



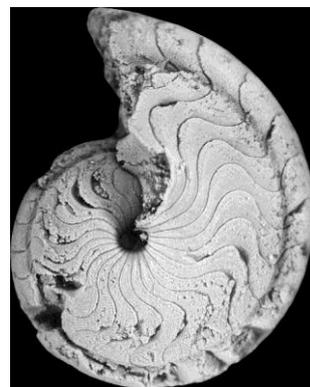
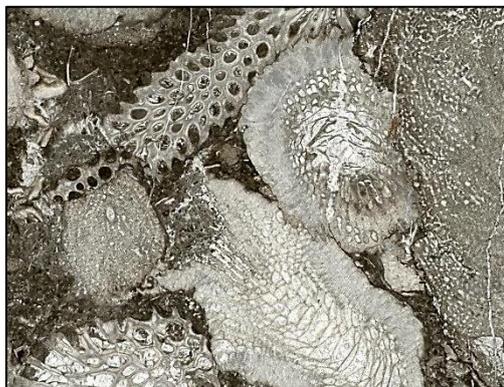
*INTERNATIONAL UNION OF
GEOLOGICAL SCIENCES
COMMISSION ON STRATIGRAPHY*

—s—D—s—

**SUBCOMMISSION ON
DEVONIAN STRATIGRAPHY**

NEWSLETTER No. 29

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



August 2014

ISSN 2074-7268

SDS NEWSLETTER 29

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, if not announced otherwise. **Please ease the editing by strictly keeping the uniform style of references, as shown in the various sections.**

Content:

Message from the Chairman (J.E. MARSHALL)	1
Obituaries	
BAI Shunliang (SUN, Y. & MA, X.)	2
Nikolay K. BAKHAREV (THE NOVOSIBIRSK GROUP)	2-3
Vladimir Nikolaevich PAZUKHIN (E.I. KULAGINA et al.)	3-6
Mena SCHEMM-GREGORY (U. JANSEN & E. SCHINDLER)	6-8
Noel William SCHLEIGER (J.A. TALENT)	8-10
SDS Reports	
1. SDS Annual Report 2013 to ICS (J.E. MARSHALL)	10-13
2. Minutes of the Erfoud Business Meeting (L. SLAVIK & C.E. BRETT)	13-15
3. Morocco 2013 Field Symposium (R.T. BECKER)	16-17
SDS Documents	
1. Devonian Rugosa in organogenic constructions of the North Urals (V.S. TSYGANKO)	18-21
2. Lithologic and biotic aspects of major Devonian events in South China (MA, X. et al.)	21-33
3. Carbon isotope ratios in Devonian terrestrial organic matter (G. RACKI & M. JOACHIMSKI)	33-34
Devonian Meetings	
1. 4 th International Palaeontological Congress, Mendoza, Argentine 2014	35-37
2. (past) Joint Meeting IGCP 580 & 596, Calgary, September 2013	38-39
Devonian Publications	
1. TSYGANKO 2011	39
2. Freiburger Forschungshefte, 20 and 21	40
3. EICHELE 2014 – Lower Devonian bivalves	40
Membership News	
CM Olga V. ARTYUSHKOVA and the Ufa Group	41-42
CM Gordon C. BAIRD	42-43
TM R.Thomas BECKER and the Münster Group (including CMs Sven HARTENFELS and Sarah Z. ABOUSSALAM)	43-47
TM Alain BLIECK	47

TM Carlton E. BRETT	48
CM Rainer BROCKE	49
CM Pierre BULTYNCK	49
CM Carole BURROW	49-50
TM Jean-Georges CASIER	50
CM Leona CHADIMOVA	50-51
TM Carlo CORRADINI	51-53
CM Anne-Christine DA SILVA	53-55
CM James R. Ebert	55
CM Lenka FERROVÁ and CM Jiri FRÝDA	55-57
CM Peter Isaacson	57
TM Nadezhda G. IZOKH and the Novosibirsk Group (including CMs Olga OBUT, Nikolay K. BAKHAREV, and Aleksandr Y. YAZIJKOV)	57-59
TM Ulrich JANSEN	60
CM Elga MARK-KURIK	60-61
TM John E. MARSHALL	61-62
CM Marek NARKIEWICZ	62
TM Jeff. OVER	62-63
TM Maria-Christina PERRI	63
TM Eberhard SCHINDLER	63-64
CM Claudia SPALLETTA	64
CM Thomas J. SUTTNER	64-66
CM Chuck VER STRAETEN	66-67
CM Stanislava VODRÁZKOVÁ	67-68
CM Michael WHALEN	68-69
CM James J. ZAMBITO	69-70

MESSAGE FROM THE CHAIRMAN

Dear SDS Members,

It has been a very sad year in the Devonian in that we have lost some very dedicated SDS Members who have contributed much to both the Devonian and our organisation. So, it is important to stop and celebrate their achievements.

We were all very shocked at the sudden death of Mena SCHEMM-GREGORY who had been such a strong supporter of SDS, an excellent attendee at meetings, even when finance was difficult and was such a prolific researcher and publisher on brachiopods. We will miss her in many ways and our subject will be much the poorer for it. As a relatively young worker she would have been very much a part of the future for the SDS.

We had the equally sudden loss of Kolya BAKHAREV. He was well known to SDS members who had attended the excellent Novosibirsk meetings. We were delighted that he was able to bring a large group of Devonian workers from Russia to this year's SDS meeting in Morocco.

We also learnt that BAI Shun-liang of Beijing University passed away on the 21st November. He was well known for his studies on the Devonian of China. SDS members will know his publication *Devonian Events and Biostratigraphy of South China*.

You will find obituaries for these Members in this SDS Newsletter.

In July I attended the 1st International Conference on Stratigraphy (STRATI 2013) in Lisbon. There was no SDS contribution to the conference but, in future, it will/may become the meeting for formal International Commission on Stratigraphy business rather than the International Geological Congresses. It is intended to be low cost (€350!) than the IGC's. It was a meeting that was relatively well attended by a number of the subcommissions, notably those of the Paleogene and Neogene. As a conference it was a mixture of quite traditional talks that described a section with more modern syntheses. The extended abstracts will be published as a post-Congress special volume:

ROCHA, R., PAIS, J., KULLBERG, J.C. & FINNEY, S. (Eds., 2014). *First International Congress on Stratigraphy. At the cutting edge of Stratigraphy*. - Springer Geology, XLV, 1343 p., 285 illus., 165 illus. in color, ISBN 978-3-319-04364-7.

The 2nd ICS (STRATI 2015) will be held in Graz, Austria, 19-23 July 2015. Clearly this timing is unfortunate as it is in the same year as the closing meeting of IGCP 596 in Frankfurt where we have already agreed to meet. The SDS has always had a close relationship with a succession of IGCP programmes and we must maintain that link and

collaboration. However, we can expect a request to start meeting at future STRATI conferences that may occur more frequently than the 4 yearly IGC's.

Our main meeting in 2013 was our field conference in Morocco jointly organised by the SDS, SCS, IGCP 596 and the Institut Scientifique, Mohammed V University, Rabat. Once again we must thank Ahmed EL HASSANI and his colleagues for all their efforts in the local organization ably assisted by Thomas BECKER, Sarah ABOUSSALAM, Sven HARTENFELS and others. There is a full conference report in this Newsletter.

Stan FINNEY has been awarded an NSF grant on behalf of the ICS. The ICS executive is now open to proposals from subcommissions for use of the funds. The grant is modest - \$20,000/year for three years. The ICS executive will review proposals from subcommissions and then fund a few that offer the greatest potential for progress on GSSPs (or other significant subcommission activities). This will focus significant funds on a few proposals each year. Funds will also be allocated for travel support for young stratigraphers and those from under-represented regions to participate in subcommission meetings and for design and construction of subcommission websites. These funds cannot be passed directly to subcommissions, only individuals. So, clearly where the SDS could ask for support is for completion of the redefinition of the base Emsian GSSP. Requests can be submitted throughout the year and there will be some money allocated every year. So, time for think where additional funds could speed completion of our Emsian GSSP work.

Our main meeting this year is at the 4th IPC in Mendoza, Argentina. This conference is well organized and there are constant updates and messages from the organizers. I know that many SDS Members will find it difficult to attend this meeting, but it will be an opportunity to meet new South American colleagues and see new Devonian sections. As usual we will be having an SDS business meeting at the conference, the agenda and notice of the meeting to be announced electronically to all nearer the time. We are organizing a symposium jointly with IGCP 596 on the interaction between climate change and biodiversity in the Devonian and Carboniferous Periods. The deadline for abstracts is April 15th and when submitting you need to identify it as an SDS/IGCP 596 Symposium talk/poster.

With best wishes to all, John MARSHALL

OBITUARIES

BAI, SHUNLIANG

21.05.1932 – 21.11.2013

SUN Yuanlin & MA Xueping

Prof. BAI Shunliang of Peking University passed away on November 21, 2013, at the age of 81. It is a great loss for our Devonian community.

BAI Shunliang was born in Jakarta City of Indonesia. After he graduated from a middle school in 1952, he returned to China and studied Coal field Geology at the “Beijing Geological Institute”, now named as “China University of Geosciences”.



BAI Shunliang at Xishan, Beijing,
May, 2013

During 1956-1957 BAI Shunliang served as an engineer responsible for geological mapping in Jiangxi and Anhui provinces of south China. Since 1957 he worked at Peking University and began his scientific career on paleontology and biostratigraphy. His major efforts were related to studies of the Devonian of south China and some of the most important fossil groups, including conodonts, tentaculites and brachiopods. He was a pioneer to work on Chinese Devonian event and chemostratigraphy on the basis of detailed biostratigraphic framework. It is because of his great contributions that he became one of the most influential experts on Devonian biostratigraphy and paleontology in China.

The community of Chinese paleontologists lost one of its most well-known members; and we lost a warm-hearted, gentle, and modest colleague and teacher –BAI Shunliang will be missed!

NIKOLAY K. BAKHAREV

7.12.1955 – 18.07.2013

THE NOVOSIBIRSK DEVONIAN WORKERS

On the 18th July 2013 Russian paleontologist and stratigrapher Dr. Nikolay BAKHAREV suddenly passed away at the age of 57. Nikolay was well known among Devonian workers. Probably most of colleagues remember him as Kolya, or mister “Let’s go!” from several Devonian field trips and SDS meetings, organized with his active involvement in Siberia (in 2001, 2005, 2011) and Uzbekistan (in 1988, 2008).

Kolya started his research activities in 1978 just after graduation from the Geology and Geophysics Department of Novosibirsk State University. All of his life he was working in the Institute of Petroleum Geology and Geophysics, Siberian Branch of RAS (previously Institute of Geology and Geophysics SB USSR AS), where he started as a junior research assistant and become the Deputy director. In 1986 he defended his Ph.D. thesis devoted to Early Devonian ostracods of Salair (South of West Siberia).



Kolya was a very talented scientist educated by the Siberian paleontological school. During more than 35 years he studied different aspect of Paleozoic paleontology and stratigraphy of West and East Siberia. His research work was dedicated to systematic paleontology of Silurian and Devonian ostracods, analysis of their paleofacies, Devonian regional stratigraphic charts and their alignment with

global charts, paleogeographic reconstructions for Devonian of the Altai-Sayan Folded Area and West Siberian lowlands including reefs of the Eastern Urals and Rudny Altai, modeling for the island arc complexes in the basement of West Siberia Geosyncline, and so on. In recent years Kolya was involved in the investigation of the Devonian and Carboniferous of Arctic Siberia (Lena River delta). He was a member of the Siberian Regional Subcommission of the Russian Stratigraphic Committee and a corresponding member of SDS. Kolya published more than 100 scientific papers. He was a scientific advisor for a number of students of Novosibirsk State University.



Kolya BAKHAREV, pointing at the basal Emsian GSSP of the Zinzilban stratotype section.

In spite of duties as administrator Kolya almost every year went to field trips embracing investigations in Central Asia, the Urals, Altai and Salair, Arctic Siberia, and many others. He was an excellent field geologist and always took chances to go fishing, which was his favorite hobby.

Kolya was a very faithful and kind-hearted friend, always ready to help and encourage. He was an excellent family man, reliable family support, careful father and grandfather, who adored his grandsons. Kolya was in the middle of his life full of creative ideas and energy. The geological scientific community suffered a severe and irreparable loss of an extraordinary, patient and courageous man. Cherished memories about Kolya will forever remain in our hearts.

VLADIMIR NIKOLAEVICH PAZUKHIN

20.6.1951- 30.6.2013

E.I. KULAGINA, N.N. KOCHETOVA, O.V. ARTYUSHKOVA, T.M. MAVRINSKAYA, V.N. PUCHKOV, V.N. BARYSHEV, H.A. KUCHEVA, T.I. STEPANOVA, S.V. NIKOLAEVA, A.S. ALEKSEEV, N.V. GOREVA & Y.A. GATOVSKY

45 years of work in the Institute of Geology, Ufa Research Center, Russian Academy of Science, Ufa, Bashkortostan.

Vladimir PAZUKHIN (Volodya), a scientist with a world-wide reputation for his expertise on Devonian and Carboniferous conodonts, and an excellent stratigrapher and geologist, passed away after a long illness on June 30th, shortly after his 62nd birthday.



Vladimir graduated from the Department of Geology and Geomorphology, Geographical Faculty of the Bashkirian State University, in 1974. He became interested in geology while at school, when he joined a young geologists' club led by Igor Nikolaevich SEMENOV. He worked for the Institute of Geology from 1968, starting his research work at the institute while still a university student. He was employed by the Laboratory of Paleozoic Stratigraphy, then led by V.A. MASLOV, who suggested that Vladimir Nikolaevich should work on conodonts, then a new and promising group of fossils. Studying conodonts became his life-long research. Vladimir devoted himself to this work with great enthusiasm. He dissolved vast quantities (many tons) of samples and assembled an exceptional conodont collection. In the absence of technicians he himself worked in the lab, extracting and picking out conodonts.

At the beginning of his career Vladimir worked on the D-C boundary problem with N.M KOCHETKOVA, L.I. KONONOVA, and E.A. REITLINGER. Specialists of this team substantiated the position of the D-C boundary in the Urals at the base of the Gumerovian Regional Substage. In 1989

he received his Ph.D. degree for his thesis “Tournaisian conodonts of the Urals” from the Department of Paleontology of the Moscow State University. In 1994 he earned the title of Senior Researcher. He developed a phylogeny of the genus *Siphonodella*, which is of paramount importance for Tournaisian stratigraphy, based on material from the South Urals. Vladimir made important contributions to the updated stratigraphic scheme of Carboniferous successions in the Urals, while preparing to the 4th Uralian Interdepartmental Stratigraphic Conference (1988-1991). He participated in many joint expeditions and excursions, e.g., in the Omolon Massif, Kitab Reserve in Uzbekistan, the Donets Basin, and the Middle Urals.



