September. Another focus is the allochthonous Pragian Trilobite Limestone found in the Tinerhir region; first results will be available in spring 2013. Some new Middle/Upper Devonian phacopids collected by Thomas in 2011 in the Kuznetsk Basin are very different from contemporaneous forms of the western Prototethys. The previously mentioned manuscript on new Moroccan *Gerastos* (Proetinae) is still to be completed.



Fig. 6. View from the top of the Givetian reef limestone at Sidi Bou Talaa (Rehamna) on the adjacent river.

M.Sc. Students

Sören STICHLING started a M.Sc. on the Devonian stratigraphy and facies development at the northern margin of the Maider. It focuses on the two successions west and east of the more famous Ouhlane Syncline. Most interesting are the Givetian biostrome facies and major reworking units.

Marie RYTINA analyzes the allochthonous Silurian-Devonian olistoliths at the base of the thick Carboniferous succession just east of Tinerhir. This region belongs to the overall "Southern Variscan Front". The study will enable a reconstruction of Devonian sedimentation in the subsequently completely eroded regions north of the Maider. Preliminary results will be presented during the 2013 Field Symposium.

Dustin WARD logged and sampled the northernmost autochthonous Devonian of the Anti-Atlas at Oued Ferkhla (just NE of Tinejdad). It comprises a fine record of the Kacak and *pumilio* Events. Preliminary data will be presented in spring 2013. Based on ArcGis modelling, the succession will be incorporated in new, more detailed isopach maps for the complete eastern Anti-Atlas.

Klaus SCHWERING started a M.Sc. on the spatial and stratigraphic distribution of sharks in the Devonian Morocco. His survey will be based on the systematic scanning of our conodont samples. It is already clear that early sharks had a very distinctive and uneven distribution in peri-reefal/biostromal, neritic to pelagic carbonates and at different times. The rarity/wide-spread lack of pre-Givetian sharks requires an explanation. German localities may be used for comparisons.

Tobias FISCHER started to compare the ontogenetic morphometry of upper/uppermost Famennian ammonoids from the Rhenish Massive, Franconia, and Anti-Atlas (Fig. 7). The Prionoceratinae became a focus since a previous B.Sc. suggested so far un-noticed major differences between representatives of the group from the north and south of the western Prototethys. This will lead to taxonomic distinctions and palaeobiogeographic implications.

B.Sc. Students

Nicola PUCK finished the mapping of the Devonian around the reefs of the Hofermühle region (Velbert Anticline, Rhenish Massive). Conodont dating of the reefs was very difficult but limited new evidence suggests that the long-known two local reefal belts were more or less contemporaneous. A separate, poorly known, mostly stromatolitic biostromal limestone occurs in the highest Frasnian and contains the last but rare rugose corals of the Rhenish Massive.

Timo GEHLING will study a post-reefal succession in a well from the Wülfrath Reef area (Silberberg Quarry), as part of the successful co-operation with the Rheinkalk AG.

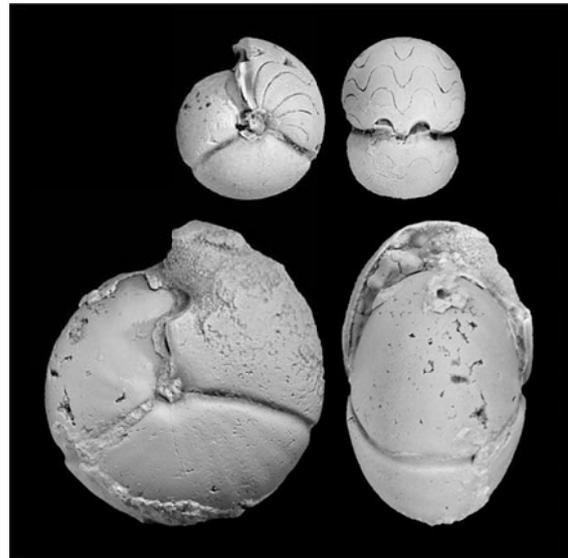


Fig. 7. Example for previously assumed *Mimimitoceras livatum* from the uppermost Famennian of the Maider (Bou Tlidat). The juvenile specimen shows evolute early whorls, unlike as in Rhenish topotypes from Drewer.

Publications

(For the long list of contributions to the Morocco Field Symposium see the Devonian Publications section)

- BECKER, R.T. & NIKOLAEVA, S.V. 2012. Case 3600. A proposal to reinstate as available the species-group names proposed for Devonian ammonoids (Mollusca, Cephalopoda) by SOBOLÉW (1914a, 1914b). – *Bulletin of Zoological Nomenclature*, **69** (3): 170-177.
- BECKER, R.T., & GRADSTEIN, F.M. & HAMMER, O. 2012. *The Devonian Period*. – In: GRADSTEIN, F.M., OGG, J.G., SCHMITZ, M.D. & OGG, G.M. (Eds.), *A Geological Time Scale 2012*, Vol. 2: 559-601, Amsterdam etc. (Elsevier).
- BECKER, R.T., EL HASSANI, A. & TAHIRI, A. (Eds.) 2013. International Field Symposium "The Devonian and Lower Carboniferous of northern Gondwana", Field Guidebook. – *Document de l'Institut Scientifique, Rabat*, **27**: 150 pp.
- BOCKWINKEL, J., BECKER, R. T. & EBBIGHAUSEN, V. 2013. Late Givetian ammonoids from Hassi Nebech (Tafilalt Basin, Anti-Atlas, southern Morocco). – *Fossil Record*, **16** (1): 5-65 + 58 pp. (online supplement).
- BRETT, C.E., ZAMBITO, J.J., SCHINDLER, E. & BECKER, R.T. 2012. Diagenetically-enhanced trilobite obrution deposits in concretionary limestones: The paradox of "rhythmic event beds". – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 30-43.
- EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.) 2013. International Field Symposium „The Devonian and Lower Carboniferous of northern Gondwana“,

Abstract Book. - *Document de l'Institut Scientifique, Rabat*, **26**:134 pp.

- HAHN, G., MÜLLER, P. & BECKER, R.T. 2012. Unterkarbonische Trilobiten aus dem Anti-Atlas (Marokko). - *Geologica et Palaeontologica*, **44**: 37-74.

Popular Science Contributions

- HARTENFELS, S. & BECKER, R.T. 2012. *Conodonten – Zähne entfernter Verwandter der Wirbeltiere*. - In: MARTIN, T., von KÖNIGSWALD, W., RADTKE, G. & RUST, J. (Eds.), *Paläontologie. 100 Jahre Paläontologische Gesellschaft*: 78-79, München (Dr. Friedrich PFEIL).
- BECKER, R.T. 2012. *Ein früher Ammoniten-Verwandter aus dem Rheinischen Devon*. - In: MARTIN, T., von KÖNIGSWALD, W., RADTKE, G. & RUST, J. (Eds.), *Paläontologie. 100 Jahre Paläontologische Gesellschaft*: 80-81, München (Dr. Friedrich PFEIL).

Abstracts

- ABOUSSALAM, Z.S., BECKER, R.T. & EICHHOLT, S. 2012. Conodont dating of reefs and carbonate platforms in the Middle and Upper Devonian of the Moroccan Meseta. - In: WITZMANN, F. & ABERHAN, M. (Eds.), *Centenary Meeting of the Paläontologische Gesellschaft, Programme, Abstracts, and Field Guides*, 24.09. - 29.09.2012, *Terra Nostra*, **2012** (3): 27-28.
- BECKER, R.T. & EICHHOLT, S. 2012. *Phylogeny and palaeogeography of the Beloceratidae from the Middle/Upper Frasnian of the Canning Basin (Australia)*. - 34th International Geological Congress, *Unearthing our Past and Future – Resourcing Tomorrow*, Abstract CD: 3907.
- BECKER, R.T., GRADSTEIN, F. & HAMMER, O. 2012. *Devonian Time Scale*. - GSA Annual Meeting, Charlotte, 4th - 7th November 2012, Abstracts and Programme.
- EICHHOLT, S., BECKER, R.T. & STICHLING, S. 2012. Microfacies and development of the Devonian reef at Ain Jemaa (Moroccan Meseta). - In: WITZMANN, F. & ABERHAN, M. (Eds.), *Centenary Meeting of the Paläontologische Gesellschaft, Programme, Abstracts, and Field Guides*, 24.09. - 29.09.2012, *Terra Nostra*, **2012** (3): 47-48.
- FISCHER, T. & BECKER, R.T. 2012. Palaeopathology and autecology of uppermost Famennian ammonoids from the Maider and Tafilalt Basins (eastern Anti-Atlas, southern Morocco). - In: WITZMANN, F. & ABERHAN, M. (Eds.), *Centenary Meeting of the Paläontologische Gesellschaft, Programme, Abstracts, and Field Guides*, 24.09. - 29.09.2012, *Terra Nostra*, **2012** (3): 54.
- HARTENFELS, S. & BECKER, R.T. 2012. *Local variations of the global Annulata and Dasberg Crisis biofacies*. - 34th International Geological Congress, *Unearthing our Past and Future – Resourcing Tomorrow*, Abstract CD: 3719.
- HARTENFELS, S. & BECKER, R.T. 2012. Conodont age and correlation of the transgressive *Gonioclymenia* and *Kallocklymenia* Limestones (Famennian, Anti-Atlas, SE Morocco). - In: WITZMANN, F. & ABERHAN, M. (Eds.), *Centenary Meeting of the Paläontologische Gesellschaft, Programme, Abstracts, and Field Guides*, 24.09. - 29.09.2012, *Terra Nostra*, **2012** (3):

67.

- HELLING, S. & BECKER, R.T. 2012. New proetid and phacopid trilobites from the Middle Frasnian (Upper Devonian) of the Tafilalt (Anti-Atlas, SE Morocco). - In: WITZMANN, F. & ABERHAN, M. (Eds.), *Centenary Meeting of the Paläontologische Gesellschaft, Programme, Abstracts, and Field Guides*, 24.09. - 29.09.2012, *Terra Nostra*, **2012** (3): 73.
- MA, X., ZONG, P., BECKER, R.T., ZHANG, Y. & ZHANG, M. 2012. *Famennian stratigraphic and faunal sequence of western Junggar, northwestern China*. - 34th International Geological Congress, *Unearthing our Past and Future – Resourcing Tomorrow*, Abstract CD: 3258.
- NOWAK, H., BECKER, R.T., ABOUSSALAM, Z.S. & HARTENFELS, S. 2012. *Facies development and death of the Devonian Wülfrath Reef (northern Rhenish Massif, Germany)*. - 56th Palaeontological Association Annual Meeting, 16-18 December 2012, University College Dublin: 81.