In the 1970s-1980s Vladimir worked on joint projects with the Chelyabinsk Geological Mapping Expedition and took part in field work with geologists of the Magnitogorsk Geological Mapping Group, including A.V. YARKOVA, V.M. MOSEICHUK, A.G. RYZHOV and L.V. KASHINA, studying sections of carbonate, clastic-carbonatic, and volcano-sedimentary Carboniferous sections of the Magnitogorsk Megasyntroclinalium. Vladimir's major and systematic conodont extraction from numerous samples of carbonates, even including marbles, allowed the recognition of regional substages in the Famennian and Lower Carboniferous of this region. Using these and other paleontological data, geologists of the Magnitogorsk Geological Mapping Group established the volcanoclastic Shumilino Formation and the Carbonate Formation of Magnitnaya Mountain

(Famennian-Tournaisian boundary beds, Kosvian Regional Substage).

In the Institute of Geology, Vladimir was mainly involved with the development of the stratigraphic scales of the Carboniferous system. He developed a conodont zonal scale for the Lower Carboniferous of the Urals, which was used for the conodont zonal scale of Russia (PAZUKHIN 2009). Based on conodonts he substantiated an updated stratigraphic scheme of the Bashkirian Stage, which was approved by the Interdepartmental Stratigraphic Committee of Russia in 2006. From 2006, Vladimir, now a part-employee of the Institute of Geology, started his job at “BashNIPIneft” (Bashkirian Research and Design Petroleum Institute). Vladimir was particularly interested in the substantiation of the Viséan-Serpukhovian boundary in the Verkhnyaya Kardailovka section, which has been proposed as a candidate GSSP for the base of the Serpukhovian. He started his research at this section in 1976, was the first to systematically excavate several trenches, sampled the succession and processed rocks for conodonts. This work culminated with the publication of several papers on the Verkhnyaya Kardailovka section (PAZUKHIN et al. 2002, 2009; PAZUKHIN & GOROZHANINA, 2002). In one of his most recent papers he described the Late Viséan and Serpukhovian conodonts of the South Urals (PAZUKHIN 2011).

Vladimir took part in many scientific projects, including projects funded by the Russian Foundation for Basic Research «Choice of Sections and Biostratigraphic Substantiation of Global Stratotypes of the Viséan-Serpukhovian Boundary (Lower Carboniferous)» (2004–2006), «Middle Carboniferous of the Urals and Russian Platform: Stratigraphy, Biozonal Correlation» (2007–2009), «Type and Reference Sections of the Lower Carboniferous of the South Urals and the Russian Platform: Biostratigraphy, Global Correlation, GSSP» (2010–2012).

Since 2003 Vladimir was a member of the Devonian and Carboniferous Commissions of the Interdepartmental Stratigraphic Committee of Russia. He also participated in the elaboration of the International Chronostratigraphic scale of the Carboniferous System, and was a member of three Task Groups of the ICS: on the revision of the base of the Carboniferous, on the choice of GSSPs for the base of the Serpukhovian and Moscovian stages. While working in “BashNIPIneft” Vladimir Nikolaevich obtained new data on the stratigraphy of Bashkirian Cisuralia. He was the first to substantiate the Bashkirian-Moscovian boundary in this region at the base of the *Declinognathodus donetianus* conodont zone, and studied the biostratigraphy of the Upper Frasnian in different facies (depression, slope, and reefal).

Vladimir obtained important results from boreholes in the Orenburg Region. Using conodonts he recognized the Emsian (Vyazovian-Koivian Regional Substages), Eifelian, Frasnian and Famennian intervals in deep-water facies in the marginal area of the Peri-Caspian Basin. He was the first to obtain and characterize conodonts from boreholes in the Tournaisian, Viséan, Bashkirian, and Moscovian deposits in that area. Vladimir PAZUKHIN co-authored three monographs and published over 100 papers.

Volodya was a highly motivated scientist, who worked with great inspiration and passion. He often forgot about time and worked tirelessly beyond his working hours. He was a careful and thorough researcher, who never cut corners and wanted to be absolutely certain of his conclusions.



Volodya was a very optimistic person. He recognized the positive things of life, and solved problems with a smile. He was a devoted friend and a good companion. He was also a very good chess player, and very few of his colleagues could beat him. He loved nature and took great care of his garden. On his desk at work, he had a lemon plant grown from a seed, which now produces fruit. Volodya's untimely death is a colossal and irreparable loss for Uralian geology, and for Devonian and Carboniferous stratigraphers in particular. We lost the only specialist on Carboniferous conodonts in the Middle and South Urals, fanatically and utterly dedicated to his research, at the peak of his scientific career. We will always remember him not just as a major scientist, but also as an experienced, calm, balanced and reliable friend and colleague in field and laboratory research, on whom we could always rely.

Volodya's friends and colleagues wrote about him:

"Volodya was hard-working, a responsive friend, and in the last years he, I think, re-examined

his entire collection. He was a fighter" (Lemuza AKHMETSHINA).

"I am so sorry, and I am utterly upset. He was my good friend, a fantastic person..." (Yurii GATOVSKY)

"...I was always touched by his tact, modesty and understanding of other people's problems" (Svetlana NIKOLAEVA)

I have no words to describe my grief about this untimely loss of an excellent person and scientist" (Rimma IVANOVA)

"This is a big loss, he was a very good geologist and it is a pity he cannot continue his work" (Jiri KALVODA)

"I am very, very sorry. He was a great man and good geologist" (Elham ASADI)

Many others sent their condolences sharing this deep feeling of having suffered a major loss.

Selected publications relevant for the Devonian:

BARYSHEV, V.N. & PAZUKHIN, V.N. 1980. *Coding of the species characters of the conodont genus Polygnathus*. - In: *Stratigrafiya i paleontologiya paleozoya Yuzhnogo Urals: 67-74*, Ufa (BFAN SSSR) (in Russian).

KOCHETKOVA, N.M., PAZUKHIN, V.N., REILTINGER, E.A. & SINITSYNA, Z.A. 1985. *Reference sections of the Devonian-Carboniferous boundary beds in the South Urals*. - In: *Biostratigrafiya pogranichnykh otlozhenii devona i karbona*, 6: 66 pp., Magadan (SVKNII DVNTs AN SSSR).

KOCHETKOVA, N.M., BARSKOV, I.S., ALEKSEEV, A.S., BOGOSLOVSKY, B.I., BYVSHEVA, T.V., GAGIEV, M.KH., KONONOVA, L.I., KULAGINA, E.I., PAZUKHIN, V.N., ROMANOV, V.A. & YANBULATOVA, M.G. 1987. *Fauna and biostratigraphy of the Devonian-Carboniferous boundary beds of Berchogur (Mugodzhary)*. - 121 pp., Moscow (Nauka) (in Russian).

NEMIROVSKAYA, T.I., CHERMNYKH, V.A., KONONOVA, L.I. & PAZUKHIN, V.I. 1992. *Conodonts of the Devonian-Carboniferous boundary section, Kozhim, Polar Urals, Russia*. - *Annales de la Société Géologique de Belgique*, 115: 629-647.

PAZUKHIN, V.N. 2008. *Phylogeny of the conodont genus Siphonodella*. - *Novosti paleontologii i stratigrafii*, nos. 10-11 (Supplement to the journal *Geologiya i geofizika*, 49): 41-44 Novosibirsk (SO RAN) (in Russian).

PAZUKHIN, V.N. 2008. *Gumerovian Region Substage (Lower Carboniferous) of the Urals and the Russian Platform*. - In: *Geobiosfernye sobytia i istoriya organicheskogo mira*. Materials

of the 54th session of the All-Russia Paleontological Society, 7-11 April, 2008, St. Petersburg: 128-130.

PAZUKHIN, V.N. 2011. *Upper Devonian and Lower Carboniferous biostratigraphy of the Bahkirian Cisuralia*. - In: Biostratigrafiya, paleogeografiya i sobytia v devone i nizhnem karbone (International Subcommission on Devonian Stratigraphy), IGCP Project 596, Materials of the International Conference commemorating E.N. ELKIN, Ufa, Novosibirsk, 20 July-10 August 2011: 126–129, SO RAN (Novosibirsk).

MENA SCHEMM-GREGORY, 1976-2013

U. JANSEN & E. SCHINDLER

Mena SCHEMM-GREGORY, a young brilliant, very active brachiopod worker and Corresponding Member of the International Subcommission on Devonian Stratigraphy, passed away in Coimbra (Portugal) on the 8th July 2013. Her untimely death at the age of 36 was a great shock for all of us.

Mena was born on the 11th November 1976 in Plettenberg (Sauerland area, Rhernish Massive, Germany). She grew up in the city of Attendorn and started her studies of geology and palaeontology at the University of Marburg an der Lahn in 1996. She attended lectures of the late Willi ZIEGLER. There had been a long-term close relationship between Senckenberg and the former geological institute in Marburg, thanks to Willi ZIEGLER and other Devonian researchers, so it was not surprising that Mena looked to Senckenberg when she decided to specialize in palaeontology.

The first meeting with Mena (UJ) took place in 2000 on a field trip of the Marburger Geowissenschaftliche Vereinigung, where she expressed her interest to do a diploma thesis with palaeontological focus. In the course of her studies, she gained early field experience on a short course on dinosaur tracks in northern Spain, and museum experience during an internship at the Museo de Ciencias Naturales de San Juan (Argentina). As she was still undecided about her professional career, she started in addition studies on Romance philology and received European certificates in Portuguese (2003) and Spanish (2004) languages. Her excellent linguistic skills were of advantage during her later scientific career.

In 2002, Mena started her work on Devonian brachiopods in UJ's section (Palaeozoology III, Palaeozoic brachiopods) at Senckenberg. From this year to 2010 she drove by car almost every day 100 km from Marburg to Frankfurt departing at 5 o'clock in the morning and very often working until

late at night. Remarkable is the story when she was preparing her beloved special green tea (South American "Mate") at the speed of 160 km/h on the motorway (!), and was stopped by two policemen who asked her questions. Apparently, the answers were satisfactory as she did not get a ticket.

Mena's diplom thesis dealt with the spiriferid fauna of the Late Emsian Ems Quartzite (Rheinisches Schiefergebirge). On the occasion of a joint field trip in 2001, she showed her great enthusiasm and skill in field work. She received her diploma in 2004, and there was no question that she wished to continue her work on brachiopods by working for a Ph.D. degree.



Under the supervision of one of us (UJ), Mena started her Ph.D. thesis entitled "Phylogeny, taxonomy and palaeobiogeography of delthyridoid spiriferids (Brachiopoda, Silurian, Devonian)" at Senckenberg. Her work was embedded in a brachiopod research project and financed by the German Research Foundation (DFG) for three years. An additional technical assistant could be employed mainly for the preparation of serial sections, and many field and congress trips were possible in the following years. In 2005-2006, a project of the German Academic Exchange Service (DAAD) in cooperation with CHEN Xiuqin (Nanjing) enabled her and UJ to compare European and South Chinese brachiopod faunas, including a stay at the Palaeontological Institute in Nanjing and field work in the Guangxi Autonomous Region. In addition, Mena was participating in another DAAD project (by ES, 2007-2008) concerning comparisons of European and North American faunas and including stays at several institutions in the United States. She

was supported in the technical work by American exchange students who came to the Senckenberg via the RISE programme of the DAAD.

Mena's daily workload was commonly 12 or more hours. Many joint discussions enriched the research in the brachiopod section. After the work in the institute, guests were led in the evening to Devonian outcrops in the Taunus Mountains north of Frankfurt. In addition, we (MSG & UJ) undertook many field trips together to the Rheinisches Schiefergebirge always resulting in much material. The continuing monographic project on Rhenish Lower Devonian brachiopods has gained much benefit from these activities. In addition, we collected material for her thesis during conference field trips, partly in connection with SDS meetings, or in the frame of research projects, and we studied brachiopods in a number of museum collections.

From the beginning it was for Mena a matter of course that she participated at numerous national and international conferences to present her results, for example the annual meetings of the German Palaeontological Society, the Palaeontological Association, the International Brachiopod Congress in Copenhagen 2005, the SDS-IGCP 499 Meeting in Novosibirsk 2005, the International Palaeontological Congress in Beijing 2006, the SDS-IGCP 499 Meeting in Eureka/Nevada 2007, the Palaeozoic Seas Symposium in Graz 2009, and several others. Commonly, she gave one talk and presented one or more posters. At the North American Palaeontological Convention in Cincinnati/Ohio (2009) we (MSG & UJ) jointly organized a symposium on Palaeozoic brachiopods. Mena was a regular participant in the SDS meetings and was known by most of the members. Less than a year ago, the SDS members who attended the SDS-IGCP 596 Meeting in Erfoud/Morocco met Mena – for most of us it was the last time. All these conferences and linked field trips are still evoking many nice memories.

Mena's research concentrated on Devonian spiriferids which she described in a detailed, meticulous way. The descriptions were supplemented by numerous, very clear hand-drawn figures in her unique style. Her computer-based 3D-visualization of internal characters was path-breaking for brachiopod research. For this purpose, she scanned serial sections and combined these in a very time-consuming process to achieve three-dimensional reconstructions which could be rotated in all directions on the computer. By this technique she could recognize the special orientation of the brachidium of a Spanish spiriferid which led to the erection of a new genus and the first record of possible brachiopod-brachiopod endoparasitism. She erected a number of new taxa, reconstructed their phylogenetic relationships and established a new systematics of the delthyridoid spiriferids. The

palaeobiogeographical results have effects on Siluro-Devonian reconstructions. Apart from the spiriferids she worked on Devonian terebratulids, partly in close cooperation with one of us (UJ). In 2007, Mena started studies on Mesozoic brachiopods in cooperation with Mesozoic researchers, mainly on material from the Jurassic of Jordan and Portugal and the Cretaceous of South America.

Mena had numerous contacts to international brachiopod workers and started several cooperations, among others with Jed DAY (Normal, Illinois), Jay ZAMBITO (Madison, Wisconsin) and Howard FELDMAN (New York City, New York). Carlton BRETT and Alex BARTHOLOMEW made it possible for her to teach Historical Geology at the State University of New York at New Paltz for half a year in 2007. Her long publication list is impressive considering her short academic career. It included about 20 papers in peer-reviewed international journals and 76 contributions to conferences by the time she finished her Ph.D. thesis. Mena concluded her 600-page dissertation with the highest possible grade "summa cum laude" in December 2009. Our colleague Nacho VALENZUELA-RÍOS (Valencia) was the external member of the dissertation committee. The work was supervised from Goethe University Frankfurt am Main by Prof. Peter PRINZ-GRIMM.

From early stage, Mena successfully applied for financial support from third parties. It was a notable success that she received the *Charles Schuchert and Charles O. Dunbar Award* of the Peabody Museum/Yale University twice, in 2007 and 2008, and the *Learner Grey Award* of the American Museum of Natural History (New York City). She was thus able to finance her studies in the respective collections. Gypsum replicas of numerous specimens stored in the Senckenberg collections remind of these works. She also received an award of the *Zonta Club Frankfurt* (supporting women in science) which made possible another trip to the United States.

After her contract at the Senckenberg ended, Mena left our institute in 2010. A short research stay at the Smithsonian Tropical Research Institute in Panama followed, and finally she got a postdoctoral position at the University of Coimbra, where she could continue her research on Devonian and Mesozoic brachiopods. In addition, she was committed to making known the collections of her institute and prepared two catalogues in cooperation with Prof. Maria Helena HENRIQUES, one of which was published last year (*Zootaxa* 3677, 2013). Her most recent papers appeared last November and this year (in press), respectively. Because they are not yet included in the publication list mentioned earlier, they are added at the end of this text. Mena's death is a severe loss for brachiopod and Palaeozoic research. Recently, the new genus *Menathyris* was

dedicated to her (FELDMAN 2013). Mena conducted her research in a classical sense concentrating on morphology as the base of many palaeontological questions, with very strong ambition and enthusiasm; she had an impressive amount of energy. In all these respects, she leaves an example to the young researchers in palaeontology today.

Following her departure from Senckenberg, we had occasional contact with Mena from her new home in Portugal. She was appreciated very much by the members of the SDS. Many colleagues will miss her vivid and humorous nature in future meetings. The great number of condolence letters circulated last July has shown how much she was part of the “Devonian Family”. The Senckenberg colleagues and all scientists related to Mena will keep her memory in great esteem.

Publications

http://www.uc.pt/fctuc/ID/Geo/Sedimentary/Dra_Mena_Schemm-Gregory.

Mena’s two most recent papers (in chronologic order) which are not yet included in that list:

SCHEMM-GREGORY, M. & PICARRA, J.M. 2013. *Astraelenia saomamedensis* n. sp. – a new gigantic rhynchonellid species and its palaeobiogeographical implications for the Portalegre Syncline (Central Portugal). – *Rivista Italiana di Paleontologia e Stratigrafia*, **119** (3): 247-256.

FREY, L., NAGLIK, C., HOFMANN, R., SCHEMM-GREGORY, M., FRYDA, J., KRÖGER, B., TAYLOR, P.D., WILSON, M.A. & KLUG, C. 2014. Diversity and palaeoecology of Early Devonian invertebrate associations in the Tafilalt (Anti-Atlas, Morocco). – *Bulletin of Geoscience*, **89** (1): 75-212. DOI 10.3140/bull.geosci.1459

The publication including the new genus *Menathyris*:

FELDMAN, H.R. (2013): *Menathyris wilsoni* (Brachiopoda), new genus and species from the Middle Triassic (Ladinian) of southern Israel. – *Annales Societatis geologorum poloniae*, **83**: 81-85.

NOEL WILLIAM SCHLEIGER

(1926–2013)

J.A. TALENT

Soon after I had completed an MSc, mainly on brachiopods from the Early Devonian of eastern Victoria, Noel Schleiger appeared on my doorstep with boxes of rocks with a few poorly preserved brachiopods and bivalves he had found in the

vicinity of Seymour and Puckapunyal from places north of Melbourne where no one else had reported anything, except a supposed lycopod reported as *Lepidodendron* in the Progress Reports of the Geological Survey of Victoria; it was thought to imply a Carboniferous age. Noel’s treasures included a couple of specimens of a large lycopod from the extensive railway cuttings excavated at Seymour for the Melbourne–Sydney railway, inaugurated in 1872. Though the lycopods bore some resemblance to *Lepidodendron* and were very likely the creature that had been identified 85 years earlier as that genus, they were in fact specimens of *Baragwanathia*, then thought to be the oldest land plant in the World. It was first described from several localities in east-central Victoria—from Matlock, Yea and Alexandra—where, typically, it occurred in association with graptolites of the genus *Monograptus*, often in considerable abundance. The hunt for lycopods and graptolites in the Seymour area then became serious.

Most of Noel’s weekends over two or three decades became devoted to exhaustive examination, sampling and taking measurements of bedding phenomena and searching with unparalleled intensity for fossils in the Silurian and Devonian rocks exposed in every rail or road cutting and every excavation in an area north of Melbourne that seemed to become larger with every carload of fossils he brought to me. Eventually he had worked his way over about 3,000 square kilometres of countryside with Seymour at its centre: from Locksley in the north to Wallan in the south, almost to Yea in the east and Tooborac in the west, with ‘tentacles’ of investigation extending to Bendigo, Daraweit Guim, Bullengarook, Clonbinane, Costerfield, Flowerdale and various instructive road cuts within the Melbourne metropolitan area, seemingly wherever shelly fossils or graptolites could be found, bedding phenomena measured, orientations of fossils recorded, and dips taken. If outcrops were not quite good enough, Noel dug trenches. At Clonbinane, his son John helped dig trenches and what seemed like post holes for trilobites, crinoids, starfish and brachiopods in the Early Devonian rocks. Noel made voluminous collections of graptolites from the Ordovician of Bendigo and Bullengarook and did directional studies on them. In later years, he introduced many groups of students and enthusiastic amateurs to the sedimentary phenomena displayed by Silurian rocks in the road cuttings along Victoria Street, Doncaster, near the Ruffey Lake Park.

Henry MOORS reminded me that “Noel used to go to the field in a pair of farmer’s bib-and-braces overalls because he liked the large number of pockets”. He was very inventive and made many tools himself, including clinometers and goniometers. One day when we met to review what we had done on our collaboration, he stunned me

with a series of cross-plots of various parameters which clearly showed different fields. I asked him in wonder why he had chosen these parameters. He replied that he had no scientific basis; it was just trial and error. He was a very inventive and hard working person.” Noel William SCHLEIGER was born in Bendigo. His mother, Ede, and father, Eric, a butcher, were both energetic people. As with his parents, determination, perseverance and generosity were in Noel’s DNA. Throughout life, he retained a sentimental attachment to Bendigo, its remarkably repetitive geological structure and amazing Ordovician graptolite fossils: some multi-branched, others resembling tuning forks. After undertaking a BSc in geology and mathematics at Melbourne University, he was appointed to the no-longer existing primary school in Erin St in Melbourne’s inner suburb, Richmond, where he had the good fortune to meet Enid Esme TAYLOR (died 2nd February 1989), who became his highly supportive wife. They produced two children: Barbara and John. Noel was appointed to a teaching position at the Seymour High School, so he and Enid shifted to Tehan Street in Seymour where they remained for a decade or more. It became the base for what developed into Noel’s attack on the stratigraphy, sedimentation, structure and biostratigraphy (all phyla from graptolites to brachiopods, trilobites and land plants) of the Silurian and Early Devonian rocks of central Victoria. He then transferred to Eltham High School where he taught mathematics and science for several years, built a house at 1 Astley St, Montmorency (where he lived for 52 years) and set about filling the underside of the house with collections he kept making all over central Victoria. A specific room became his study, but it became so crammed with books, reprints, manuscripts and drafts of maps (he was a fanatical compiler of maps) that it had become almost nonfunctional well before his death.

Noel’s last teaching position (until retiring in 1992) was at the State College of Victoria at Coburg (now a division of the Royal Melbourne Institute of Technology University) where he was head of the Department of Mathematics and, for a time, the College’s Vice-Principal. There he was the moving force in developing a brilliantly new mathematics curriculum for primary schools in the state of Victoria. Throughout his career, Noel was driven by a passion to teach—mathematics, geology (in all its branches, but especially sedimentation and palaeontology), biology and environmental science at all levels from primary school to university level.

Several years after Enid’s death, Noel, who had become a devoted member of the Field Naturalists’ Club of Victoria, teamed up with another spirited member of the FNCV, Dorothy MAHLER. Both were workaholics; their capacity to edit all manner of publications and jointly organize FNCV field ventures was prodigious. Enid and Noel had

travelled widely; the same pattern was repeated by Dorothy and Noel: through China, Europe and the USA.

Noel’s first major production was in sociology: on the social relationship of transported and non-transported pupils at Seymour High School; it was a 356-page monster published by Melbourne Teachers College where he had been a Diploma of Education student a few years earlier. He published important papers on bedding features of the Silurian–Devonian sediments of the Seymour district, quantitative studies of the Late Silurian–Early Devonian conglomerates of the Tallarook and Seymour East synclines of central Victoria (1964, *J. geol. Soc. Aust.*, **11**: 1–31; *Ibid.* 217–233), and studies of the orientation patterns of Ordovician graptolites in central Victoria (1968, *J. sed. Res.*, **88**: 462–472; 1986, *Geol. Soc. London, Spec. Pub.*, **20**: 79–96; *Ibid.* 249–259). He compiled and edited a much-acclaimed popular volume (1995, *Roadside Geology Melbourne to Ballarat*, 98 p. Geol. Soc. Aust. Victoria Division and Field Naturalists Club of Victoria). Noel’s voluminous collections of monograptids greatly advanced the late Hermann Jaeger’s pivotal work on the Early Devonian graptolites of central Victoria (1966, *Proc. roy. Soc. Vic.*, **79**: 393–413; *J. geol. Soc. Aust.*, **14**: 281–286; and unpublished identifications).

He published 19 papers in *The Victorian Naturalist* on all aspects of natural history, among them a paper on the geomorphology of the Murray River Basin (2002, *Vic. Nat.*, **119**: 95–101), one on the geological structure of Mt Buffalo, and another with Dorothy MAHLER on the molluscan shells on the Bellarine Peninsula (2000, *Vic. Nat.*, **117**: 14–30). He was a member of the Council of the Field Naturalists Club of Victoria for 22 years, ran its Environment Committee for 10 years, was founding editor of its newsletter, and was the driving force in a field program on mapping of fungi.

Noel produced four reports, each of them between 50 and 100 pages, on the teaching of mathematics: on symmetry and its applications, rod-mathematics, individualized programs, and *Mathsbank* (1973, 1975, 1976, 1983). These were published by the Australian and Victorian Mathematics Associations, and the State College of Education Coburg. He was a polymath, eager to be a ‘sounding board’ for ideas, enthusiastically offering to help colleagues, many of them earth scientists, with mathematical methods of testing and presenting their data; he was a giver in every sense of the word. Nevertheless, most of his geological information including map compilations, filling much of his study in Astley Street, Montmorency, remain unpublished. ...

Many of Noel’s key qualities became apparent to me on first meeting him back in the mid-1950s: his enthusiasm about everything, his sincerity, his lack

of ambition. He was uncomplicated, a man of great energies and formidable will, who was at ease with everyone he met, and had a keen sense of humour—his conversation tending to be shot through with puns... For Noel, life was too short for miserable ambitions, intellectual point-scoring, or worrying about the ‘impact factors’ of his publications. He never had time to formulate research proposals and submit them. He felt that to have done so would have taken too much time that he preferred to devote to his research and discussions with colleagues. All his research was funded out of his own pocket. He was a gem!

A celebration of Noel’s life took place in the Inglewood Estate Chapel, Kangaroo Ground, on 2nd May 2013. His coffin bore the largest pile of the exclusively Gondwana Proteacea (proteoids and grevilleoids) I have ever seen. Fittingly, it was an extraordinary day, the sort of autumn day and setting he would have chosen if he had any say in the matter: blue skies, a diversity of birds and trees, a non-denominational chapel of natural stone, a few items of rusting farm machinery, a large dam with weeping willows. The only thing missing was a few road cuttings that he would like to have demolished in search of more data. Noel was buried, with his field hat on his coffin, in the Kangaroo Ground Cemetery, northeast of Melbourne.

SDS REPORTS

INTERNATIONAL COMMISSION ON STRATIGRAPHY

SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

ANNUAL REPORT TO ICS 2013

J.E. MARSHALL

1. TITLE OF CONSTITUENT BODY

Subcommission on Devonian Stratigraphy

2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

SDS has continued in 2013 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 SDS, SCS and IGCP 596 in March 2013. Other continued activities include multidisciplinary international correlation, the organisation of

Devonian stratigraphic symposia, the publication of the SDS Newsletter and of monographic books/journal volumes. SDS objectives for 2014 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 28.
- Annual Business Meeting in conjunction with the 4th IPC in Mendoza, Argentina.

All listed objectives fit the directions of IUGS and ICS:

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

3. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2013

List of major publications of subcommission work (books, special volumes, key scientific papers):

EL HASSANI, A., BECKER, R.T. & TAHIRI, A. 2013. International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book. - *Documents de l’Institut Scientifique, Rabat*, **26**: 1-134.

BECKER, R.T., EL HASSANI, A. & TAHIRI, A. 2013. International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Field Guidebook. - *Documents de l’Institut Scientifique, Rabat*, **27**: 1-150.

Problems encountered

- 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.
- The decline of Devonian stratigraphy in other countries (e.g., Canada, Australia) by the lack of replacement of retiring specialists by new active researchers.

4a. OBJECTIVES AND WORK PLAN FOR NEXT YEAR (2014)

- Annual Business Meeting, jointly with IGCP 596 and D/C Boundary Task Group, at the 4th IPC, Mendoza, Argentina (October 2014).
- Editorial work for a volume on *Devonian Climate, Sea Level and Evolutionary Events* as a Special Publication of the Geological Society of London, edited by BECKER, BRETT & KÖNIGSHOF. Papers to be submitted in 2014.
- Publication of SDS Newsletter 29.
- Update of SDS homepage (pdf files of former SDS Newsletters and new GSSP illustrations).

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 sub-division 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.
- Progress on Famennian substage definitions.

5. SUMMARY OF EXPENDITURES IN 2013 INCOME

Balance from 2012 0 \$

EXPENSES 2012

SDS Newsletter 28 500 \$

Support for SDS Vice-Chair and Secretary to attend the SDS/ICS Morocco meeting 833 \$

Support/subvention from IUGS/ICS 1333 \$

6. BUDGET REQUESTS AND ICS COMPONENT FOR 2014

\$600 for 2013 SDS Newsletter

\$1500 for Vice-Chair and Secretary to attend 4th IPC in Mendoza, Argentina

\$1000 for SDS TM's to meet and discuss base Emsian redefinition to promote progress. New conodont samples need to be collected. This stage redefinition is the main activity that we are required to do to complete all our GSSP's.

Total Request: \$3100

APPENDICES

7. CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (2009-2013)

Being a highly proactive subcommission with at least yearly meetings.

2009th NAPC, Cincinnati, USA

2010^{3rd} IPC London, UK

2011 SDS, Novosibirsk, Russia

2012^{34th} IGC Brisbane, Australia

2013 SDS/IGCP 596, Morocco

- Sponsoring a regular 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 (2014-2017)

- Redefinition of the Devonian/Carboniferous Boundary with 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.
- Define and publish the Famennian substages.
- Annual meetings, for 2015 this is in Frankfurt jointly with IGCP 596 on completion of their project.

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. HU Huaicheng, Nanjing, China; palynology;
hczhu@nigpas.ac.cn
19. R.T. BECKER: Germany, ammonoid, conodonts;
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 I. KAISER, Germany: conodonts, isotope stratigraphy; kaiser.smms@naturkundemuseum-bw.de

John E.A. 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

The Carboniferous members are:

Jim BARRICK, USA: conodonts; jim.barrick@ttu.edu

Paul BRENCKLE, USA: foraminifers;
saltwaterfarm1@cs.com

Geoff CLAYTON, Ireland: palynomorphs;
gclayton@tcd.ie

Jiri KALVODA, Czech Republic: foraminifers;
dino@sci.muni.cz

Rich LANE, USA: conodonts; hlane@nsf.gov

Svetlana NIKOLAEVA, Russia: ammonoids;
44svnikol@mtu-net.ru

Edouard POTY, Belgium: corals; e.poty@ulg.ac.be

Barry RICHARDS, Canada, sedimentology, conodonts; brichard@NRCan.gc.ca

YUAN Jin-Liang, China: trilobites;
yuanjl403@sohu.com

9c. INTERFACES WITH OTHER INTERNATIONAL PROJECTS

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. We have a joint meeting at the 4th IPC in Mendoza, Argentina.