Recent Theses

- EICHHOLT, S. 2011. *Phyletischer Gradualismus bei Beloceratiden (Agoniatitida, Gephuroceratacea) des tiefen Oberdevon: Morphometrie und Taxonomie*. - M.Sc. Thesis, WWU Münster, 125 pp.
- HELLING, S. 2011. *Devonische Trilobiten aus dem Anti-Atlas (S-Marokko) – Taxonomie, Morphometrie und Biostratigraphie*. - M.Sc. Thesis, WWU Münster, 158 + 44 pp., 12 pls.
- NOWAK, H. 2012. *Paläoökologie und Faziesanalyse des devonischen Riffkomplexes von Wülfrath*. - M.Sc. Thesis, WWU Münster, 49 pp., 17 pls.
- PUCK, N. 2012. *Geologische Kartierung im Bereich der Riffe von Hofermühle (Blatt Heiligenhaus, Bergisches Land, NRW)*. - B.Sc. Thesis, WWU Münster, 41 pp., 6 maps.
- SCHWERMANN, K. 2011. *Exotische Riffbildner im pelagisch geprägten Mitteldevon (Givetium) des östlichen Dra-Tals (Marokko)*. - B.Sc. Thesis, WWU Münster, 20 pp., 9 pls.
- STICHLING, S. 2011. *Stratigraphie und Fazies der Bohrung B102 im Raum Hönnetal (Nord-Sauerland)*. - B.Sc. Thesis, WWU Münster, 67 pp.
- TEMMESELD, F. 2011. *Stratigraphie und Mikrofazies des Famenniums am Ballberg bei Hövel im Sauerland*. - B. Sc. Thesis, WWU Münster, 43 pp.

CM Marek NARKIEWICZ

Early in 2012 the monograph on the Devonian basins of SE Poland was finally published by the Polish Geological Institute (see the *Devonian Publications* section). It summarizes several years of my and my collaborators' research on the Devonian stratigraphy and sedimentology of the Łysogóry-Radom and Lublin basins. After a quick celebration of the appearance of the monograph, I rushed to carry on my current Devonian work which is devoted to: (1) sedimentological and palaeocological study of the Zachełmie early tetrapods trackway-site and (2) joint Polish-Belarusian project on the presumed Kačak

Event(s) in the uppermost Eifelian of Belarus and central-eastern Poland.

(1). In November, the final report on the project has been submitted to the Polish National Science Centre. The results are now being prepared for a publication. They include new findings on the mid-Eifelian dolomitic lagoonal to shallow subtidal environments based on i.a. MS investigations, microfacies study, SEM observations, elemental and isotope chemistry, and XRD analyses. The track-bearing succession is organized in 9-10 shallowing upward, meter-scale cycles consisting mostly of microbial laminites topped by erosional surfaces or incipient paleosols. The study of paleosols (carried out in co-operation with Gregory J. RETALLACK from the University of Oregon) gives some interesting palaeoclimatic clues consistent with the Lagoa Vermelha model of a microbial dolomite formation. The tidal influence was either non-existent or negligible and, therefore, the "Swedish table" model of tetrapods emerging in the fertile tidal flat environments seems hardly probable. On the other hand, also the idea of early woodlands as the tetrapods' cradle appears doubtful.

(2). The project received funding from the NSC for the period 2012-2015 under the title "Biostratigraphy, palaeoecology and sedimentology of the unique transgressive event in the Middle Devonian of Belarus: regional aspects and a global significance". The leader is Katarzyna NARKIEWICZ (Polish Geological Institute), collaborators from Belarus include Semen KRUCHEK, Dmitri PLAX, Veronica OBUKHOVSKA (BelNIGRI Minsk); Polish participants: Zdzisław BELKA (Poznań University), Marek NARKIEWICZ, and Anna MADER (both PGI). The summer visit of our Belarussian colleagues was devoted to the inspection and sampling of selected cores from the Lublin Basin and to visit the Holy Cross Mts. exposures. The well-sections appear particularly promising and there are some distinct intervals that will be further tested stratigraphically as potential correlatives of the Belarussian transgressive level that was tentatively associated with the global Kačak Event(s). The very preliminary results were presented at the IGC 34 in Brisbane, in the framework of the IGCP Project 596.

Publications 2012

- NARKIEWICZ, M., KRZYWIEC, P. & DIEMER, J. 2012. Geology of the Holy Cross Mts. in the eyes of Roderick MURCHISON – visit in June of 1843 and its echoes. - *Prz. geol.*, **60** (4): 220-225. (in Polish). [during his 1843 visit MURCHISON established for the first time the presence of the Devonian in Poland]
- GRABOWSKI, J., NARKIEWICZ, M. & DE VLEESCHOUWER, D. 2012. Environmental context of the earliest tetrapod trackways: clues from MS and petrological studies (Eifelian, Holy Cross Mts., Poland). - IGCP

580, 4th Annual Meeting, Graz, 24-30th June 2012, Abstract Volume, *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 24.

- NARKIEWICZ, M., GRABOWSKI, J., NARKIEWICZ, K., NIEDŹWIEDZKI, G. & DE VLEESCHOUWER, D. 2012. *Palaeoenvironmental context of the earliest tetrapod trackways from the Eifelian of the Holy Cross Mountains (Poland)*. - Abstract, 34th International Geological Congress, 5-10 Aug. 2012, Proceedings: 3259.
- NARKIEWICZ, K., NARKIEWICZ, M., KRUCHEK, S. & BELKA, Z. 2012. Middle Devonian Kačak Event in a shallow-marine epicontinental basin of Belarus (East European Craton). - Abstract, 34th International Geological Congress, 5-10 Aug. 2012, Brisbane, Australia, Proceedings, 3260.

CM M. SCHEMM-GREGORY

In 2012 my main work on Devonian stratigraphy was on Portuguese museum brachiopod collections. The brachiopods housed in the Science Museum of the University of Coimbra are now identified according to modern taxonomy. These brachiopod collections consist mainly of Devonian taxa and are an essential source for stratigraphic and taxonomic study. The collection data will be published in two catalogues financed by the Consortium Galp-Petrobras-Partex and published by the Coimbra University Press. Both catalogues are bilingual, Portuguese and English, to guarantee a global distribution. Currently the Nery DELGADO Brachiopod Collection stored in the Geological Museum in Lisbon and in the archives of the Laboratório Nacional de Energia e Geologia (LNEG, former Portuguese Geological Survey) is under revision and first data will be presented at the SDS Meeting in Morocco in 2013.

If financial situation allows further field work further field, especially in northern Portugal, work is planned for 2013. The aim is the exact stratigraphic assignment of these strata and their correlation with sections in Central and southern Portugal.

On scientific meetings and workshops I try to point out the importance of accurate storage and documentation of museum collections. Especially in times where opportunities for field work are limited, much of our work depend on these collections and their accessibility and study should be guaranteed for scientists.

Beside my work on Portuguese brachiopods, the work on Devonian brachiopods from southern Devon in England was continued. The manuscript is almost finished and should be submitted soon. Together with Dr. J.J. ZAMBITO (West Virginia University) the first manuscript on ambocoelid brachiopods could be finished which is now in press at the *Journal of Paleontology*. Together with

the working group of Dr. C. KLUG (Palaeontological Institute and Museum, Zürich University) and with Dr. F. FRANCHI (University of Bologna) pentamerid brachiopod from Morocco are studied, one manuscript was published this year and a second one is in press.

Publications

Journal articles

TESSITORE, L., SCHEMM-GREGORY, M., KORN, D., WILD, F., NAGLIK, C. & KLUG, C. (in press): Taphonomy and palaeoecology of the green pentamerid Devonian brachiopods from the Aferdou el Mrakib, eastern Anti-Atlas, Morocco. – *Swiss Journal of Palaeontology*.

ZAMBITO, J.J. & SCHEMM-GREGORY, M. (in press). Revised Taxonomy and Interpretation of Life Position for the Brachiopod Genus *Ambocoelia* in the Middle and Late Devonian Northern Appalachian Basin (USA). – *Journal of Paleontology*.

FRANCHI, F., SCHEMM-GREGORY, M. & KLUG, C. 2012. A new species of *Ivdelinia* ANDRONOV, 1961 and its palaeoecological and palaeobiogeographical implications (Morocco, Givetian). – *Bulletin of Geosciences*, **87** (1): 1-11.

Books/book chapters

SCHEMM-GREGORY, M. & HENRIQUES, M.H. (in press). *Os Braquiópodes da Coleção SAEMANN do Museu da Ciência da Universidade de Coimbra (Portugal)*. [The Brachiopods of the SAEMANN Collection of the Museu da Ciência da Universidade de Coimbra (Portugal).] – Coimbra (University Press).

SCHEMM-GREGORY, M. & HENRIQUES, M.H. (in press): *Os Braquiópodes da Coleção KRANTZ do Museu da Ciência da Universidade de Coimbra (Portugal)*. [The Brachiopods of the KRANTZ Collection of the Museu da Ciência da Universidade de Coimbra (Portugal).] – Coimbra (University Press).

SCHEMM-GREGORY, M. (in press). *Reconstruções tridimensionais de fósseis de braquiópodes e implicações taxonómicas*. – In: LOPES, F.C., ANDRADE, A.I., HENRIQUES, M.H., QUINTA-FERREIRA, M., BARATA, M.T. & PENA DOS REIS, R. (Coords), Para Conhecer a Terra. Memórias e Notícias de Geociências no Espaço Lusófono, Chapter 23, Coimbra (University Press).

SCHEMM-GREGORY, M. & FELDMAN, H.R. (in press). *Técnicas laboratoriais e computacionais aplicadas ao estudo taxonómico integrado de braquiópodes*. – In: LOPES, F.C., ANDRADE, A.I., HENRIQUES, M.H., QUINTA-FERREIRA, M., BARATA, M.T. & PENA DOS REIS, R. (Coords), Para Conhecer a Terra. Memórias e Notícias de Geociências no Espaço Lusófono, Chapter 22, Coimbra (University Press).

SCHEMM-GREGORY, M. & HENRIQUES, M.H. (in press). A Coleção Krantz de braquiópodes do Museu da Ciência da Universidade de Coimbra. – In: HENRIQUES, M. H., ANDRADE, A. I., HENRIQUES, M.H., QUINTA-FERREIRA, M., LOPES, F.C., BARATA, M.T., PENA DOS REIS, R. & MACHADO, A. (Coords),

Para Aprender com a Terra. Memórias e Notícias de Geociências no Espaço Lusófono, Chapter 29, Coimbra (University Press).