MINUTES OF THE ANNUAL SDS BUSINESS MEETING, ERFOUD, MOROCCO, MONDAY, MARCH 25, 2013

L.SLAVÍK & C.E. BRETT

Attendance: The Chairman (J. MARSHALL), Vice-Chairman (C.E. BRETT), Secretary (L. SLAVÍK);

TMs: R.T. BECKER, A. EL HASSANI, N. IZOKH, U. JANSEN, M. NARKIEWICZ, J. OVER, E. SCHINDLER, J.I. VALENZUELA-RÍOS;

CMS: O. ARTYUSHKOVA, N. BAKHAREV, P. BUDIL, R. BROCKE, P. BULTYNCK, C. KLUG, C. DOJEN, R. FEIST, J. FRÝDA, Y. GATOVSKY, S. HARTENFELS, H. HÜNEKE, A. KURILENKO, S. NIKOLAEVA, O. OBUT, M. SCHEMM-GREGORY, K. TRINAJSTIC, A. YAZIKOV, J. ZAMBITO;

GUESTS: A. ALEKSEEV, T. ALEKSEEVA, M.W. AMLER, M. ARETZ, O. BÁBEK, S. EICHHOLT, A. ERNST, S. HELLING, H.-G. HERBIG, P. KOENIGSHOF, T. KHLEBNIKOVA, J. LAKIN, J.-C. LIAO, E. NARDIN, B. RICHARDS, R. TAGARIEVA, J. WATERS.

This is one of the most complete attendances in the past couple of years.

1. Introductions and apologies for absence

The meeting started in the foyer of hotel Palm Erfoud at 21.00 and was opened by the CHAIRMAN. Agenda was circulated well before the meeting. The chairman expressed thanks to the former team of SDS officers, especially to former chairman R.T. BECKER for his successful and efficient leadership. He also expressed very sincere thanks to TM A. EL HASANI and members of the local organizing team for a wonderfully organized and spectacular meeting in Morocco.

Apologies were received from:

TMs: A. BLIECK, G. CASIER, C. CORRADINI, J. DAY, MA X., T. UYENO;

CMS: A. BARTHOLOMEW, I. BONCHEVA, L. FERROVÁ, O. IZOKH, J. HLADIL, A. KIM, L. KOPTÍKOVÁ, X. MA, H. MATYJA, C. VER STRAETEN, J. TALENT and S. VODRÁŽKOVÁ.

2. Approval of 2012 Minutes

The Minutes of the Brisbane Business Meeting were circulated by e-mail in the middle of March. The Minutes were approved after some minor corrections.

3. Chair's Business

3.1. Obituaries

Fortunately, no SDS members losses in 2012 were announced.

3.2. New Officers

The CHAIRMAN introduced the new officers for the new period. The complete officer team was present at the meeting and thus we had extraordinarily strong representation, also, as regards the membership presence. The Chairman expressed thanks to R.T. BECKER for continuation of SDS newsletter editing and to C. CORRADINI for the SDS webpage maintenance.

3.3. Other topics

The CHAIRMAN opened the issue of Substage definitions. He invited SDS members to submit formal proposals for substages that would then be ratified and published in ICS journal - *Episodes*. The formal descriptions of the substage levels has not yet been finished. The base of the Emsian is the major problematic boundary in the Devonian. The teams should finish the middle-upper Frasnian substage boundary (J. OVER), middle Givetian boundary (P. BULTYNCK) and the upper Givetian boundary (Z.S. ABOUSSALAM and R.T. BECKER). TM R.T. BECKER commented that we should start soon with the formal proposals to be submitted to *Lethaia* in order to speed the formal ratification. The *Lethaia* paper does not have to propose formal stratotypes.

The CHAIRMAN drew attention to the recently published book *Geological Time Scale 2012* by F. GRADSTEIN and co-authors (Ed.) as a remarkable stratigraphic overview. TM R.T. BECKER commented the fact that the book contains high quality stratigraphic information, but it is not an official publication of the ICS. TM J.I. VALENZUELA-RÍOS pointed to some mistakes in Lower Devonian conodont zonations that appeared in the book.

The CHAIRMAN informed that the Annual report of the SDS 2012 for the ICS will appear in the forthcoming issue of the SDS newsletter.

4. ICS Matters

The CHAIRMAN mentioned that the future formal definition of substages should serve as a template for other formal proposals to the ICS. He referred to a document on the Toarcian Stage that might be used as a model as to how to go about drafting substage definitions.

ICS will hold a meeting in Lisbon - 1st Congress on Stratigraphy "Strati 2013", 1st to 7th of July in Lisbon. The congresses will be organized every four years and will partly replace local European meetings with stratigraphical topics (e.g., French stratigraphical meeting). The CHAIRMAN will take part in Lisbon meeting this July, although he commented that the high registration fee would reduce attendance to the congress.

5. Revision of GSSPs

5.1. Pragian-Emsian

TM J.I. VALENZUELA-RÍOS provided a short overview of the history of problem of the definition of the Pragian/Emsian boundary in Uzbekistan and listed the statements that were concluded by the SDS directly at the meeting in the Kitab State Reserve in 2008. The informal SDS working group is following up on these statements and plans to run a new sampling campaign in the GSSP section. TM R.T. BECKER mentioned the *Devonobactrites* Shale interval above the Pragian Limestone that has been shown during the Moroccan field trip in El Khraouia (South Tafilalt). These shales may correspond to the Bohemian graptolite Event in the uppermost Praha Fm. in the Prague Synform as a good indicator of prospective future basal Emsian boundary. He expressed a wish to discuss and correlate the icriodontid (conodont) ranges that were documented in Morocco with those in Celtiberia (e.g. *C. sigmoidalis*). TM N. IZOKH reminded that the data for the future boundary definition is still in Zinzilban and, as it has been presented in talks, the future sampling interval should be much higher than the previous attempt of 2008. The Secretary asked whether it is possible to go there in near future in order to finish the resampling of the GSSP section. TM N. IZOKH remarked that a small group (2-3 people) would be able to go there without a problem. TM R.T. BECKER urged that the future GSSP must have much higher correlation potential (e.g., -be correlatable in both shallow and deeper environments) and that multiproxy data should be provided (e.g., geochemistry, etc.) according to present demands of the ICS. The new definition will also have to include data other areas and additional fossil taxa beyond conodonts (e.g., dacryoconarids).

5.2. D/C Boundary

This discussion was deferred because of forthcoming D/C task group meeting in few days. Many SDS members joined this meeting of the Carboniferous Subcommission and the D/C

Boundary Task Group. The meeting was conducted by Markus ARETZ, the D/C TG Chairman, and secretary of Carboniferous Subcommission. In the discussion many different opinions were expressed. The main problem is the incoherence between geochemical signals and their rather indistinct excursions and biostratigraphical problems (conodont *S. sulcata* problem). The discussion of whether to choose an alternative biostratigraphic marker for the boundary definition or to rely on geochemical or geophysical signals, which may not be easily followed and reproduced in many sections, will continue as no definitive conclusion has yet been made.

6. Devonian Substages

6.1. Pragian

The Pragian will need to have two substages as has been shown in the talks during scientific sessions. The fundamental issue is still the upper Pragian boundary and that depends on basal Emsian boundary redefinition.

6.2. Emsian

See 5.1 Revision of the Pragian/Emsian boundary. There is a new paper on the Daleje Event and dacryoconarid faunas by L. FERROVÁ et al. (2012) that might be a significant contribution for the future Emsian subdivision.

6.3. Famennian

TM R.T. BECKER noted that this year there should be a formal vote for the Upper Famennian substage. The document for the formal vote will be sent out soon. TM R.T. BECKER also noted that he had proposed that the base of the upper Famennian be placed at the base of the *annulata* Event; there had been no comment on this from the membership, to date.

7. SDS Membership

Titular members (TM's) are nominated every four years. No changes for this year will be made.

New CMs

Michal MERGL (University of West Bohemia, Czech Republic, brachiopods)

Jau-Chyn LIAO (University of València, Spain, conodonts)

Egberto PEREIRA, Departamento de Estratigrafia e Paleontologia Faculdade de Geologia, UERJ (Universidade do Estado do Rio de Janeiro), Rio de Janeiro, Brasil, egberto@uerj.br

Mercedes DI PASQUO, Palinoestratigrafía, Investigadora Independiente (Senior Res.), CICyTTP- CONICET, Dr. Matteri y España,

Diamante - CP E3105BWA, Entre Ríos, Argentina, medipa@cicyttp.org.ar

Yury GATOVSKY (Moscow State University, conodonts)

The Chairman asked the membership to find somebody from Asia and South America to complete the SDS community representation. TM R.T. BECKER asked the new members to provide Devonian publication lists for the SDS newsletter.

8. SDS Publications:

Proceedings of the symposium of IGC 596 held at the IGC in Brisbane (plus 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. TM R.T. BECKER reported that about 22 manuscripts had been announced. There is some delay and the original submission deadline of July was slightly postponed to the end of October. The volume should have at least about 300 pages and would be published on-line immediately after final submission.

The planned Proceedings Volume of the Novosibirsk meeting in *Palaeodiversity and Palaeoenvironments* (chief editor P. KÖNIGSHOF) of the Senckenberg Institute was delayed. There are not many contributions and the editorial work has not yet been finished. However, CM O. Obut said that of 10 promised contributions nine were already in hand; they are now going to be edited for English with assistance from Svetlana.

It was announced that a comprehensive thesis by S. Hartenfels on late Devonian Ammonoids has been published.

TM R.T. BECKER asked SDS members to send contributions to the SDS newsletter, especially proposals for substages (Givetian, Frasnian and Famennian).

9. Future meetings

STRATI 2013, 1st International Congress on Stratigraphy, 1st to 7th July 2013, Lisbon, Portugal. The chairman will take part.

2013 *ICOS* (Conodont) meeting, July 15-19, 2013 Mendoza, Argentina

2013: *IGCP 596 meeting* joins the *International conference on Paleontology of SE Asia*, Malaysia-Vietnam, September-October.

2014: *Fourth International Paleontological Congress*, in Mendoza, Argentina, September 28 to October 24, 2014 will be joined with the IGCP 596 meeting. Most of conodont workers will probably not come again because of the *ICOS* (Conodont) meeting at same place in 2013.

2015: *Final meeting of IGCP 596* is planned to be in Frankfurt, Germany. Field trips will be offered to the Eifel and Sauerland

2016: *IGC - International Geological Congress in South Africa*: the possibility that SDS joins the meeting with excursion to the Devonian of South Africa is being considered.

2017: *ICOS (International Conodont Symposium)* will be probably proposed in Europe.

2018? An SDS meeting in New York State or in Bulgaria is being discussed.

10. Financial Report

The CHAIRMAN reported that from the budget (\$1,600 USD), \$600 USD will be allocated for SDS Newsletter. The subvention from the ICS for 2013 is \$1,400 USD. The balance from last year is \$156.00.

11. Other business

CM J. FRÝDA asked who is working on the subdivision of the Emsian. TM R.T. BECKER mentioned that TM R. MAWSON was working on this but she has had health problems that have delayed progress. He noted work by the Senckenberg and North American teams. However, he emphasized that ICS Chair, Stan FINNEY, has stated that there can be no formal Devonian substage division until all stage boundaries are formalized.

CM M. SCHEMM-GREGORY discussed the on-going revision of the KRANTZ brachiopod collection in Coimbra University Science Museum. P. KÖNIGSHOF reported on the good evaluation of the IGCP 596 and about the forthcoming meeting in Malaysia and Vietnam. J. WATERS discussed problems with organization of the Mongolian meeting that was planned for 2014.

The CHAIRMAN again expressed thanks to the organizers of the International Field Symposium in Morocco and to excursion guides and editors and contributors to the Field Guidebook. The meeting adjourned shortly after 10 p.m.



The Field Party of “Morocco 2013”, enjoying the Sahara feeling at the dunes of Merzouga in the Tafilalt.

CONFERENCE REPORT

International Field Symposium

„The Devonian and Lower Carboniferous of northern Gondwana“

(in memory of Dr. Volker EBBIGHAUSEN),
22nd to 29th March, 2013,
Anti-Atlas, southern Morocco.

R.T. BECKER

The meeting was jointly organized by the Institute Scientifique of the Mohammed V University in Rabat, notably by Prof. Dr. A. EL HASSANI and Prof. Dr. A. TAHIRI, the International Subcommission on Devonian Stratigraphy (SDS), the International Subcommission on Carboniferous Stratigraphy (SCS), and IGCP 596 on “Climate Change and Biodiversity Patterns in the Mid-Palaeozoic”. It had a strong field component, interrupted by a day of talks in the nice atmosphere of the Palm Hotel in Erfoud, and its logistics were very well organized by the Moroccan hosts. Because of an unexpected change of flight schedules, most of the ca. 60 participants had to arrive a day early in Ouarzazate but this allowed a relaxed acclimatization to the local conditions and climate or a recovery from jet lag. Conference members represented thirteen countries, with a very good representation from Germany and Russia, followed

by Czechia, France, Belgium, Poland, Great Britain, the U.S., Spain, Portugal, Switzerland, and Australia. (Almost) Everybody gathered for the ice breaker and joint dinner in the Hotel Riad Salam of Ouarzazate in the evening of the 22nd March. The meeting was held in memory of the “amateur palaeontologist” Volker EBBIGHAUSEN, a chemist from Odenthal, Germany, who had contributed significantly to the research on the Devonian and Carboniferous of Morocco and Algeria in the last decades, until his untimely and accidental death in summer 2011. He was actively involved in the two previous SDS field meetings in southern Morocco (Tafilalt-Maider, 1999; Dra Valley, 2004) and it was him, who had the original idea to hold another meeting in the Anti-Atlas that brings together Devonian and Carboniferous workers.

The field party took off in the morning of the 23rd. Field leaders were the “Münster Devonian Team”, notably Z.S. ABOUSSALAM, S. HARTENFELS, and R.T. BECKER, A. EL HASSANI and A. TAHIRI from Rabat, M. ARETZ from Toulouse, and C. KLUG from Zürich. Dieter KORN from Berlin had to excuse himself at short notice. The extensive **Excursion Guidebook** (BECKER, EL HASSANI and TAHIRI, Eds., 150 pp.) includes fourteen conodont plates (upper Silurian to Tournaisian taxa) and has been published as Volume 27 in the series “**Document de l’Institute Scientifique, Rabat**, ISBN 0251-4249). The group first visited the allochthonous Devonian at the Southern Variscan Front east of Tinerhir, with breccias/conglomerates composed of partly

conodont-rich Ludfordian to upper Famennian blocks or large olistholites. These enable to reconstruct the Middle Palaeozoic sedimentation in the now eroded area at the northernmost margin of stable Gondwana. The surprising discovery of a small Moroccan cobra on that hill, just a few days prior to the meeting, was kept secret because every snake would certainly flee the tremors of more than sixty pairs of field boots. As it can be expected from a large field party, blocks with previously unnoticed lithology were observed, including one with large placoderm remains and Kellwasser limestones. The second locality at Oued Ferkla just east of Tinejdad belongs to the most northerly autochthonous Devonian of the Anti-Atlas. It includes a very well exposed succession through the Middle Devonian Kacak and *pumilio* Events. The second field day offered a complete and fossiliferous transect from the Silurian-Devonian boundary to the uppermost Famennian of the Tafilalt, in a setting at the margin of the Tafilalt Basin. In the evening the poster session was opened in the Palm Hotel.

The ambitious science program of the 25th March included more than twenty talks that covered the basalmost Devonian to Viséan, many different regions, conodonts and other fossil groups, and multidisciplinary stratigraphic methods. In addition there were more than 30 posters. The extended abstracts, some with conodont plates, were published as Volume 26 in the same series (EL HASSANI, BECKER and TAHIRI, Eds., **Document de l'Institut Scientifique, Rabat**, ISBN 0251-4249, 134 pp.). One focus was the current revision of the Devonian-Carboniferous Boundary, which was also the subject of evening discussions, for example at the Annual Business Meeting of SDS and in the evening of the 27th.

Day 3 of the field program began with a march through the Lower Devonian of the Amessoui Syncline in the southern Tafilalt, led by C. KLUG. A Moroccan field lunch was held with a view on the Devonian-Carboniferous boundary at the deserted village of El Atrous, to the west within the same syncline. The afternoon program focused on the Middle Givetian to topmost Famennian at Oum el Jerane, even further to the west. Above the locally youngest thin biostrome beds, common, large *Ancyrodella* specimens were easy to see in thin-bedded limestone on the outcrop. Wednesday the 27th was a Carboniferous day, starting with evidence for Middle Tournaisian erosion, re-sedimentation, and deformation in chaotic deposits NE of Taouz (guided by A. TAHIRI). Conodont dating of this important Eovariscan phase is still in process. M. ARETZ led to the similarly chaotic but very fossiliferous conglomerates/breccias at the base of the Jebel Begaa. Examination of the regionally very thick Upper Viséan of the easternmost Tafilalt is restricted by its proximity to the Algerian border and

we had to collect some of the rich macrofauna under the eyes of the border military.

The following day concentrated on the Devonian-Carboniferous transition in the northern and southwestern Maider. The Lalla Mimouna North section resembles the La Serre C GSSP section and is characterized by frequent *Siphonodella*-relatives. Currently, it contains the most diverse conodont assemblage from the Hangenberg Event Intervall on a global scale but the conodont succession is interrupted by fine siliciclastics of the Hangenberg Regression interval, as in almost all other sections. The much thicker boundary interval of the southern Maider was examined at Tazoult. Some of the locals from the near-by Fezzou village offered splendid "desert refreshment" (mint tea, nuts and oranges) after the hot day – and some rare and good fossils from the area could be purchased, too.

The last field day offered an overview of the Emsian to Frasnian conodont and event stratigraphy of the western Tafilalt (Jebel Amelane-Jebel Ihr). The Guidebook documents some of its rich or distinctive conodont assemblages and it will take some time before more complete publications will become available. The group returned to Ouarzazate in the evening, where the farewell dinner was held, followed by cold bear or other refreshments on the terrace next to the swimming pool. Not a bad way to finish a highly successful meeting, which had the luck of good weather and which took place in an extraordinarily friendly atmosphere. All that did not attend, missed a wonderful (and conodont-rich) occasion.

Several months later, two of the participants, Kolya BAKHAREV and Mena SCHEMM-GREGORY, died very unexpectedly and very untimely. Both were very lively and in good spirits at the meeting and in the field. They were in the middle of their highly active life as reknown scientists and much liked by everybody. Nobody would have thought that a bad fate was lurking in the near future. We miss both deeply and their presence at the meeting now provides the last but best memories of good times we could enjoy together.

SDS DOCUMENTS

DEVONIAN RUGOSA IN ORGANOGENIC CONSTRUCTIONS OF THE NORTH URALS

V. S. TSYGANKO

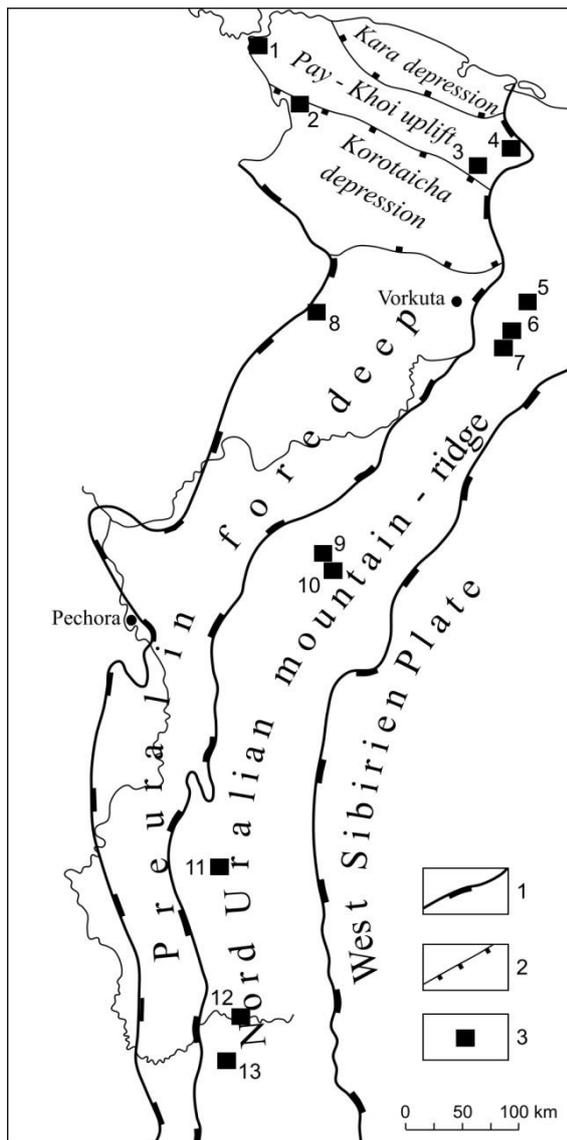


Fig. 1. Overview of tectono-sedimentary units at the northern transition from the Russian Plate to the Urals.

In the Devonian, the territory of the western slope of the North Urals and Pay-Khoi represented a passive margin of the Russian plate. The major part was covered with prevailing shallow-water shelf sediments considered as the Elets structural-facial zone (SFZ). The zone of deep-water open shelf and continental slope sediments (Lemva SFZ) was

located eastward. The formation and development of biostromes, bioherms and reef massifs was most active in the eastern subzone of the Elets SFZ near the Lemva SFZ in the Devonian (Fig. 1). Among the lime-biomineralizing organisms inhabiting the biotope of these constructions there were coelenterates including Rugosa. Their role and importance in the organogenic constructions was different: from a few species in the composition of reef-dwellers to active participation in the buildup process.

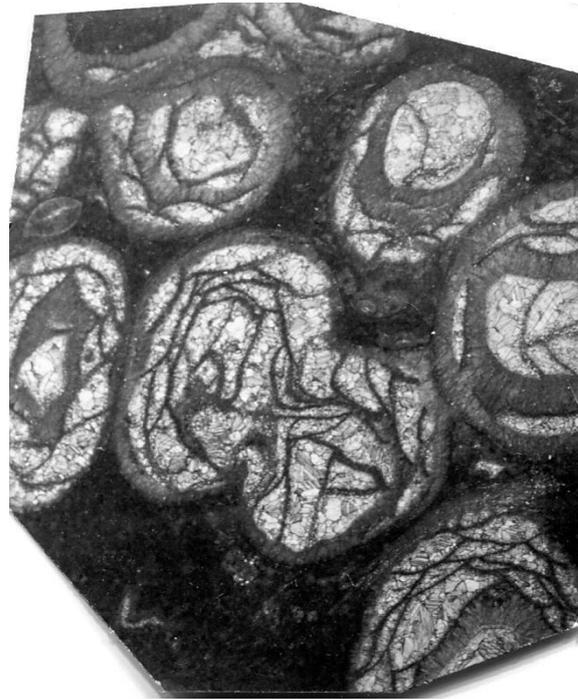


Fig. 2. *Gyaloplasma agglomerate* ZHAV. from the Early Lochkovian of the Ilych River.

The formation of **Lochkovian** organogenic constructions in most cases was spatially related to Late Silurian ones (rivers of Ilych, Bol'shaya Usa, Kara, Bely Nos cape). Here, as well as in Silurian reef formations, Rugosa were not numerous. On the Ilych River (the North Urals) the Early Lochkovian biohermal-type organogenic build-up is mainly composed of massive "algal-hyroid" limestones, and partially with abundant shell bioclastic material, about 25 m thick. The Anthozoa are represented by rare tabulate colonies (Favositidae) and more frequent Rugosa (SOSHKINA 1949, 1952, SPASSKY 1977, TSYGANKO 1981). Among the latter the remains of branched *Pseudoamplexus fascicularis* SOSHKINA are most numerous. At separate bioherm parts this species participates in the buildup construction equally with *Renalcis*, *Epiphyton* and other calcimicrobes. Individual *Salairophyllum angustum* (ZHELTONOGOVA), *Pseudamplexus subbrevis* SCHNUR, pseudocolonial *Pseudoamplexus quadripartitus* SOSHKINA, and *Gyaloplasma agglomerata* ZHAV. occur sporadically (Fig. 2). The role of *Pseudoamplexus fascicularis* in the reef

buildup on the Bol'shaya Usa River (Polar Urals) was analogous. But here this species was accompanied by rarer colonies of *Spongophyllum originalis* (ZHMAEV) and *Neomphyma originata* SOSHKINA. In the Kara basin (south-eastward of Pay-Khoy), the Lochkovian organogenic buildups were represented by coastal reefs edging the sub-oval dryland that appeared at the Silurian-Devonian boundary. The reefs are mainly made of microbes. The Rugosa – *Pseudamplexus* sp. and *Entelophyllum* sp. - played a passive role here. In the Late Silurian-Early Emsian reef buildup on the Bely Nos cape (Pay-Khoy), the Lochkovian interval is about 200 m thick. As well as in other organogenic buildups of this age, some Rugosa (*Pseudamplexus fascicularis*) actively participated in the buildup construction. *Holacanthia* sp. was very rare.

The **Pragian** was characterized by considerable regression of the sea resulting in cessation of reef formation in the basins of Ilych and Bol'shaya Usa. At the same time new centres of biogenic carbonate accumulation appeared on the rivers of Pechora (Fig. 3) and Lemva. The Rugosa partially participated in the construction of the biohermal and bioclastic limestones in the first. They were represented by the species *Astrictophyllum uralicum* TSYGANKO, *A. minor* (SOSHKINA), *Loyolophyllum cresswelli* CHAPMAN, and *Lyrielsma petshoreense* (SOSHKINA). The Rugosa practically did not participate in the creation of the Pragian biohermal buildup, over 150 m thick, in the second. Only one species – *Acanthophyllum baculoides* POCTA – was found in the limestone.



Fig. 3. Pragian reefal limestones at Pechora River.

In the Polar Urals the Pragian-Early Emsian beds are exposed in the middle course of the Lek'elets River. The Rugosa in these formations were represented in some parts. The following species were present: *Lyrielsma petshoreense* (SOSHKINA), *Zelophyllia tabulata* (SOSHKINA), *Symphyphyllum stiliferum* SPASSKY. The distribution of the Rugosa in the reef buildup of the Bely Nos cape was similar. According to N. Y. SPASSKY, the Rugosa complex included *Pseudamplexus ligeriense* BARR., *Zelophyllia tabulata* SOSHKINA, *Pseudomicroplasma multilobata* SPASSKY, and *Lyrielsma* sp. In the Pragian of the Kara River area the construction of coastal reefs continued around the island dryland, where Rugosa practically did not participate.

In the **Early Emsian** a part of the Early Devonian reef buildups of the northern part of the Urals terminated. However this stage of evolution of the reef-associated organogenic buildups is characterized by a flash in the development of reef-associated different heterotrophic organisms,

including Coelenterates. It is especially evident for reef buildups in the rivers of Lemva, Maly Shezhim, which in the Early Emsian were located in tropical or subtropical climatic zones. Here a part of species, whose appearance was marked in the Pragian, developed massively: *Astrictophyllum uralicum* TSYGANKO, *A. minor* (SOSHKINA), *Loyolophyllum cresswelli* CHAPMAN, *Spongophyllum halysitoides* ETHERIDGE, *Lyrielsma petshoreense* (SOSHKINA), and *Zelophyllia tabulata* SOSHKINA. Taxa, which did not occur earlier, were represented by *Astrictophyllum massivum* (SOSHKINA), *Columnaria virgata* (TSYGANKO), *Crista varia* TSYGANKO, *Xystriphyllum gorskii* (BULV.), *Septiphyllum notabilis* (TSYGANKO), and *Aculeathophyllum uralicum* ZHAV. All the above Rugosa, along with calcimicrobes and stromatoporoids ("hydroids"), actively participated in the buildup construction. They also often occur in the allochthonous blocks among more deep-water, marginal slope reef sediments. With that no renovation among the Rugosa, as compared to the Pragian interval, was revealed in similar

organogenic buildup on the Bely Nos cape. Their quantity increased only a little. The reef buildup on the river of Lek'elets (Polar Urals) ceased its existence at the end of the first half of the Early Emsian. It was marked by biohermal limestones with clear stratum separation. Separate corallites of *Grypophyllum striatum* SOSHKINA and *Aculeathophyllum uralicum* ZHAV. occurred there.

The peculiarity of the Early Emsian reef construction on the Kara River is in its annular, atoll-like character. The coastal reefs of the Lochkovian and Pragian, edging previously the low coastal dryland that was submerged in the beginning of the Emsian, served as its socle. The mainly "hydroid-algal" (stromatoporoid-calcimicrobe) character of the buildup construction shows the

passive role of the Rugosa, represented in the sections of the Kara Basin by *Astrictophyllum uralicum* (TSYGANKO) and *Grypophyllum striatum* (SOSHKINA). On the Silova River, where the western periphery of the atoll is exposed, apart from the two above mentioned species *Lyriellasma* ex gr. *petshorensis* (SOSHKINA) and *Zelophyllia tabulata* SOSHKINA were also established.

A considerable reduction of reef formation took place on the western slope of the North Urals in the **Late Emsian** due to a large sea transgression. Only one small biohermal buildup of this age on the Elets river (the Polar Urals) is known. The Rugosa occur in these limestones rarely. They are represented by *Zelophyllia tabulata* SOSHKINA and *Calceola sandalina* (LINNAEUS).