Abstracts

SCHEMM-GREGORY, M. 2012. *Three-dimensional reconstructions of fossil brachiopods and taxonomic implications*. – In: HENRIQUES, M.H., ANDRADE, A.I., LOPES, F.C., PENA DOS REIS, R., QUINTA-FERREIRA, M. & BARATA, M.T. (Coord.), I Congresso International GeoCiências na CPLP, 240 Anos de Geociências na CPLP, Coimbra, 12-19 Maio, Centro de Geociências e Centro de Geofísica da Universidade de Coimbra (Eds.), Livro de Resumos: 286.

SCHEMM-GREGORY, M. & FELDMAN, H.R. 2012. *Laboratory techniques and computer applications in integrated taxonomic studies of brachiopods*. – In: HENRIQUES, M.H., ANDRADE, A.I., LOPES, F.C., PENA DOS REIS, R., QUINTA-FERREIRA, M. & BARATA, M.T. (COORD.), I Congresso International GeoCiências na CPLP, 240 Anos de Geociências na CPLP, Coimbra, 12-19 Maio, Centro de Geociências e Centro de Geofísica da Universidade de Coimbra (Eds.), Livro de Resumos: 287.

SCHEMM-GREGORY, M. & HENRIQUES, M.H. 2012. A *Coleção KRANTZ de braquiópodes devónicos do Museu da Ciência da Universidade de Coimbra (Portugal)*. – In: HENRIQUES, M.H., ANDRADE, A.I., LOPES, F.C., PENA DOS REIS, R., QUINTA-FERREIRA, M. & BARATA, M.T. (Coord.): I Congresso International GeoCiências na CPLP, 240 Anos de Geociências na CPLP, Coimbra, 12-19 Maio, Centro de Geociências e Centro de Geofísica da Universidade de Coimbra (Eds.), Livro de Resumos, 288.

FREY, L., SCHEMM-GREGORY, M., FRÝDA, J., KRÖGER, B., TAYLOR, P.D., WILSON, M.A. & KLUG, C. 2012. *Alpha diversity and palaeoecology of invertebrate associations of the Early Devonian in the Moroccan Anti-Atlas*. – In: 10th Swiss Geoscience Meeting, Bern 16th – 17th November 2012, Mountains – Up and Down: 210.

TESSITORE, L., SCHEMM-GREGORY, M., KORN, D., WILD, F., NAGLIK, C. & KLUG, C. 2012. *Taphonomy and palaeoecology of the green pentamerid Devonian brachiopods from the Aferdou el Mrakib, eastern Anti-Atlas, Morocco*. – In: 10th Swiss Geoscience Meeting, Bern 16th – 17th November 2012, Mountains – Up and Down: 209.

TM Eberhard SCHINDLER

The year 2012 started with a non-Devonian event: Together with Senckenberg colleagues CM Rainer BROCKE, Rolf SCHROEDER, Volker WILDE and Reinhard A. KRAUSE from the Alfred-Wegener-Institut für Polar- und Meeresforschung (Bremerhaven), I organised an honorary colloquium on the 100 year anniversary of Alfred WEGENER's hypothesis of drifting continents on 6 January which he had presented in a talk of the 2nd Annual Meeting of the 'Geologische Vereinigung'

at the Senckenberg Museum on 6 January 1912 (see KRAUSE et al. for review article). The colloquium was entitled “Die Hypothese von der Drift der Kontinente wird 100 – Alfred WEGENERS Idee hat Geburtstag“. It was a great pleasure for us to host some 150 guests – among them two grandsons of Alfred WEGENER and their wives – listening to seven talks on topics related to the revolutionary theory and the life of the great man.

Research activities, of course, concentrated on Devonian matters:

After termination the Turkish–German cooperation project DEVEC-TR focusing on basic questions of the Devonian in Turkey, application for a follow-up project was successful; the scope of the project lies on long-term and short-term processes in the Devonian of the Taurides and is entitled “Devonian Cycles and Global Events in the Northern Gondwanan Taurides” (DECENT). Two field campaigns were undertaken, one in connection with a meeting on the “Paleozoic of Northern Gondwana and its Petroleum Potential” organised by the ‘Turkish Association of Petroleum Geologists’ in Kayseri from 9-14 September 2012 (with presentations NAZIK et al., SAYDAM-DEMIRAY et al., SCHINDLER et al., WEHRMANN et al.). Together with Senckenberg colleague Achim WEHRMANN and some of our Turkish colleagues a section in the Eastern Taurides (Halevikdere Section) was presented during a post-conference field trip. First results from recent field work could already be shown to more than 120 participants of the field trip (YALÇIN et al.).

As a final result of the IPC3 Congress in London (2010), papers have been included in the proceedings (special volume of Palaeo3) edited by the organizers of the symposium on “Time-specific facies” (TSF), as mentioned in last year’s report. In Palaeo3 volume 367-368 a tribute article in honour of O.H. WALLISER (to whom the entire volume is dedicated acknowledging his stimulation of TSF in our science) is present (SCHINDLER) as well as an overview paper on TSF (BRETT, McLAUGHLIN et al.). A paper demonstrating relationship and application of TSF in respect to detailed correlation in the course of the Kellwasser Crisis (GEREKE & SCHINDLER) and one on the paradox of “rhythmic event beds” which can be found in the Dra Valley of the Moroccan Anti-Atlas (BRETT, ZAMBITO, SCHINDLER & BECKER) are also included.

Work in Morocco has further been addressed by the publication of a paper together with American colleagues on Lower Devonian cyclic trilobite-rich sequences in the Dra Valley of the Anti-Atlas (BRETT, ZAMBITO, HUNDA & SCHINDLER)

As a result of the long-time work on an update of the largely widened type locality of the Kellwasser Horizons in the Kellwasser Valley

(Harz Mountains, German) a paper together with German colleagues Manfred GEREKE, Friedrich Wilhelm LUPPOLD, Matthias PIECHA and Dieter STOPPEL has been nearly completed and will be submitted early in 2013.

As a contribution to the so-called “monster volume” in connection with the International Year of Planet Earth (IYPE) edited by CM John TALENT, a review article on the Tentaculitoidea has been published.

Examples from other ongoing research activities shall be briefly summarised (mostly together with other colleagues): Work on Middle Devonian strata in the Eifel Hills area, comparison of rock in the interval of the Chotec Event, work on the Emsian and Eifelian strata of the Appalachian Basin (including work on the comparison of dacryoconarids).

Publications 2012 (in chronological order)

- KRAUSE, R.A., SCHINDLER, E., BROCKE, R., SCHROEDER, R. & WILDE, V. 2012. Alfred WEGENER: Vordenker und Erneuerer der Geowissenschaften – 100 Jahre Hypothese von der Drift der Kontinente. – *SENCKENBERG – natur • forschung • museum*, **142** (1/2): 12-17.
- BROCKE, R., SCHULTKA, S. & SCHINDLER, E. 2012. 400 Millionen Jahre alte Böden in der Eifel – Als die Pflanzen sesshaft wurden. – *SENCKENBERG – natur • forschung • museum*, **142** (1/2): 52-57.
- SCHINDLER, E. 2012. *Tentaculitoids – an enigmatic group of Palaeozoic fossils*. – In: TALENT, J.A. (Ed.), *Earth and Life: Global Biodiversity, Extinction Intervals and Biogeographic Perturbations Through Time*: 479-490; Dordrecht (Springer). [doi: 10.1007/978-90-481-3428-1_14]
- SCHINDLER, E. & RADTKE, G. 2012. Obituary: Hans-Jürgen ANDERLE 23.01.1939 – 22.01.2012. – *Subcommission on Devonian Stratigraphy, Newsletter*, **27**: 5-6.
- BRETT, C.E., ZAMBITO IV, J.J., HUNDA, B.R. & SCHINDLER, E. 2012. Mid-Paleozoic trilobite lagerstätten: Models of diagenetically enhanced obrution deposits. – *Palaios*, **27** (5): 326-345. [doi: 10.2110/palo.2011.p11-040r]
- WEHRMANN, A., BOZDOĞAN, N., BROCKE, R., SCHINDLER, E., WILDE, V., YALÇIN, M.N. & YILMAZ, İ. 2012. Sedimentary signatures of the North Gondwana margin in the Devonian (Taurides, Turkey): Reconstruction of depositional environments and hinterland processes. – *Turkish Association of Petroleum Geologists, Special Publication*, **6**: 7-9.
- SCHINDLER, E., BOZDOĞAN, N., BROCKE, R., JANSEN, U., KARSLIOĞLU, Ö., KOZLU, H., NALCIOĞLU, G., NAZIK, A., ÖZKAN, R., SAYDAM-DEMIRAY, D.G., WEDDIGE, K., WEHRMANN, A., WILDE, V., YALÇIN, M.N. & YILMAZ, İ. 2012. Facies development, global events, and lithology of stratigraphically constrained sequences in the Devonian of the Central and Eastern

- Taurides (Turkey). – *Turkish Association of Petroleum Geologists, Special Publication*, **6**: 10-11.
- NAZIK, A., YALÇIN, M.N., WILDE, V., WEHRMANN, A., YILMAZ, İ., SCHINDLER, E., KOZLU, H. & BOZDOĞAN, N. 2012. Palaeoecology and palaeogeography of ostracods from the Devonian of Halevikdere (Eastern Taurides, Turkey). – *Turkish Association of Petroleum Geologists, Special Publication*, **6**: 35-36..
- SAYDAM-DEMIRAY, D.G., WEDDIGE, K., SCHINDLER, E., YILMAZ, İ., WEHRMANN, A., WILDE, V. & YALÇIN, M.N. 2012. Devonian conodonts from the Geyikdağ Unit in the Eastern Taurides (Southern Turkey): Biostratigraphical implications. – *Turkish Association of Petroleum Geologists, Special Publication*, **6**: 37-40.
- YALÇIN, M.N., WEHRMANN, A., SCHINDLER, E., YILMAZ, İ., WILDE, V., NAZIK, A., BOZDOĞAN, N., ÖZKAN, R., KOZLU, H. & BROCKE, R. 2012. Devonian. – *Turkish Association of Petroleum Geologists, Special Publication*, **7**: 79-97..
- SCHINDLER, E. (2012): "Time-Specific Facies" – a great concept introduced by a great man: Otto H. WALLISER. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 3-5. [doi: 10.1016/j.palaeo.2012.04.025]
- BRETT, C.E., MCLAUGHLIN, P.I., HISTON, K., SCHINDLER, E. & FERRETTI, A. 2012. Time-specific aspects of facies: State of the art, examples, and possible causes. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 6-18. [http://dx.doi.org/10.1016/j.palaeo.2012.10.009]
- GEREKE, M. & SCHINDLER, E. 2012. "Time-Specific Facies" and biologic crises – the Kellwasser Event interval near the Frasnian/Famennian boundary (Late Devonian). – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 19-29. [doi: 10.1016/j.palaeo.2011.11.024]
- BRETT, C.E., ZAMBITO IV, J.J., SCHINDLER, E. & BECKER, R.T. 2012. Diagenetically-enhanced trilobite obrution deposits in concretionary limestones: The paradox of "Rhythmic Events Beds". – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 30-43. [doi: 10.1016/j.palaeo.2011.12.004]