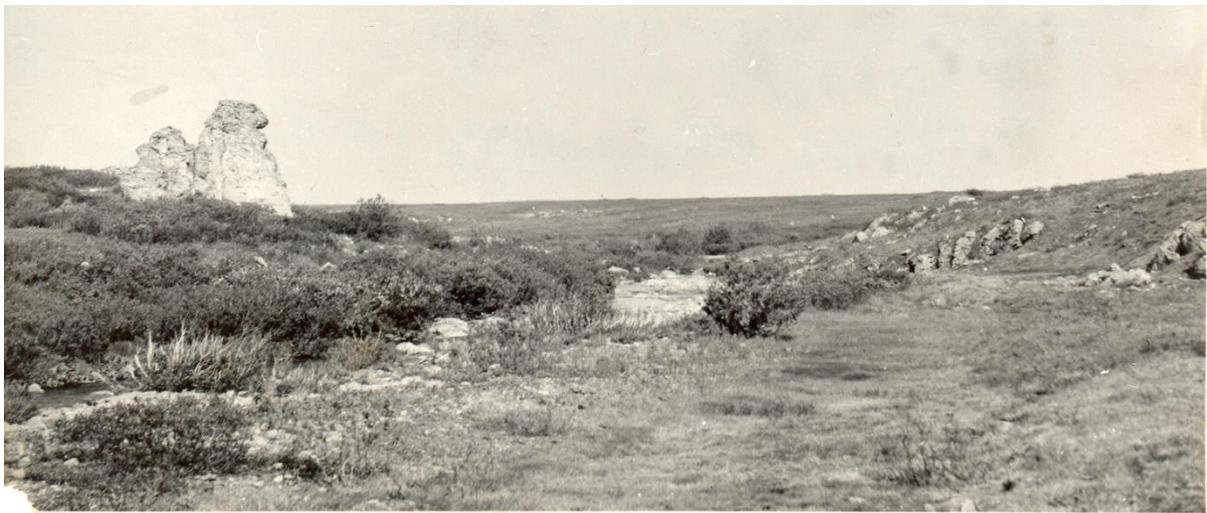


Fig. 4. Eifelian reefal limestone of the Bol'shaya Nadota Basin (Subpolar Urals)

In the **Middle Devonian** the organogenic buildups are generally characterized by small sizes. Eifelian buildups are found in the basins of Bol'shaya Nadota (Subpolar Urals; Fig. 4), Bol'shaya Usa (Polar Urals) and Bel'kovskaya (Pay-Khoy). The characteristic peculiarity of the buildups on the Pay-Khoy and Subpolar Urals is an active participation of the Rugosa in the buildup construction, represented by *Dendrostella rhenana* (FRECH), **Columnaria rara* TSYGANKO, **Fasciophyllum conglomeratum* SCHLÜTER, **F. polygonum* TSYGANKO, *Neospongophyllum semiseptatum* (SCHLÜTER), **Centristela fasciculata* Tsyganko, **C. discreta* TSYGANKO, *Loboplasma magnifica* TSYGANKO, and **Cystiphylloides septatum* YOH. A part of the above mentioned species continued their participation in the formation of organogenic buildups of the Early Givetian (taxa marked with *). In the reef formations in the basins of Bel'kovskaya (Pay-Khoy) and Bol'shaya Nadota (Subpolar Urals), together with the marked species, *Columnaria mutabilis* TSYGANKO, *Polydelphia*

polymera SOK. & TSYGANKO (Fig. 5), *Spongophyllum sedwicki* EDWARDS & HAIME, *S. praestans* TSYGANKO, *Crista compacta* TSYGANKO, *Nadotia stilifera* TSYGANKO, *Mackenziophyllum (Zonastraea) graciosa* (TSYGANKO), *Dialithophyllum complicatum* WEDEKIND, *Heliophyllum aiese* SOSHKINA, and *Temnophyllum isetense* (SOSHKINA) also participated. The second half of the Givetian was characterized by a complete termination of the organogenic buildup formation, due to a long interval in the sedimentation as a whole (Taghanic Event), as well as by a slow sea transgression at the end of this interval.

In the **Late Devonian** the most ancient biohermal buildups are referred to the Sagrai time of the beginning of the Frasnian (North Urals, Unya River). In these buildups, along with stromatolites, numerous *Phillipsastrea hennai* (LONSDALE) and *Temnophyllum modicum* (SMITH) also actively participated in the bioconstruction. Rarely *Grypophyllum mackenziense* (PEDDER) occurred. Rugosa did not participate in the biohermal

construction of the Domanic beds on the Shernyadeita River (Polar Urals). But in later biohermal and reef formations, four levels were determined in the same section and related to the Upper Frasnian substage, where changes occurred in the composition of buildup constructors including Rugosa. In the lower microbialithic (“algal”) bioherms and biostromes (30 m thick), Rugosa – *Thamnophyllum* aff. *virgatum* (SOSHKINA), *Scruttonia bowerbanki* (EDWARDS & HAIME), and *Temnophyllum* sp. – often occur. In the second unit, “microphytolites” and oncolite limestones with the prevalence of encrusting textures (100 m) are widespread. Here Rugosa are represented by three species – *Nicholsoniella bashkirica* SOSHKINA, *Temnophyllum modicum* (SMITH), and *Heliophyllum* (*Charactophyllum*) *elongatum* SOSHKINA. The next unit is characterized by the prevalence of reef limestones (100 m), which partly include receptaculites. Rugosa are represented by only one species – *Gorizdronia profunda* (SOSHKINA) - but receptaculites, up to 20 cm high, are numerous. In the fourth upper unit the microbialithic (“algal”) formations are dominated by *Renalcis* and *Epiphyton* (80 m). The Rugosa in these limestones are represented by rare *Temnophyllum* aff. *isetense* SOSHKINA and *Heliophyllum* (*Charactophyllum*) *elongatum* SOSHKINA. In the overlying bedded, mainly bioclastic limestones, containing a complex of Lower Fammenian brachiopods, Rugosa corals are absent. They were also not found in the reef buildups of Fammenian age in other sections of the western slope of the North Urals.

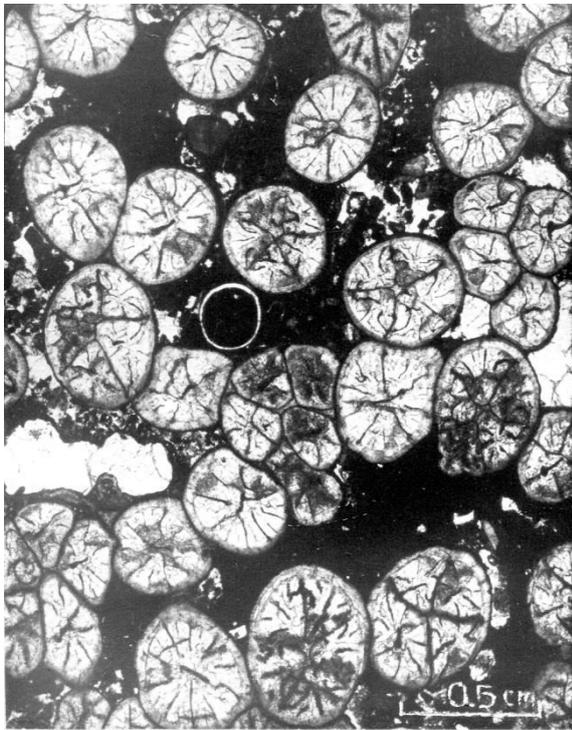


Fig. 5. *Polyadelphia polymera* SOK. & TSYGANKO from the Early Givetian of the Subpolar Urals.

References

- SOSHKINA E. D. 1949. Devonskie Korally Rugosa Urala. – *Trudy Paleontologicheskogo Institut, Akademii Nauk SSSR*, **15** (4): 1-160.
- SOSHKINA E. D. 1952. Opredelitel devonskikh Chetyrekhluchevykh korallov. – *Trudy Paleontologicheskogo Institut, Akademii Nauk SSSR*, **39**: 3-123.
- SPASSKY N. Ya. 1977. Devonskie Rugosa SSSR. – 345 pp. (Leningrad).
- TSYGANKO V. S. 1981. *Devonskie Rugosa Severa Urala*. – 220 pp., Akademii Nauk SSSR, Komi Filial, Institut Geolog. (Leningrad).

LITHOLOGIC AND BIOTIC ASPECTS OF MAJOR DEVONIAN EVENTS IN SOUTH CHINA

MA, X.P., ZHANG, Y.B. & ZHANG M.Q.

Department of Geology, Peking University, Beijing 100871, China

Introduction

Devonian events as a whole have not been systematically studied or discussed in China, except for the *Punctata*, Kellwasser (F/F), and Hangenberg events, especially the F/F event. Other events have even rarely been mentioned, although many of them may show some kind of faunal and/or geochemical and/or sedimentological (e.g., sea-level change) variations. This review attempts to present some data of those changes at possible event levels of global significance in South China, the most important area for the study of the Devonian in China. The terminology follows HOUSE (2002), otherwise as cited. There are very rare geochemical studies concerning Devonian “minor” events, BAI et al. (1994), in their systematic studies of the Devonian stage boundaries, included some oxygen and carbon isotope analyses of the interval possibly involving those “minor” events close to a boundary, e.g., early Frasnian and early Eifelian times. Many of the events can be correlated with those recognized world-wide, but some are only temporarily assigned based on current knowledge of fossil data.

Klonk Event (Silurian/Devonian boundary)

The Silurian-Devonian boundary interval is located in three kinds of facies areas. In the basal facies, the lithology consists of mudstones, siltstones, and fine sandstones, with a 10 to 25 m thick sandstone layer just above the boundary (BAI et al., 2004, p.156). In the shallow water (neritic) facies in western Qinling in central China (ZHAO et

al. 2010), the lithology in the lowermost Devonian is mainly made up of [calcareous and silty] shales, with minor limestone intercalations, whereas in the uppermost Silurian, the lithology is variable, with either limestones or shales with minor fine sandstones. There are biotic turnovers and weak positive $\delta^{13}\text{C}_{\text{org}}$ shifts (ZHAO et al. 2010). A similar but weak positive $\delta^{13}\text{C}_{\text{org}}$ shift (ZHAO et al. 2011) is also present at the supposed S/D boundary in the marine (uppermost Silurian shales) to “non-marine” (early Devonian) facies (Qujing type, see MA et al. 2009 and references cited); the early Devonian is about several hundred meters, composed of sandstones, siltstones and silty mudstones.

Basal Zlíčov and Chebbi Events

The Lochkovian/Pragian (Basal Pragian) boundary is not so clear yet in South China. Reasons include unfavourable facies control (in both basinal and shallow water settings), which results in the rarity or absence of index fossils and makes recognition of the boundary difficult.

The Basal Zlíčov Event was approximately coincident with the boundary between the Nagaoling and Yujiang Formations in the Liujing section (Fig. 1), although conodonts at this interval are limited so that the Pragian/Emsian boundary can hardly be determined. WANG (1989) mentions the presence of *Polygnathus dehiscens* at the top of the Gaoling Member (Nagaoling Fm.) without description and figures, 100 m below the Nagaoling and Yujiang Fm. boundary (Fig. 1), which still needs independent supporting material. The Yujiang Fm. is characterized by widespread benthic organisms, including the brachiopod *Rostrospirifer-Dicoelostrophia* Assemblage, corals, trilobites, and various molluscs (Fig. 1). A generally gradual sea-level rise seems associated with the development of the assemblage.

The *gronbergi* Zone ranges from the uppermost Yujiang Fm. to the lower Moding Fm. (BAI et al. 1994, p. 117), with the occurrence of *Po. gronbergi* about 5 m below the top of Yujiang Fm. The Moding Fm., mainly with bedded cherts and recrystallized dolostones, apparently represents a deepening event in the Liujing section and adjacent areas. During the late *gronbergi* Zone, first ammonoids (*Erbenoceras* and others) seem to occur and became widely distributed in most parts of Guangxi, not only in pelagic facies deposits, e.g. in the lower part of the Tangding Formation in the Luofu section (ZHONG et al. 1992) as well as in the Liujing section, but also in shallow water benthic facies deposits, e.g., in the Luomai Member (= upper part of the Ertang Fm.) of the Dale section (RUAN 1981, p. 11). This level should correspond to the Chebbi Event of BECKER & ABOUSSALAM (2011).

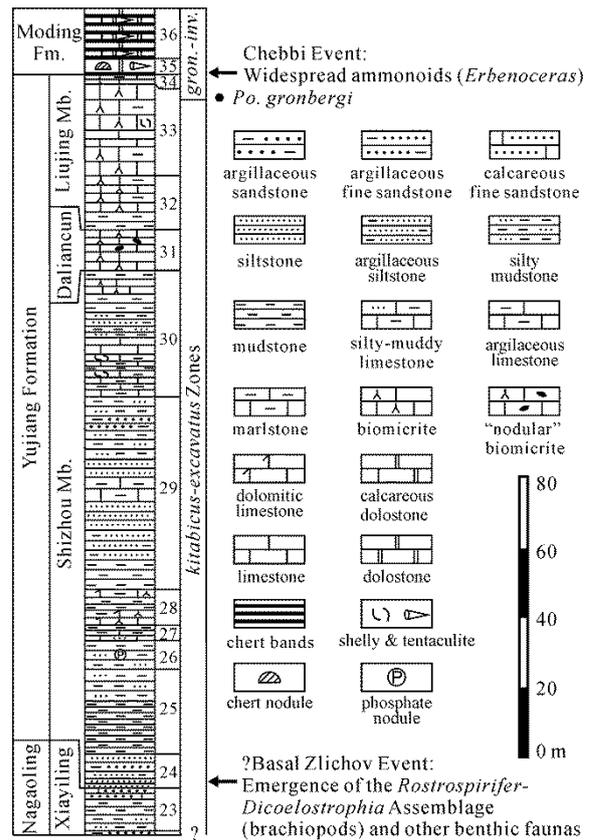


Fig. 1. Liujing section, showing the possible Basal Zlíčov and Chebbi Events. Stratigraphy is based on KUANG et al. (1989), with minor modification regarding the Xiyaling Member (BAI et al. 1994).

Upper Zlíčov and Daleje Events

In South China, the Dale Fm. and its equivalents may be related with this event (Fig. 2). The Dale Fm. is a (marly) limestone unit with minor marl and shaly layers, with abundant benthic fossils (corals, stromatoporoids, brachiopods, etc.). The underlying Luetang Fm. is characterized by a thick sequence (~335 m) of gray shales intercalated with medium bedded dolostones, which changes laterally to the Guanqiao Fm. (medium-thick bedded dolostone, dolomitic limestone, and calcareous shale); rare fossils (including brachiopods, trilobites, and dacroconarid tentaculites; see BAI et al. 1982) mainly in the middle part. The Luetang Fm. should represent an interval of sustained low sea-level and restricted environments (with occasional sea-level rise episodes), whereas the Dale Fm., a general transgressive phase. The Luetang and Dale Formation boundary may be correlated with the Upper Zlíčov Event of GARCÍA-ALCALDE (1997).