TM Ladislav SLAVÍK

Last two years I continued work as a chief of the five-year project "Late Silurian integrated stratigraphy" financed by the Czech Science Foundation; it is also partly related to the Devonian as it includes the Silurian/Devonian boundary in the Prague Synform. My student Aneta HUŠKOVÁ started a study on spathognathodontid conodont faunas around the Silurian-Devonian boundary in classical S/D sections. This work is still in progress and a part of her BSc. thesis. In 2012 a long-time work on the Lochkovian conodont biostratigraphical framework in the Prague Synform was finished; data were published (see the list below). I also started cooperation with Tatyana MAVRINSKAYA (Ufa, Russia) on the early Devonian

conodonts from the South Urals; we have submitted a manuscript on the Lochkovian conodont correlation. Last year a manuscript on early Devonian forams from the Prague Synform was finished with Katarína HOLCOVÁ.

In 2012 we (me and Nacho VALENZUELA-RÍOS) were successful in getting a new 3-year project "High-resolution correlation and dating of Mid-Palaeozoic sedimentary sequences of Peri-Gondwana using integrated biostratigraphy and chemo-physical methods" - it is a Czech-Spanish project with a team including Teresa LIAO, Leona KOPTÍKOVÁ, Aneta HUŠKOVÁ and Helena CALVO. For 2013 we plan field campaigns in the Prague Synform and in the Pyrenees to sample selected Lower Devonian sections for biostratigraphy, magnetic susceptibility and gamma-ray spectrometry. Unfortunately, in 2012 our international team was not able to move on with the revision of the Basal Emsian GSSP, because the sampling campaign in Zinzilban (Uzbekistan) was postponed. We expected that the next planned meeting of the IGCP 580 (magnetic susceptibility) would take place in Kitab State Reserve in 2013. However, the decision has been made in favour of Canada. We will try other possibilities anyway. Since 2011 I am taking the office as a chief of the Department of Paleobiology and Paleocology at the Institute of Geology AS CR, v.v.i.

Recent Devonian Papers

- SLAVÍK, L. 2011. *Lanea carlsi* conodont apparatus reconstruction and its significance for subdivision of the Lochkovian. - *Acta Palaeontologica Polonica*, **56** (2): 313-327.
- HLADIL, J., SLAVÍK, L., VONDRA, M., KOPTÍKOVÁ, L., ČEJCHAN, P., SCHNABL, P., ADAMOVIČ, J., VACEK, F., VÍCH, R., LISÁ, L. & LISÝ, P. 2011. Pragian–Emsian successions in Uzbekistan and Bohemia: magnetic susceptibility logs and their dynamic time warping alignment. – *Stratigraphy*, **8** (4): 217-235.
- SLAVÍK, L., CARLS, P., HLADIL, J. & KOPTÍKOVÁ, L. 2012. Subdivision of the Lochkovian Stage based on conodont faunas from the stratotype area (Prague Synform, Czech Republic). – *Geological Journal*, **47**, 616-631.

CM Claudia SPALLETTA

I am continuing studies on Devonian conodonts of the Carnic Alps, mainly focused on the Frasnian-Famennian boundary and Frasnian event stratigraphy. These studies concern conodont biostratigraphy, taxonomy, and biofacies analysis, but also detailed lithostratigraphic and sedimentologic analysis are carried on in collaboration with Enzo Farabegoli and M. Cristina PERRI (University of Bologna), and Monica PONDRELLI (University of Pescara).

The collaboration within the project for the formal definition of the pre-Variscan lithostratigraphic units of the Carnic Alps, coordinated by Carlo CORRADINI (University of Cagliari) and Thomas SUTTNER (University of Graz), is still active. I am responsible for the definition of the Devonian pelagic limestone units, and involved in the study of the Middle to Upper Devonian transitional carbonatic units.

Together with Carlo CORRADINI I am studying Upper Devonian to Lower Carboniferous conodonts from Sardinia. After the revision of the upper Famennian-lowermost Carboniferous species of *Protognathus* we also plan to re-study all species of all the conodont genera found in rocks of the same age, trying to clarify if one of them could be used as palaeontological criterium for defining the Devonian-Carboniferous boundary.

CM Maurice STREEL

We have published a paper with three South American colleagues who present the spore content of diamictites of latest Famennian and Mississippian from Brazil and Bolivia.

We defend the opinion that latest Famennian diamictites in Bolivia were deposited during a rather "short" time corresponding to the deepest erosion phase in Western Germany i.e. during the upper part of the LN *lepidophyta-nitidus* Zone. We suggest that these latest Famennian diamictites might have been directly covered by Mississippian diamictites. Finally we display the spore content of latest Famennian and late Visean diamictites of the Parnaíba Basin in Brazil emphasizing the importance to separate the very abundant reworked miospores from the contemporaneous material. (What do latest Famennian and Mississippian miospores from South American diamictites tell us? - M. STREEL, M.V. CAPUTO, J.H.G. MELO & M. PEREZ-LEYTON, *Palaeobiodiversity and Palaeoenvironments*, in press. *Ask the first author for reprint*).

With Ken HIGGS and two geologists from Belgium, we have submitted to "*Geologica Belgica*", online early 2013, a new contribution on the type Upper Famennian of Belgium where we redefine the VCo *versabilis-cornuta* Zone and the VH *verrucosa-hystricosus* Zone, emphasizing their relation with the "*Annulata*" and Dasberg events. (High resolution miospore stratigraphy of the Upper Famennian of eastern Belgium, and correlation with the conodont zonation. - Kenneth T. HIGGS, Cyrille PRESTIANNI, Maurice STREEL & Jacques THOREZ, *Geologica Belgica*, in press).

CM Thomas J. SUTTNER

2012 was again a very productive year for the Austrian Devonian working group. Beneath several abstracts and papers, we also organized some symposia and field workshops. One highlight was the 4th Annual meeting of IGCP 580, held in June in Graz, with a field workshop in the Carnic Alps (Fig. 1). Within the frame of this meeting we intended to bring together scientists that apply geophysical methods, working on different time slices. Therefore, the scientific sessions have been divided into three parts; *Paleozoic*, *Mesozoic* and *Cenozoic*. In total, 17 talks and 8 posters were presented by 23 participants from 12 countries. The *Paleozoic* session, was divided into two parts with keynote lectures held by Michael T. WHALEN, (University of Alaska Fairbanks, USA) and Leona KOPTÍKOVÁ (Institute of Geology AS CR, Czech Republic). T. WHALEN reported on geochemical, MS as well as the isotopic data obtained across the Frasnian-Famennian boundary at Fuhe in Guilin, China, where the lower and upper Kellwasser Events are recognized. The second keynote lecture by KOPTÍKOVÁ provided comprehensive information about the petrophysical record as well as the data of MS and GRS of the Middle Devonian Basal Choteč Event in three different paleogeographical settings observed in the perigondwanan Perunica microcontinent, Laurussian and Central Asian settings. Abstracts of these and other Devonian related contributions are available online: http://erdwissenschaften.uni-graz.at/publikationen/zeitschrift/band17/index_de.php

The field workshop after the indoor sessions was held in the Cason di Lanza area (Carnic Alps, Italy) and organized by a core team consisting of staffs from Graz University (Thomas SUTTNER and Erika KIDO), Università di Cagliari (Carlo Corradini) and Museo Friulano di Storia Naturale, Udine (Luca Simonetto). In total 25 persons joined the Field-Workshop and discussed about the geology of the pre- and post-Variscan sequence in the Carnic Alps. The second day of the Field-Workshop was regarded as *Working day*. All participants worked together on the Silurian-Devonian Rio Malinfier West section sampling a six meters interval in 10 cm steps for MS and applying the GRS field device.

Within the frame of the projects IGCP 596 and the nationally funded FWF P23775 B17 (Late Eifelian climate perturbations: Effects on tropical coral communities) successful field trips led to localities in the Carnic Alps (Cason di Lanza area, on site team: Anne Christine DA SILVA, Pauline LAMBERTY, Monica PONDRELLI, Luca SIMONETTO, Erika KIDO and Thomas SUTTNER), in the Eifel (Blankenheimer Mulde, team: Peter KÖNIGSHOF, Anne-Christine DA SILVA, Damien PAS, Erika

KIDO and Thomas SUTTNER), and to Western Mongolia (team: ARIUNCHIMEG Yarinpil, SERSMAA Gonchigdorj, Johnny WATERS, James William ATWOOD, Gary WEBSTER, Erika KIDO, Thomas SUTTNER, K. ZORIGT, MYAGMARTSEND and BATAIVAN; Fig.2).

Additionally, Erika KIDO organized a workshop in Graz (17-22nd September; Fig. 2) which was followed by a joint field trip to the Devonian and Carboniferous sequence of the Wolayer area and the Nassfeld in the Carnic Alps. In total 13 participants joined. Among them are colleagues from Natural National Science Foundation of China, NIGPAS (China), Appalachian State University (U.S.A.), Senckenberg Museum (Germany) and Graz University (Austria).

Claudia DOJEN

Beneath the preparations for exhibitions in the Landesmuseum Kärnten she continues to work on ostracode biodiversity in the Middle Devonian (Givetian) of the Fromelennes Fm., Ardennes, France (team: Sébastien MAILLET, Bruno MILHAU & Claudia DOJEN) and on the Early to Middle Devonian ostracodes of the Western Dra Valley, Morocco (team: Claudia DOJEN & Helga UFFENORDE).



Fig. 1: IGCP 580 - 4th Annual Meeting, Graz, Austria (24-30th June 2012): Conference in Graz (left) and field workshop in the Carnic Alps (right).



Fig. 2: Workshops on the Devonian & Carboniferous in Western Mongolia (left) and in Graz, Austria (right).

Publications

CORRADINI, C., SCHÖNLAUB, H.P., PONDRELLI, M., SIMONETTO, L., CORRIGA, M.G., SUTTNER, T.J. & KIDO, E. 2012. A short overview on the Palaeozoic sequence of the Carnic Alps. – In: KIDO, E., SUTTNER, T. J., PILLER, W. E., DA SILVA, A. C., CORRADINI, C.

& SIMONETTO, L. (Eds.), IGCP 580 - 4th Annual Meeting, 24-30th June 2012, *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, 17: 65-70.

- CORRADINI, C., PONDRELLI, M., CORRIGA, M.G., SIMONETTO, L., KIDO, E., SUTTNER, T.J., SPALLETTA, C. & CARTA, N. 2012. Geology and stratigraphy of the Cason di Lanza area (Mount Zermula, Carnic Alps, Italy). – In: KIDO, E., SUTTNER, T.J., PILLER, W.E., DA SILVA, A.C., CORRADINI, C. & SIMONETTO, L. (Eds.), IGCP 580 - 4th Annual Meeting, 24-30th June 2012, *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 83-103. KÖNIGSHOF, P., SUTTNER, T. & KIESSLING, W. 2012. Klimawandel und Veränderung der Biodiversität in der Erdgeschichte. - *SENCKENBERG - natur • forschung • museum*, **142** (1/2): 28-31.
- SUTTNER, T.J., KIDO, E., KÖNIGSHOF, P. & PILLER, W.E. 2012. Mid-Paleozoic climate change and biodiversity patterns (IGCP 596): Conferences and Collaborations in 2011. – *Episodes*, **35** (3): 438-444.
- VODRÁŽKOVÁ, S., FRÝDA, J., SUTTNER, T.J., KOPTÍKOVÁ, L. & TONAROVÁ, P. 2012. Environmental changes close to the Lower-Middle Devonian boundary; the Basal Choteč Event in the Prague Basin (Czech Republic). – *Facies* [doi 10.1007/s10347-012-0300-x]
- Abstracts**
- CORRADINI, C., CORRIGA, M. G., SUTTNER, T. J., KIDO, E., VODRÁŽKOVÁ, S., KOPTÍKOVÁ, L., DA SILVA, A. C., PONDRELLI, M. & SIMONETTO, L. 2012. Facies development and MS across the Silurian/Devonian boundary in the Lake Wolayer area (Carnic Alps, Italy and Austria). – In: KIDO, E., SUTTNER, T.J., PILLER, W.E., DA SILVA, A.C., CORRADINI, C. & SIMONETTO, L. (Eds.), IGCP 580 - 4th Annual Meeting, 24-30th June 2012, *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 13-14.
- DEREUIL, A.A., WATERS, J.A., CARMICHAEL, S.K., SUTTNER, T.J., KIDO, E., & CHEN, X.Q. 2012. Diagenetic alteration in samples from the Hongguleleng Formation in the Late Devonian of northwestern China. - Southeastern Section, 61st Annual Meeting (1–2 April 2012), Asheville, North Carolina, paper 17-5, Booth 31, *Geological Society of America, Abstracts with Programs*, **44** (4): 62.
- KIDO, E., SUTTNER, T., PONDRELLI, M., CORRADINI, C., CORRIGA, M.G., SIMONETTO, L. & VODRÁŽKOVÁ, S. 2012. *Middle Devonian crisis and rugose corals in the Carnic Alps (Austria-Italy)*. - 34th International Geological Congress (IGC), 5-10. August 2012, Brisbane, Australia: 3908.
- KIDO, E., SUTTNER, T. J., PONDRELLI, M., CORRADINI, C., CORRIGA, M. G., SIMONETTO, L., VODRÁŽKOVÁ, S. & KOPTÍKOVÁ, L. 2012. Geochemical and geophysical records of the Middle Devonian sequence in the Carnic Alps. – In: KIDO, E., SUTTNER, T.J., PILLER, W. E., DA SILVA, A. C., CORRADINI, C. & SIMONETTO, L. (Eds.) IGCP 580 - 4th Annual Meeting, 24-30th June 2012, *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 29-30.
- KIDO, E., SUTTNER, T.J., PONDRELLI, M., CORRADINI, C., CORRIGA, M.G., SIMONETTO, L., VODRÁŽKOVÁ, S. & KOPTÍKOVÁ, L. 2012. *Magnetic susceptibility and carbon isotopic record across the Eifelian – Givetian boundary in the Carnic Alps*. – 4th International Geologica Belgica Meeting 2012, Moving Plates and Melting Icecaps, Processes and Forcing Factors in Geology, 11-14. September 2012: 43.
- PAS, D., DA SILVA, A.C., CORNET, P., SUTTNER, T.J., KÖNIGSHOF, P., BOULVAIN, F. & BULTYNCK, P. 2012. Multi-disciplinary research on long-term Middle to Upper Devonian fore-reef successions from Germany and Austria. – In: KIDO, E., SUTTNER, T.J., PILLER, W. E., DA SILVA, A.C., CORRADINI, C. & SIMONETTO, L. (Eds.), IGCP 580, 4th Annual Meeting, 24-30th June 2012, *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 36-37.
- PAS, D., DA SILVA, A.C., CORNET, P., SUTTNER, T., KÖNIGSHOF, P., BOULVAIN, F. & BULTYNCK, P. 2012. *Sedimentary development and correlation of Mid-Late Devonian fore-reef deposits from Central Europe*. – 4th International Geologica Belgica Meeting 2012, Moving Plates and Melting Icecaps, Processes and Forcing Factors in Geology: 11-14. [http://hdl.handle.net/2268/130411]
- SUTTNER, T. & KIDO, E. 2012. Facies development and biodiversity of the Early to Middle Devonian shallow marine sequence of the central Carnic Alps (Austria-Italy). – In: WITZMANN, F. & ABERHAN, M. (Eds.), Centenary Meeting of the Paläontologische Gesellschaft, 24.09.-29.09.2012, Museum für Naturkunde, Berlin, *Terra Nostra*, **2012** (3): 176.
- SUTTNER, T.J., KIDO, E., CHEN, X.-Q., WATERS, J. A., MAWSON, R. & FRÝDA, J. 2012. Magnetic susceptibility across the Frasnian–Famennian boundary at the Boulongour Reservoir (Northwest Xinjiang-Uygur Autonomous Region, China). – In: KIDO, E., SUTTNER, T.J., PILLER, W.E., DA SILVA, A.C., CORRADINI, C. & SIMONETTO, L. (Eds.), IGCP 580, 4th Annual Meeting, 24-30th June 2012, *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, **17**: 52
- SUTTNER, T.J., KIDO, E., VODRÁŽKOVÁ, S. & BRIGUGLIO, A. 2012. *Microtomography and 3D reconstruction of Devonian conodonts*. - 34th International Geological Congress (IGC), 5-10. August 2012, Brisbane, Australia: 3910.
- VODRÁŽKOVÁ, S., SUTTNER, T.J., KIDO, E. & TONAROVÁ, P. 2012. *Upper dark interval of the shallow-water Koneprusy area (Prague Basin, Czech Republic): a correlation with the global Kacak Event (Middle Devonian, Eifelian)*. - 34th International Geological Congress (IGC), 5-10. August 2012, Brisbane, Australia: 3261.
- WATERS, J.A., CARMICHAEL, S.K., DEREUIL, A.A., SUTTNER, T.J., KIDO, E., & CHEN, X.Q., TALENT, J. A. & MAWSON, R. 2012. *Recognition of the Kellwasser Event (Late Devonian) in the Hongguleleng Formation, Xinjiang Province, China*. - 34th International Geological Congress (IGC), 5-10. August 2012, Brisbane, Australia: 3720.
- WATERS, J.A., CARMICHAEL, S.K., DEREUIL, A.A., SUTTNER, T.J., KIDO, E., & CHEN, X.Q., TALENT, J. A. & MAWSON, R. 2012. *Geochemistry across the Frasnian/Famennian Boundary, Hongguleleng*

Formation, Xinjiang Province, China. - 22nd V.M. GOLDSCHMIDT Meeting, 24-29. June 2012, Montreal, Canada: 310.

Editorials

KIDO, E., SUTTNER, T.J., PILLER, W.E., DA SILVA, A.C., CORRADINI, C. & SIMONETTO, L. (Eds.). IGCP 580 - 4th Annual Meeting, 24-30th June 2012. - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, 17: 1-108.

Ta Hoa PHUONG

TRAN Van Tri, VU Khuc (Editors), BUI Minh Tam, CU Minh Hoang, DANG Tran Huyen, DOAN Nhat Truong, DO Bat, LE Do Binh, LE Duc An, MAI Trong Nhuan, NGO Quang Toan, NGO Thuong San, NGUYEN ba Minh, NGUYEN Bieu, NGUYEN Dich Dy, NGUYEN Huu Ty, NGUYEN Quang Hung, NGUYEN Thanh Van, NGUYEN Tuan Phong, NGUYEN Van Quy, NGUYEN Van Vuong, NGUYEN Xuan Bao, PHAM Duc Luong, PHAM Kim Ngan, PHAN Thien, PHAN Trong Trinh, TA Hoa Phuong, TRAN Ngoc Nam, TRAN Tan Van, TRAN Tat Thang, TRAN Thanh Hai, TRAN Trong Hoa, TRAN Tuan Anh, TRINH Van Long & VO Cong Nghiep 2009. *Geology and Natural Resources of Vietnam*. - 592 pp., Hanoi (Publishing House for Science and Technology).

KOMATSU, T., TAKASHIMA, R., NARUSE, H. TA Hoa Phuong, DANG Tran Huyen, NGUYEN Duc Phong, DINH Cong Tien, HO Tien Chung, TRAN Tan Van, Satoru KATO, Takumi MAEKAWA & Yuri GLOTOV 2012. Devonian–Carboniferous transition in the Pho Han Formation on Cat Ba Island, northeastern Vietnam. - *The Journal of the Geological Society of Japan*, 118 (6): 5-6.

CM Kate M. TRINAJSTIC and the PERTH GROUP

The last year has seen a continuation of research in the Devonian of the Canning and Carnarvon Basins of Western Australia. The majority of this work has been supported by an Australian Research Council Linkage grant CHRONOSTRATIGRAPHIC FRAMEWORK FOR THE DEVONIAN CANNING BASIN – A MULTIDISCIPLINARY STUDY OF ENVIRONMENTAL CHANGE with Chief investigators Eric TOHVER, (University of WA), Kliti GRICE, (Curtin University) and partner investigators Joseph KIRSCHVINK, (CALTECH), Peter WARD, (University of Washington) Ted E. PLAYTON, Paul MONTGOMERY (Chevron), Peter HAINES, Roger HOCKING (Geological Survey of Western Australia). Associate Professor Kate TRINAJSTIC (Curtin University) has provided conodont and microvertebrate biostratigraphy for this project and is supervising PhD student Brett ROELOFS, who is investigating the use of microvertebrates as a biostratigraphy tool for the Late Devonian and Early Carboniferous in the Canning Basin. PhD student Jeroen HANSMA is investigating the

application of magnetostratigraphy for correlation at the University of Western Australia (UWA).