Detailed lithologic studies are still lacking regarding the physical environment variation of the Dale Formation. Biologically, the Liuhui Member is quite different from the underlying strata (including the Shipeng Member and Luetang Fm.: no corals and stromatoporoids) in the re-appearance of

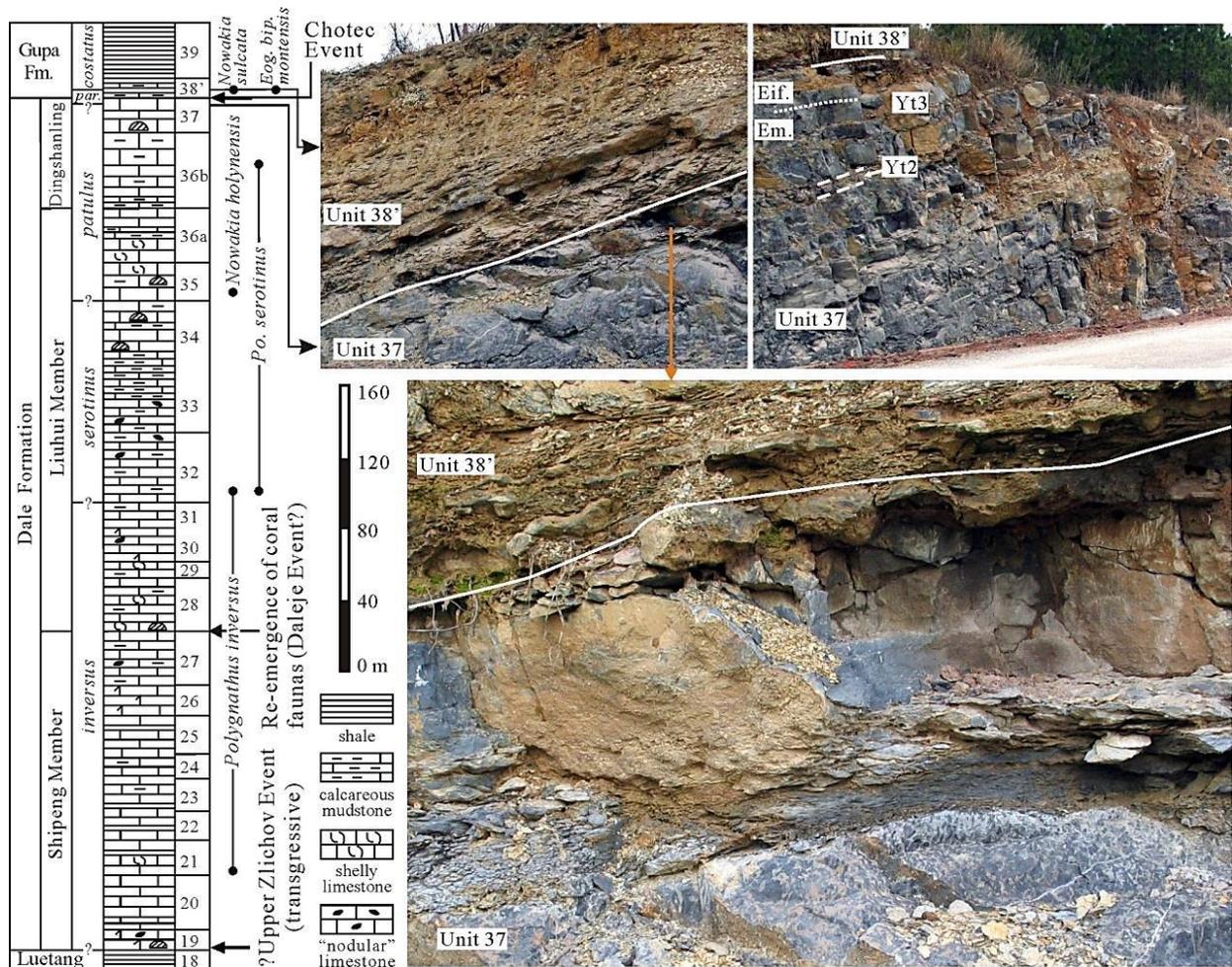


Fig. 2. The Dale Formation in the Dale area, Guangxi. Litho-stratigraphy and fossil data are based on BAI et al. (1982, 1994), with some modification of lithology based on HOU & XIAN (1975). Unit 38' includes Beds Yt4 through Yt16 of BAI et al. (1994, p. 144). See Fig. 1 for more legends.

abundant coral and stromatoporoid taxa (patch reefs). This may correspond to the Daleje Event.

Chotec Event

In the Nayi section (basinal facies), this interval is basically composed of limestones, with a one-dotted $\delta^{13}C$ anomaly within the *partitus* Zone (BAI et al. 1994, p. 129, fig. 10-3: in-*partitus* spike). In the Dale area, there is a sharp lithologic change from the Dale Fm. to the Gupa Fm. (Fig. 2), which can probably be correlated with the Chotec Event level. The $\delta^{13}C$ curve is apparently affected by various lithologies across the boundary (BAI et al. 1994, p. 145). The *partitus* Zone is relatively thin compared with its underlying and overlying zones in the present framework.

Kačák Event

In the Liujing section, alternations of limestone and “shale” (YIN et al. 2012: weathering product of ferrous argillaceous bioclastic limestones) occurred at the beginning of the *ensensis* Zone, associated with the first appearance of the

brachiopod *Stringocephalus* (BAI et al. 1994, p. 116: Hx12-Hx14). The dactyloconarid tentaculite *Nowakia otomari* also first occurred in the *ensensis* Zone in many areas in South China, associated with *Stringocephalus*, in “shaly”, (siliceous) mudstone or cherts, and thin-bedded micrite intercalated with chert bands (YIN et al, 2012). This level is suggested to be the base of the Chinese regional Dongganglingian Stage (YIN et al. 2012), which seems consistent with the Kačák Event.

Middle Givetian Events

The Lower *Pumilio* level is dated as ca. the middle part of the *rhenanus/varcus* Zone (BECKER 2007). The initial Taghanic Event corresponds to a level within the Middle *varcus* Zone (HOUSE 2002, his fig. 4; upper *ansatus* Zone of ABOUSSALAM 2003). In the Dale area of Guangxi, the Givetian is mainly composed of the Donggangling and Baqi Formations (Fig. 3). There are several major lithologic changes in the Givetian according to BAI et al. (1982): (1) between unit 62a (marly limestone, sometimes “nodular”) and the rest of the

Donggangling Fm. (Units 52-61); (2) boundary between the two formations (Units 62a and 62b); (3) between the lower part of 62b (Upper *varcus* Zone and below, with rare chert bands) and the middle-upper parts of 62b (*hermanni* Zone and above, with more cherts). The first two levels of lithologic changes may reflect initial and further rifting activities, which are probably correspondent with *Pumilio* Events.

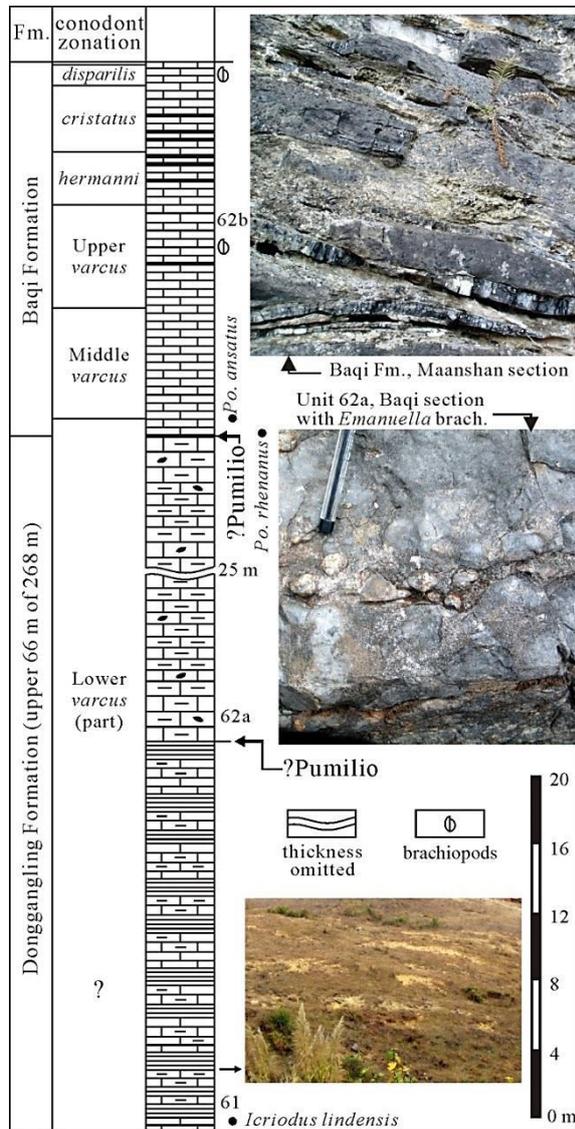


Fig. 3. Baqi section in the Dale area showing the major lithologic changes in the Givetian. Columnar section and conodont zonation based on BAI et al. (1982, 1994) and BAI (1995); the Middle *varcus* through *disparilis* Zones are all defined by their index conodonts. See previous figures for more legends.

Northwards in the Caiziyan section (Fig. 4), there are also comparable lithologic changes. One is between the Donggangling and “Gubi” Formations approximately at the base of or within the Middle

varcus Zone (LI et al. 2009a); further northwards in central Hunan, it is probably approximately the boundary between the Yijiawan (marl and shale) and the Qiziqiao (thick bedded limestone) Formations, although conodont zonation cannot be properly established. This sharp lithologic change is interpreted to be a result of intensified rifting activity, which led to the formation of the rift-platform depositional system in South China (MA & ZONG 2010), which probably corresponds to the initial Taghanic Event. After the initial formation of the rift-platform system, a Mid-Givetian regression was widespread in South China, an opinion which has long been known to many workers (e.g., SHEN 1995, WU et al. 1997, MA et al. 2009), with formation of widespread dolostones. This regression occurred in the Upper *varcus* Zone (LI et al. 2009b).

Approximately at the start of the Middle Givetian, the rugose coral *Endophyllum-Sunophyllum* fauna became widely distributed in South China and mostly became extinct towards the end of this regression phase, including all cystimorph corals and some common Middle Devonian genera of rugose corals (*Calceola*, *Cystiphyllodes*, *Mesophyllum*, *Endophyllum*, *Neospongophyllum*, *Sinospongophyllum*, *Sociophyllum*, *Stringophyllum*, *Sunophyllum*) as well as most species of the brachiopod *Stringocephalus* (LIAO & MA 2007).

Geneseo Event

This corresponds to a deepening event in the start of the *hermanni* Zone in South China, exemplified in a number of sections from both deeper and shallow water facies (MA & ZONG 2010). In the Dabakou section (Fig. 4), there is a sharp lithologic change from massive limestone with many corals (Qiziqiao Fm.) to thin-bedded limestone with chert intercalations (basal part of the Baqi Fm.), which represents the Upper *varcus* and *hermanni* boundary based on the overall conodont composition (TAN et al. 1992). In the Caiziyan section (platform margin), some chert layers interbedded with thin-bedded limestones occurred at this level (LI et al. 2009a). Extinction of most taxa of the widespread coral *Endophyllum-Sunophyllum* fauna may be related to a joint effect of this event and the previous Taghanic Events, characterized by transgression-regression couples.

Early Frasnian Events

Early Frasnian events (including Frasnés, Genundewa, and Timan) as well as Middle Frasnian Middlesex Event are not readily recognizable in South China. Usually an event may be recognized in one section, but not in others, e.g., sedimentation of a dark styliolinid microcoquina grainstone layer in the *transitans* Zone in the Dongcun section (MA et al. 2008: Timan Event). It seems that the sea-level

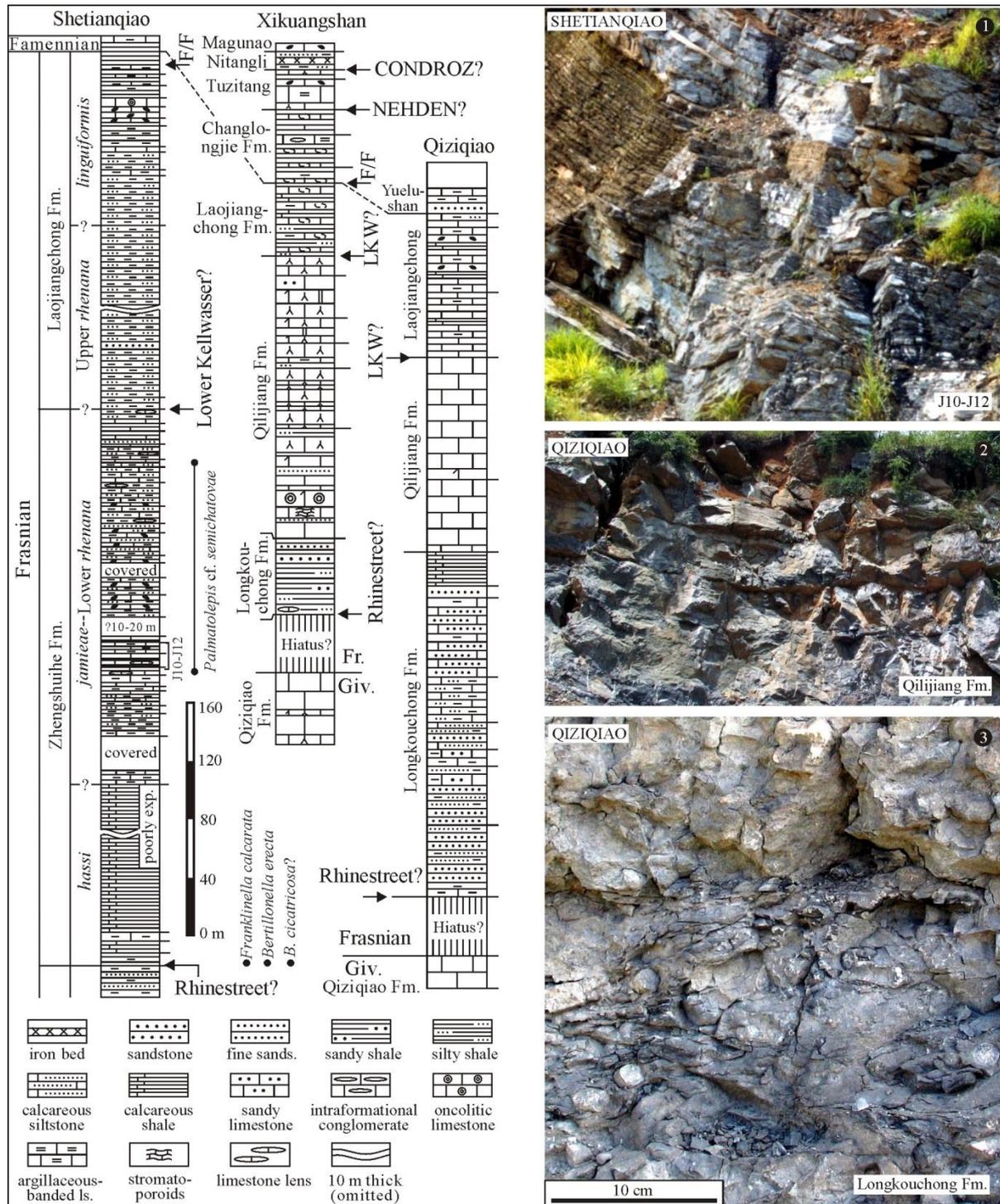


Fig. 5. Frasnian and lower Famennian lithologic sequences in the Shetianqiao (“basinal” facies), Xikuangshan and Qiziqiao (mixed carbonate and clastic platform facies) sections (all in central Hunan). Litho- and biostratigraphy of the Shetianqiao section is adapted from Ma et al. (2004); Qiziqiao, based on data in TAN et al. (1987b); Xikuangshan, Givetian and Frasnian stratigraphy, based on WANG et al. (1986) and the Famennian based on the authors’ data. (1) Showing the interval of siliceous marly limestones yielding the ammonoid *Manticoceras*; (2) Reefal limestones of the Qilijiang Fm.; (3) Sandy-argillaceous limestone of the Longkouchong Fm. yielding abundant simple corals and atrypid brachiopods. See previous figures for more legends.