Re-sampling of important Frasnian-Famennian boundary sections have yielded good conodont faunas, which are being used as a biostratigraphic framework for emerging applications of microvertebrate biostratigraphy, magnetostratigraphy, stable isotopes, molecular fossil (biomarker) and conodont Sr isotope chronostratigraphy from Devonian rocks in the Canning Basin. The diverse array of environments present some challenges for detailed correlation, even at a regional scale. Currently correlation between marginal-slope and basin facies to platform facies remains problematic. Microvertebrates show promise for correlation in facies where conodonts are absent. The excellently preserved fishes from the Gogo Formation (Frasnian) are being utilised to provide better identification of microvertebrates for correlation purposes. Taxonomic work continues on this fauna by John LONG (Flinders University), Kate TRINAJSTIC (Curtin University), Carole BURROW (Queensland Museum) and Gavin YOUNG (ANU) with other international collaborators. This has proved successful in the correlation of Frasnian strata between Canning and Carnarvon Basins (Western Australian) as conodonts were not diagnostic. In the Canning Basin Famennian samples from outcrop and core are yielding shark teeth and other microvertebrate taxa, which can be correlated to established global biozones. In addition thelodont taxa, a group extinct by the end of the Givetian in Europe, are recorded in the middle of the Famennian in the Canning Basin, significantly extending their range. A manuscript is currently being prepared with Vachik HAIRAPETIAN, Brett ROELOFS, Susan TURNER and Kate TRINAJSTIC describing these new taxa.

PhD student Brett ROELOFS is expanding these research aims into Famennian and Carboniferous strata and Sue TURNER is collaborating on many aspects of this research. Early results suggest there is an increased biotic turnover, especially of vertebrates, at the Famennian-Carboniferous boundary, which requires a more resolved chronostratigraphic framework than is currently available. Dr Milo BARHAM (Curtin University) and Brett ROELOFS are undertaking oxygen isotope work on both sharks and conodonts across key boundaries in the Canning Basin. Correlation of conodonts and microvertebrates to global event stratigraphy is a major aim over the next 12 months.

Book Chapters

GEORGE, A.D., TRINAJSTIC, K.M. & CHOW, N. 2009. Frasnian reef evolution and palaeogeography, SE Lennard Shelf, Canning Basin, Australia. – In: Late

Devonian Paleogeography and Paleocology, The Geological Society, London, Special Publication, **314** (1): 73-107.

Papers

- SEVASTOPULO, G. D. & BARHAM, M. (in press). Correlation of the base of the Serpukhovian Stage (Carboniferous; Mississippian) in northwest Europe. - *Geological Magazine*.
- CHOW, N., GEORGE, A.D., TRINAJSTIC, K.M. & Chen, Z (in press). Stratal architecture and platform evolution of an Early Frasnian syn-tectonic carbonate platform, Canning Basin. - *Sedimentology*.
- MELENDEZ, I., GRICE, K., TRINAJSTIC, K., LADJAVARDI, M., GREENWOOD, P., & THOMPSON, K.M. 2013. Biomarkers reveal the role of photic zone euxinia in exceptional fossil preservation: An organic geochemical perspective. - *Geology*, **4** (2): 123-126.
- BURROW, C. J., TRINAJSTIC, K.M. & LONG, J. 2012. First acanthodian from the Upper Devonian (Frasnian) Gogo Formation, Western Australia. - *Historical Biology*, **24** (4): 349- 357.
- BARHAM, M., JOACHIMSKI, M.M., MURRAY, J. & WILLIAMS, D.M. 2012. Diagenetic alteration of the structure and $\delta^{18}\text{O}$ signature of Palaeozoic fish and conodont apatite: potential use for corrected isotope signatures in palaeoenvironmental interpretation. - *Chemical Geology*, **298/299**: 11-19.
- BARHAM, M., MURRAY, J., JOACHIMSKI, M.M. & WILLIAMS, D.M. 2012. The onset of the Permo-Carboniferous glaciation: reconciling global stratigraphic evidence with biogenic apatite $\delta^{18}\text{O}$ records in the late Viséan. - *Journal of the Geological Society of London*, **169**: 119-122.
- RÜCKLIN, M., DONOGHUE, P. C.J., JOHANSON, Z., TRINAJSTIC, K., MARONE, F. & STAMPANONI, M. 2012. Development of teeth and jaws in the earliest jawed vertebrates. - *Nature*, **491** (7426): 748-751.
- LONG, J.A. & TRINAJSTIC, K. 2010. The Late Devonian Gogo Formation Lagerstätten of Western Australia: Exceptional Early Vertebrate Preservation and Diversity - *Annual Reviews of Earth and Planetary Sciences*, **38**: 255- 270.
- LONG, J.A., TRINAJSTIC, K.M. & JOHANSON Z. 2009. Devonian arthrodire embryos and the origin of internal fertilization in vertebrates. - *Nature*, **457**: 1124-1127.
- AHLBERG, P.E, TRINAJSTIC, K.M., LONG, J.A. & JOHANSON Z. 2009. Pelvic claspers confirm chondrichthyan-like internal fertilization in arthrodires. - *Nature*, **460**: 888-889.
- TRINAJSTIC, K.M. & GEORGE, A.D. 2009. Microvertebrate biostratigraphy of Upper Devonian (Frasnian) carbonate rocks in the Canning and Carnarvon Basins of Western Australia. - *Palaeontology*, **52** (3): 641-659.
- BURROW, C., LONG, J. & TRINAJSTIC, K.M. 2009. Disarticulated acanthodian and chondrichthyan remains from the upper middle Devonian Aztec siltstone, southern Victoria land, Antarctica. - *Antarctic Science*, **21**: 71-88.

CHOO, B., LONG, J. & TRINAJSTIC, K. 2009. A new genus and species of basal actinopterygian fish form the Upper Devonian Gogo Formation of Western Australia. - *Acta Zoologica*. **90**: 194-210.

GEORGE, A. D., CHOW, N. & TRINAJSTIC, K., 2009. Syndepositional fault control on lower Frasnian platform evolution Lennard Shelf, Canning Basin Australia. - *Geology*, **37** (4): 331-334.

Conference Presentations

HANSMA, J. 2012. *Late Devonian carbonate magnetostratigraphy from the South Oscar Range, Lennard Shelf, Western Australia*. - 34th International Geological Congress, Brisbane, Australia, 2012.

TM Jenaro I. VALENZUELA RIOS

Main activities in 2012 focused on three aspects: 1) research; 2) training young scientist, and 3) organizing the Spanish Palaeontological Society Meeting. The research focused on the Pyrenees and on the Iberian Chains. Plans for future collaboration with Ladislav SLAVIK have fructified in a joint granted proposal for studying Spanish and Barrandian sections. In training young scientists a proposal to the Worldwide RISE programme was submitted and granted, permitting a student from the TU. Darmstadt (Germany) to spend three months under my guidance on Lower Devonian matters. Also, a Master student (Helena Calvo SANCHIS) successfully finished her Master Thesis (May 2012) on Lower Devonian conodonts from a new Pyrenean section (results will be presented at the Morocco meeting). At the end of the year, together with Teresa (Jau-Chyn LIAO) and a few other friends and colleagues, we organized the Spanish Palaeontological Society Meeting in Valencia and Sóller (Majorca). Within it, a special Symposium on IGCP-596, with nine contributions (five of them on to Devonian matters), was organized.

The main research involved advancements in biostratigraphy, chronostratigraphy and systematic studies of Lower Devonian, Middle Devonian, and Lower Frasnian sequences and conodonts from several regions, mainly from the Spanish Central Pyrenees. At the same time, a new line on conodont biodiversity studies has started, and preliminary results have been presented at the 34th International Geological Congress (Brisbane, Australia) and at the Centenary Meeting of the Paläontologische Gesellschaft (Berlin).

Most of the progress is referred to in the list of papers shown below and has been presented in the three professional meetings aforementioned.

In terms of “time-slices”, I keep working on the Lower Devonian with emphasis on the stage-boundaries. Currently, with one of my former students (Carlos MARTÍNEZ-PÉREZ) we continue to

analyze the intra-Emsian boundary in the Pyrenees, and a paper has been published at the end of the year. The Givetian is another stage that is being worked out in the Pyrenees, mainly due to the effort of Teresa (Jau-Chyn LIAO). Cooperation with Sofie Gouwy strengthens the studies on Givetian and makes it possible to start in the Eifelian of the Pyrenees (the three of us finished a paper dealing with Eifelian-Lower Frasnian conodonts from one relevant section in the Spanish Central Pyrenees that is currently in the “proofs revision stage”).

For 2013, Teresa, Carlos and myself want to finish a detailed study of one of the few Global? Events that is lithologically represented in the Pyrenees. Results will be presented as a contribution to the planned special SDS volume.

Cooperation of my team with Ladislav SLAVIK's team has been reinforced by the granting of a joint proposal that will permit parallel studies in, at least, two European Lower Devonian key regions, The Spanish Pyrenees and the Prague Basin. First results of a preliminary evaluation of faunas from both regions will be presented in the SDS meeting in Morocco.

In the list of 2012 SDS-related publications, I have also added references to other relevant papers by members of my team (Héctor BOTELLA and Carlos MARTÍNEZ-PÉREZ) or other Spanish colleagues that may be of your interest.

Papers

- BOTELLA, H., MARTÍNEZ-PÉREZ C. & SOLER-GIJÓN R. 2012. *Machaeracanthus goujeti* n. sp. Acanthodii from the Lower Devonian of Spain and northwest France, with special reference to spine histology. - *Geodiversitas*, **34** (4): 761-783.
- ERNST, A., FERNÁNDEZ, L.P., FERNÁNDEZ-MARTÍNEZ, E., & VERA, C. 2012. Bryozoan fauna from mud mounds of the Lebanza Formation (Lower Devonian) in the Arauz area (Pisuerga-Carrión Province, Cantabrian Zone, NW Spain). - *Geodiversitas*, **34** (4): 871-917.
- GARCIA-ALCALDE, J.L. 2012 (in press). Productidos Productidina y Strophalosiida (Braquiópodos Articulados) del Devónico de la Cordillera Cantábrica (N de España). - *Trabajos de Geología*, **32**.
- LIAO, J.-C. & VALENZUELA-RÍOS, J.I. 2012. Upper Givetian and Frasnian (Middle and Upper Devonian) conodonts from Ampriú (Aragonian Pyrenees, Spain): Global correlations and Palaeogeographic relations. - *Palaeontology*, **55** (4): 819-842.
- MARTÍNEZ-PÉREZ, C. & VALENZUELA-RÍOS, J.I. 2012. Polygnathids around the lower/upper Emsian boundary from La Guardia d'Àres section (Lower Devonian, Spanish Central Pyrenees). - *Bolletino della Società Paleontologica Italiana*, **51** (3): 193-202.
- RACHEBOEUF, P.R., CASIER, J.-G., PLUSQUELLEC, Y., TORO, M., MENDOZA, D., PIRE DE CARVALHO, M.G., LE HÉRISSE, A., PARIS, F., FERNÁNDEZ-MARTÍNEZ, E., TOURNEUR, F., BROUTIN, J., CRASQUIN, S. & JANVIER, P. 2012. New data on the Silurian-Devonian palaeontology and biostratigraphy of Bolivia. - *Bulletin of Geosciences* **87** (2): 269-314.
- VALENZUELA-RÍOS, J.I. & LIAO, J.-C. 2012. Color/facies changes and Global Events, a hoax? A case study from the Lochkovian (Lower Devonian) in the Spanish Central Pyrenees. - *Palaeogeography, Palaeoclimatology, Palaeoecology* **367/368**: 219-230.

Abstracts and Proceedings

- CALVO, H. & VALENZUELA RÍOS, J.I. 2012. *Conodontos del Lochkoviense medio y superior (Devónico Inferior) de la sección Segre 4 (Pirineos Centrales Españoles)*. - In: LIAO, J.-C., GÁMEZ, J.A., VALENZUELA-RÍOS, J. I. & GARCÍA-FORNER, A. (Eds.), XVIII Jornadas de la Sociedad Española de Paleontología y Simposios de los Proyectos nº 587 y 596 del PICG, Valencia y Sóller, 1-6 de octubre de 2012, Homenaje a Guillem Colom CASASNOVAS (1900-1993), Libro de Resúmenes, Universitat de València, Sociedad Española de Paleontología, Madrid: 289-290.
- LIAO, J.-C. & VALENZUELA-RÍOS, J.I. 2012. *Variación morfológica y valor bioestratigráfico de Skeletognathus norrisi (UYENO, 1967)*. - In: LIAO, J.-C., GÁMEZ, J.A., VALENZUELA-RÍOS, J. I. & GARCÍA-FORNER, A. (Eds.), XVIII Jornadas de la Sociedad Española de Paleontología y Simposios de los Proyectos nº 587 y 596 del PICG, Valencia y Sóller, 1-6 de octubre de 2012, Homenaje a Guillem Colom CASASNOVAS (1900-1993), Libro de Resúmenes, Universitat de València, Sociedad Española de Paleontología, Madrid: 299-301.
- LIAO, J.-C. & VALENZUELA-RÍOS, J.I. 2012. *New data on Middle to Upper Devonian conodont faunas from Renanué (Aragonian Pyrenees, Spain)*. - Proceedings of the 34th International Geological Congress, 2012, 5-10 August 2012. Brisbane, Australia: 3909.
- LIAO, J.-C. & VALENZUELA-RÍOS, J.I. 2012. Givetian conodont biodiversity patterns (Middle Devonian) in the Spanish Central Pyrenees. - In WITZMANN, F. & ABERHAN, M. (Eds.), Centenary Meeting of the Paläontologische Gesellschaft, *Terra Nostra*, **2012** (3): 110-111.
- MARTÍNEZ-PÉREZ, C. & VALENZUELA-RÍOS, J.I. 2012. *Polygnátidos primitivos alrededor del límite Praguense/Emsiense (Devónico Inferior): paleodiversidad y evolución temprana en los Pirineos Centrales Españoles*. - In: MARTÍNEZ-PÉREZ, C. et al. (Eds.), Libro de Resúmenes del X Encuentro de Jóvenes Investigadores en Paleontología, Paleodiversity and Paleocology of Iberian ecosystems: 50-51.
- VALENZUELA-RÍOS, J.I. 2012. Biodiversidad y evolución de *Ancyrodelloides* (Lochkoviense, Devónico Inferior, Conodonta) en el PCE y sus múltiples aplicaciones. - In: LIAO, J.-C., GÁMEZ, J.A., VALENZUELA-RÍOS, J. I. & GARCÍA-FORNER, A.

(Eds.), XVIII Jornadas de la Sociedad Española de Paleontología y Simposios de los Proyectos nº 587 y 596 del PICG, Valencia y Sóller, 1-6 de octubre de 2012, Homenaje a Guillem Colom CASASNOVAS (1900-1993), Libro de Resúmenes, Universitat de València, Sociedad Española de Paleontología, Madrid: 285-287.

VALENZUELA-RÍOS, J.I. 2012. *The Lochkovian conodont biodiversity pattern and evolutionary cycle*. - Proceedings of the 34th International Geological Congress, 2012, 5-10 August 2012, Brisbane, Australia: 3911.

VALENZUELA-RÍOS, J.I. 2012. *Evolutionary patterns of Ancyrodelloides in the Spanish central Pyrenees (Middle Lochkovian, Lower Devonian) and its global chronostratigraphical potencial*. - Proceedings of the 34th International Geological Congress, 2012, 5-10 August 2012, Brisbane, Australia: 3262.

VALENZUELA-RÍOS, J.I. 2012. Biodiversity and evolution of Lochkovian and Pragian (Lower Devonian) Icriodontidae (Conodonta) from Northern Spain, a referent for global studies. - In: WITZMANN, F. & ABERHAN, M. (Eds.), Centenary Meeting of the Paläontologische Gesellschaft, *Terra Nostra*, **2012** (3): 180-181.

Book

LIAO, J.-C., GÁMEZ J.A., VALENZUELA-RÍOS, J.I. & GARCÍA-FORNER, A. (Eds.) 2012. XVIII Jornadas de la Sociedad Española de Paleontología y Simposios de los Proyectos nº 587 y 596 del PICG, Valencia y Sóller, 1-6 de octubre de 2012, Homenaje a Guillem Colom CASASNOVAS (1900-1993), Libro de Resúmenes: 332 p. [Devonian matters are on pages 279-318 and can be downloaded free in the following address: <http://www.uv.es/28jornadassep/>]

CM Chuck Ver STRAETEN

Guidebook paper and fieldtrip on Devonian and Ordovician airfall volcanic tephros, and their implications for coeval silicic magmatism and volcanism (Silicic Appalachian magmatism during the Ordovician and Devonian: Perspectives from the Foreland Basin, and the Hinterland, with CM Gordon BAIRD, Vice-Chair Carlton BRETT, Paul KARABINOS, and Scott SAMSON).

The publication of a study of the life mode of conulariids examines a large number of individuals in a lower Givetian ecological epibole. The deposit, originally discovered in eastern New York by myself in 1990, has now yielded over 300 conulariid specimens. Many are oriented in rather convincing roughly vertical, in situ benthic life positions, adjacent to other in situ benthic forms in life position. Further study continues on this project, which is led by Heyo VAN ITEN and includes three other paleontologists from New York and Brazil; I provide sedimentology and stratigraphy context.

2012 brought completion of another 7.5 minute quadrangle bedrock geological map (Rensselaerville Quadrangle, western Albany County, in eastern New York). Strata consist of upper Eifelian to mid Givetian marine to terrestrial strata, and include some small scale cyclic alternations of marine and terrestrial facies across the transition. I am currently mapping another quadrangle with basal Lochkovian to lowest Givetian, and upper Ordovician and uppermost Silurian strata. The mapping area includes the geologically and paleontologically famous John Boyd THACHER State Park west of Albany, New York.

I continue to find additional older Givetian evidence of trees in eastern New York, including lower Givetian logs in a near-shore shell bed, the “underseat” of a Eospermatopteris tree in a paleosol, and another with possibly a partial cast of stump at the top of a rooted paleosol. In addition, a local historian and hiker in Woodstock, New York showed me two 1806 mines for coal in probable lower Frasnian strata in the same area. Several thin lenses of coal, up to about 4 cm-thick occur through about 1.5 m of pyritic argillaceous sandstones along the mountainside. The mining was a lot of work to get almost no coal, decades before investigations of the New York State Geological Survey began in 1836.

Other ongoing Devonian projects variously examine: 1) the composition of Devonian conglomerates in New York, in an attempt to reconstruct an unroofing history of the Acadian mountain belt through ca. 40 million years of the Devonian (Pragian-lower Famennian); 2) additional various studies of New York Devonian strata, and implications for Acadian orogenesis; 3) collaborative work on Emsian-Eifelian biostratigraphy of the eastern U.S. (including E. SCHINDLER, R. LINDEMANN, W. KIRCHGASSER, R. BROCKE and others).

CMs Gordon BAIRD, Jeff OVER and I organized a Devonian Shales theme session for the North-Central Section Geological Society of America meeting in April 2012. For details of the session, see https://gsa.confex.com/gsa/2012NC/finalprogram/session_30179.htm

Gordon BAIRD, Jeff OVER, myself, and others organized another session on a publication to revise New York’s Devonian stratigraphy, to be held at the 2013 Northeastern Section Geological Society of America meeting in March 2013. For an overview of the session, see <https://gsa.confex.com/gsa/2013NE/webprogram/Session31784.html>.

Publications

VAN ITEN, H., TOLLERTON, V.P., VER STRAETEN, C.A., DE MORAES LEME, J., GUIMARAES SIMOES, M. & COELHO RODRIGUES, S. (in press). Life mode of *in situ* *Conularia* in a Middle Devonian epibole. – *Palaeontology*. [doi: 10.1111/j.1475-4983.2012.01146.x]

VER STRAETEN, C.A., BAIRD, G.C., KARABINOS, P., SAMSON, S. & BRETT, C.E. 2012. Silicic Appalachian magmatism during the Ordovician and Devonian: Perspectives from the Foreland Basin, and the Hinterland. - *New York State Geological Association, 84th Annual Meeting, Guidebook: A7-1 to A7-59*.

Bedrock map

VER STRAETEN, C.A. 2012. *Bedrock geological map of the Rensselaerville 7.5 minute Quadrangle, Albany Co., NY*. - New York State Museum/Geological Survey (USGS State Map project).

Abstracts

VER STRAETEN, C.A. 2012. *Beneath it all: Bedrock Geology of the Catskills*. - Second Catskill Environmental Research and Monitoring (CERM) Conference, Abstracts Volume.

VER STRAETEN, C.A. 2012, Marcellus black shale facies: Constraints and perspectives on water depth. - *Geological Society of America, Abstracts with Programs*, **44** (5): 6.

VER STRAETEN, C.A., BAIRD, G.C., BARTHOLOMEW, A., BRETT, C.E., EBERT, J.R., KIRCHGASSER, W.T., OVER, D.J. & ZAMBITO, J.J. 2013. The classic New York Devonian: Toward a new stratigraphic synthesis and chronostratigraphic chart. - New York Devonian Stratigraphy session, Northeastern Section, *Geological Society of America, Abstracts with Programs*, **44**.
[<https://gsa.confex.com/gsa/2013NE/webprogram/Session31784.html>]

VER STRAETEN, C.A., BAIRD, G.C., BARTHOLOMEW, A., BRETT, C.E. & OVER, D.J., 2013. The Marcellus (Middle Devonian) of New York: Overview and stratigraphic revisions. - New York Devonian Stratigraphy session, Northeastern Section, *Geological Society of America, Abstracts with Programs*, **44**.

VER STRAETEN, C.A., LINDEMANN, R.H., SCHINDLER, E., BROCKE, R. & KIRCHGASSER, W.T. 2013. The Emsian and lower Eifelian Stages (upper Lower and lower Middle Devonian) of New York: Overview, recent findings and consequent revisions. - New York Devonian Stratigraphy session, Northeastern Section, *Geological Society of America, Abstracts with Programs*, **44**.

BRETT, C.E., BAIRD, G.C., BARTHOLOMEW, A., KIRCHGASSER, W.T., OVER, D.J., VER STRAETEN, C.A. & ZAMBITO, J.J. 2013. Building a standard for global correlation: The classic New York Devonian section as an exemplar of an integrated stratigraphic approach. - New York Devonian Stratigraphy session, Northeastern Section, *Geological Society of America, Abstracts with Programs*, **44**.

BARTHOLOMEW, A., BRETT, C.E., BAIRD, G.C., OVER, D.J. VER STRAETEN, C.A. 2013. Revision of the stratigraphy of the Eifelian-Givetian Hamilton Group in New York State: An update since the summary of RICKARD'S 1975 Devonian correlation chart. - New York Devonian Stratigraphy session, Northeastern Section, *Geological Society of America, Abstracts with Programs*, **44**.

CM Michael WHALEN

Work on Devonian stratigraphy and bioevents in western Canada with my students and colleagues continues apace. My former PhD student, Maciej ŚLIWIŃSKI, wrapped up his dissertation with a couple of papers dealing with geochemistry and magnetic susceptibility (MS). One, in *Terra Nova*, uses geochemistry and x-ray diffraction data along with factor analysis to try to sort out the relationship between detrital input and MS. Another, in *Chemical Geology*, while not specifically a Devonian paper, concerns the lack of good analytical standards for evaluating the geochemistry of carbonate rocks. Many of the sections we work on are carbonate dominated and the types of standards used in evaluating the geochemistry of shales are not appropriate for use with carbonates so it has application to anyone doing Devonian geochemistry on carbonates.

Another significant publication, in *GSA Bulletin*, concerning application of spectral analysis to our long, high-resolution MS data sets through the Frasnian of western Canada, resulted from collaboration with David DE VLEESCHOUWER and Philippe CLAEYS (Vrije Universiteit Brussels, Belgium). This analysis provided astronomical calibration of the Frasnian time scale and significantly improved the error bars associated with age dates for the upper and lower boundaries of the stage.

In June I attended the fourth meeting of IGCP 580: Application of Magnetic Susceptibility on Paleozoic Sedimentary Rocks. This meeting was held at the Institute for Earth Sciences of the University of Graz, Austria where I presented one of the keynote talks. There was also a field excursion to work on a Silurian-Devonian Boundary section in the stunning Carnic Alps led by Carlo CORRADINI. Anne-Christine DA SILVA (Liège university) and I helped organize the IGCP project and this meeting was spearheaded by Thomas SUTTNER and Erica KIDO at the Austrian Academy of Sciences, University of Graz. The project fosters international collaboration on MS stratigraphy in the Paleozoic and the final meeting will be held in Alberta, western Canada in late August 2013.

Papers

ŚLIWIŃSKI, M.G., WHALEN, M.T., MEYER, F.J. & MAJS, F. 2012. Using factor analysis and capillary XRD to constrain the influence of detrital input on magnetic susceptibility and trace element anomalies during the Late Devonian *punctata* Event in the Western Canada Sedimentary Basin. - *Terra Nova*, **24**: 301-309. [doi: 10.1111/j.1365-3121.2012.01063.x]

ŚLIWIŃSKI, M.G., SPALETA, K.J., MEYER, F.J., HUTTON, E.H., NEWBERRY, R.J., TRAINOR, T.P., SEVERIN, K.P. & WHALEN, M.T. 2012. Making low concentration in-house pressed pellet trace element standards for carbonate rock analyses by WD-XRF. - *Chemical Geology*: **298/299**: 97-115.

De VLEESCHOUWER, D., WHALEN, M.T., DAY, J.E. & CLAEYS, P. 2012. Cyclostratigraphic calibration of the Frasnian (Late Devonian) time scale (western Alberta, Canada). - *Geological Society of America, Bulletin*, **124**: 928-942. [doi: 10.1130/B30547.1]

Abstracts

WHALEN, M.T., DA SILVA, A.C., SLIWINSKI, M., DE VLEESCHOUWER, X., PETICLERC, E., BOULVAIN, F., BERTOLA, C., PRASANNAKUMAR, V., WANG, J., ZENGHUI, G. & CHEN, D. 2012. *Geochemical, Magnetic Susceptibility, and Carbon Isotopic Records Across the Frasnian-Famennian boundary at Fuhe, China*. - In: *Magnetic Susceptibility and Gamma-Ray Spectrometry through time*, Graz, Austria, IGCP 580, Meeting Abstracts.

DA SILVA, A.C., WHALEN, M.T., SLIWINSKI, M., DE VLEESCHOUWER, X., PETICLERC, E., BOULVAIN, F., BERTOLA, C., PRASANNAKUMAR, V., WANG, J., ZENGHUI, G. & CHEN, D. 2012. *Preliminary results on the magnetic susceptibility records along the Frasnian – Famennian Fuhe and Detergent Factory sections, China*. - In: *Magnetic Susceptibility and Gamma-Ray Spectrometry through time*, Graz, Austria, IGCP 580, Meeting Abstracts.

WHALEN, M.T., DE VLEESCHOUWER, D., DAY, J.E. & CLAEYS, P. 2012. *Geochemistry and Cyclostratigraphy of Magnetic Susceptibility data from the Frasnian-Famennian event interval in western Canada: Insights in the pattern and timing of a biotic crisis*. - In: 2012 Fall Meeting, AGU, San Francisco, California, 3-7 Dec.

CM James J. ZAMBITO

I am grateful to be recently elected as a CM of the Subcommission on Devonian Stratigraphy, and I look forward to continued collaboration with other members. My Ph.D. dissertation, under TM C. BRETT and with advisement from CM G. BAIRD, focused on the Taghanic Biocrisis in the type region, the northern Appalachian Basin of New York State, USA. Articles resulting from this dissertation, dealing with paleoecological changes, brachiopod biostratigraphy, and watermass dynamics, were published this past year and we hope to have the remainder of the dissertation research, on changes in the $\delta^{18}\text{O}$ of conodont apatite and $\delta^{13}\text{C}_{\text{carbonate}}$ through the biocrisis, in

collaboration with M. JOACHIMSKI and TM J. OVER, submitted for review soon. Over the past year, I have been part of a group working to revise the Devonian correlation chart of the classic succession of New York State (USA), including CM C. VER STRAETEN, CM G. BAIRD, CM A. BARTHOLOMEW, TM C. BRETT, CM J. EBERT, CM W. KIRCHGASSER, and TM J. OVER. Also, I am continuing work on the taxonomy and biostratigraphy of North American Ambocoeliid brachiopods with CM M. SCHEMM-GREGORY. Additionally, I have been working with CM J. DAY to process samples for conodonts from the thick, siliciclastic-dominated Middle-Upper Devonian nearshore succession of eastern New York State. Focusing on sequence boundaries and flooding surfaces, we have isolated the most proximal conodonts ever found in the northern Appalachian Basin for this time interval, providing important insights into correlations with the better-studied, offshore succession. Furthermore, our preliminary data suggests that Dipleurid trilobites, previously thought to have gone extinct in the *semialternans* Zone, survived to at least the Lower *subterminus* Zone in the Appalachian Basin.

Publications

ZAMBITO, J.J., BRETT C.E. & BAIRD, G. 2012. *The Late Middle Devonian (Givetian) Global Taghanic Biocrisis in its type area (Northern Appalachian Basin): geologically rapid faunal transitions driven by global and local environmental changes*. - In: TALENT, J. (Ed.), *Earth and Life: Global Biodiversity, Extinction Intervals and Biogeographic Perturbations through Time*: 677-703 (Springer).

ZAMBITO, J.J., BRETT, C.E., BAIRD, G., KOLBE, S. & MILLER, A. 2012. New perspectives on transitions between ecological-evolutionary subunits in the 'type interval' for coordinated stasis. - *Paleobiology*, **38** (4): 664-681.

BRETT, C.E., ZAMBITO, J.J., E. SCHINDLER, & BECKER, R.T. 2012. Diagenetically-enhanced trilobite obrution deposits in concretionary limestones: the paradox of "rhythmic event beds". - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 30-43.

BAIRD, G., ZAMBITO, J.J. & BRETT, C.E. 2012. Lithologic signature of the Late Middle Devonian Taghanic Bioevent in its type area: genesis of anomalous carbonate and chamosite accumulations in the type Taghanic Succession, New York State and Pennsylvania. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **367/368**: 121-136.

BRETT, C.E., ZAMBITO, J.J., HUNDA, B. & SCHINDLER, E. 2012. Mid Paleozoic trilobite Lagerstätten: diagenetically-enhanced obrution deposits. - *Palaios*, **27** (5): 326-345.

BRETT, C.E., ZAMBITO, J.J., DESANTIS, M. & BAIRD, G. 2012. *Sea level, climate, and biotic stasis and change in the Middle Devonian of eastern North America*. - 34th International Geological Congress, Brisbane, Australia.