of YU et al. 1990) to the carbonate-deficient Laojiangchong Fm. (Fig. 5), which is apparently suggestive of a dramatic change in the geological

background, possibly related to a renewed rifting process, supported by evidences of an intense hydrothermal activity (ZENG et al. 2011). However,

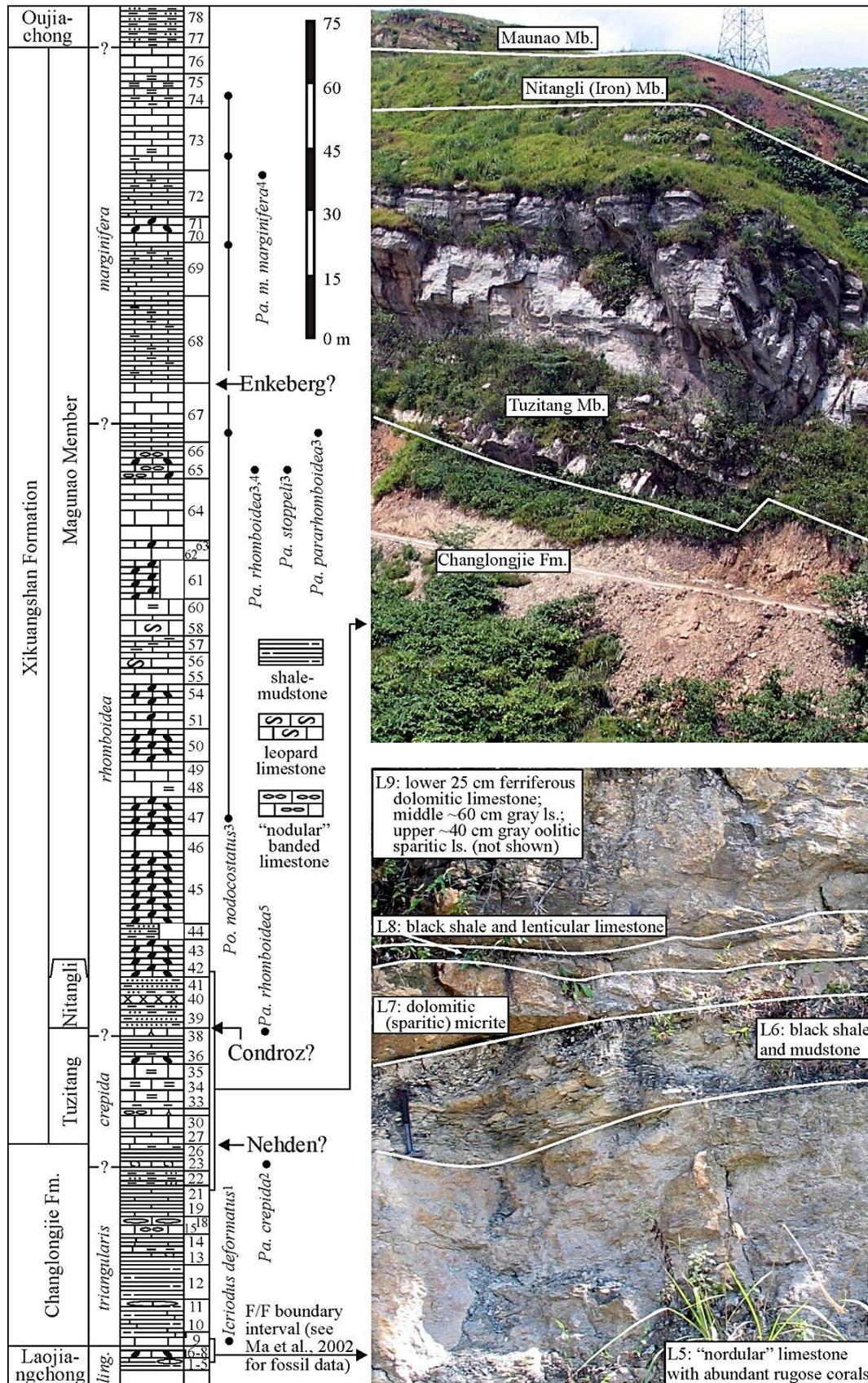


Fig. 6. Lower and middle Famennian sequence in the Xikuangshan section (mixed carbonate and clastic platform facies). Conodont occurrences are based on BAI et al. (2004), JI (1989/1990), COEN & GROESSENS (1996), WANG et al. (1986), and YU et al. (1983, 1990). See previous figures for more legends.

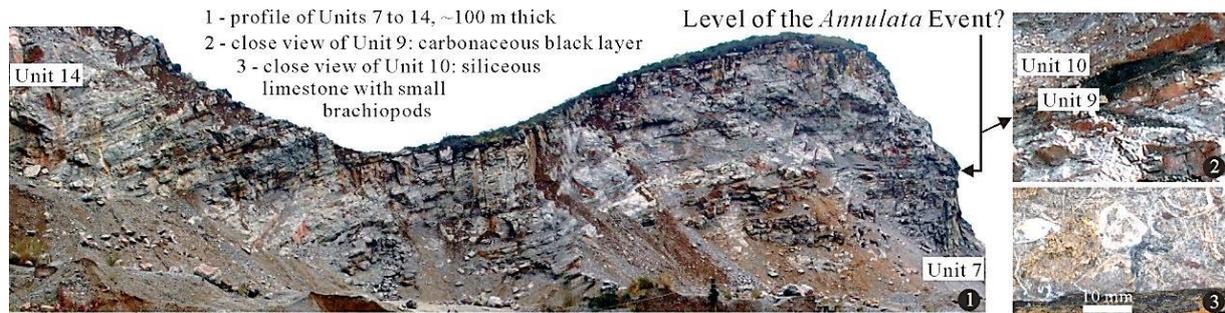


Fig. 7. Tieshan section (Guilin, Guangxi) showing possible evidence for the *Annulata* Event. See YIN (2008) for detailed stratigraphic description.

the major problem related to the platform sections is still the poor control of their conodont zonation.

The Upper Kellwasser (F/F) Event is the most thoroughly studied Devonian event in China. Many workers began to work on the subject over two decades ago (e.g., JI 1989/1990, BAI et al. 1994). Subsequently, a number of F/F sections have been extensively studied concerning various aspects of the event (biotic and geochemical), including both pelagic and neritic facies (e.g., BAI et al. 1994, MA et al. 2002, MA & BAI 2002, CHEN & colleagues 2003, 2005 etc., GONG & colleagues 2002, 2005 etc., XU et al. 2003, and more recently, DU et al. 2008, XU et al., 2008, ZENG et al. 2011, CHEN et al. 2013, WU et al. 2013). Major sections concerned are Nandong, Yangdi (= Fuhe), Baisha, Dongcun, Liujiang, Xikuangshan (Fig. 6) etc., which are basically pelagic to neritic carbonate and carbonate-shale sequences.

Nehden, Condroz, and Enkeberg Events

In South China, the Xikuangshan section is well-known for its long history of Famennian studies and stratotype of the regional Xikuangshanian Stage (including the Changlongjie and Xikuangshan Formations, approximately *triangularis* to *marginifera* Zones; Fig. 6). Compared with the abundance of brachiopods, conodonts are rare; therefore conodonts in some levels are significant for the establishment of the zonation (Fig. 6). JI (1989/1990) found *Pa. crepida* in the so-called “the base of the Tuzitang Formation” (his Unit 15), an interval that should be assigned to somewhere in the Changlongjie Fm. (COEN & GROESSENS 1996), specifically probably correspondent with Unit 23 according our own field work (MA & BAI 2002). The occurrence of *Pa. rhomboidea* at the top of the Tuzitang Member is mentioned by YU et al. (1983, 1990); however, their reported *Palmatolepis rhomboidea* and *Pa. marginifera* in the lower-middle part of the Magunao Member (approximately equivalent to Units 60-61 of Fig. 6) seems too low compared with other studies. It should be pointed out that there are no description and figures of the

conodonts and stratigraphic description. The *rhomboidea* and *marginifera* boundary in Fig. 6 is based on COEN & GROESSENS (1996) who indicate that the joint occurrence of *Pa. rhomboidea* and *Pa. stoppeli* and that, just higher, of *Pa. pararhomboidea*, indicate a level close to the *rhomboidea*-*marginifera* boundary. According to COEN & GROESSENS (1996), *Po. nodocostatus* is a species from the base of the Lower *crepida* Zone to the Upper *marginifera* Zone, rare in the Uppermost *marginifera* Zone and present throughout the Magunao Mb., which means that the top of the Magunao Member is still within the *marginifera* Zone.

Based on the present zonation, the Changlongjie and Xikuangshan Formation boundary, which represents a sharp lithologic change (Fig. 6), is probably consistent with the start of the Nehden Event (see MARSHALL 2008 for its precise level). The Nitangli Member (=Nitangli Iron Bed) is mainly composed of fine clastics, which should represent deposits of a lowered sea-level setting and is consistent with the Condroz Event. With this event, the brachiopod *Yunnanellina-Sinospirifer* fauna was replaced by the *Yunnanella-Hunanospirifer* fauna; modern taxonomic study is still needed for the latter fauna.

The Enkeberg Event level is approximately consistent with the middle part of the Magunao Member (slightly above the presumed base of the *marginifera* Zone), where a thin-bedded limestone sequence occurs, which is probably related with the supposed sea-level rise of the event (see MARSHALL 2008), as evidenced by the fact that most conodont-bearing samples are in the upper part of the Magunao Member (WANG et al. 1986, COEN & GROESSENS 1996).

Annulata Event

The level of this event is consistent with the upper part of the Upper *trachytera* Zone (upper *Ps. granulatus* Zone, HARTENFELS 2011), representing a global sea level rise and dysoxic event (BECKER 1992, HOUSE 2002). In the northern part of the Devonian South China sea (i.e., central Hunan), this level is probably within the Oujiachong Formation, which is basically a unit of shallower water deposits compared with those underlying and overlying

deposits (MA & SUN 2008). In the Tieshan section near Guilin of Guangxi, this event seems to be represented by siliceous-banded limestones and carbonaceous limestone-black mudstone intercalations in a general oolitic limestone sequence (YIN 2008; Fig. 7 herein). Distribution of benthic faunas is not clear yet as most platform areas were either too shallow (intertidal) or too restricted, which leads to the rarity of benthic fossils.

In western Junggar of northwestern China (considered to be part of the Kazakhstan plate), this event seems well represented and consistent with the occurrence of a *Platyclymenia* ammonoid fauna (MA et al. 2011; a fully detailed work on the ammonoids is about to be published by ZONG et al. 2014), representing a marine transgression.

Dasberg Event

HOU (2008) recently suggested that the base of the Shaodongian be defined by the first occurrence of *Eoendothyra c. regularis* in the foraminifer *E. communis*→*E. regularis* lineage. This stage mainly includes the Shaodong and Menggong'ao Formations (or the undivided Menggong'ao Fm.) and the lower Guiyang Formation in central-southern Hunan and the Etoucun Formation in Guangxi. Its base cannot be accurately determined in terms of the conodont zonation. TAN et al. (1987a) gave an age range from the Upper *postera* to Lower *expansa* Zones. JI (1986) concluded that the upper part of the Shaodong Fm., which yields the *Caninia dorlodoti* coral Assemblage (a name replaced with the *Eocaninophyllum yizhangense* Assemblage since *Caninia dorlodoti* is not present in South China and its usage in Europe is chaotic according to HOU, 2008 and reference therein), has an age older than the Strunian. The base of the Strunian, which is generally considered to be marked by the foraminifer *Quasiendothyra kobeitusana*, may be correlated with the Upper *expansa* Zone (e.g., STREEL et al. 2007) or is within the Middle *expansa* Zone (SANDBERG 2007). The foraminifer *E. communis* Zone may be correlated with the *postera* to the Middle *expansa* Zones (GIBSHMAN & NIKOLAEVA 2011). In the Etoucun section in the vicinity of Guilin (YIN in ZHONG et al. 1992), *E. communis* occurs at about 60 m below the top of the Dongcun Formation, and immediately above at the base of the Etoucun Formation occurs *E. regularis*, which is about 70 m below the Devonian-Carboniferous boundary. Judging from the thickness, the base of the Shaodongian may be correlated with a level somewhere in the lower part of the *expansa* Zone according to YIN (2008), who tentatively correlated the proposed Yangshuoan Stage with the *trachytera* through Lower *expansa* Zones (Fig. 8).

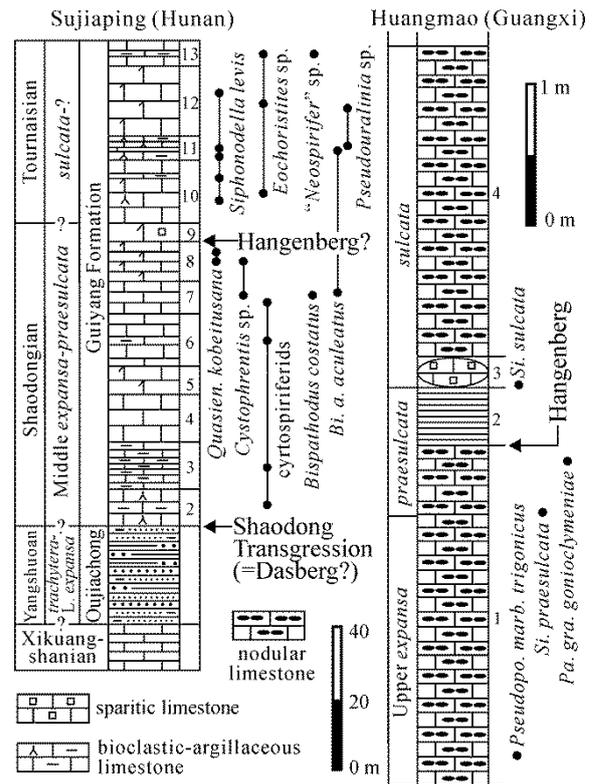


Fig. 8. Columnar sections showing their lithologic sequences and distribution of some important fossils of Sujiaping-Lijiaping (Oujiang and Guiyang Formations) against regional stage names: Yangshuoan and Shaodongian) and Huangmao (D/C boundary interval) (adapted respectively from TAN et al. 1987a and BAI et al. 1994).

In South China, the start of the Shaodongian represents a widely-recognized transgression episode (Shaodong Event of HOU 2008; cf. MA et al. 2009: Shaodong Transgression, fig. 7 therein), with new corals (e.g., the *Ceriphyllum elegantum*, *Eocaninophyllum yizhangense*, and *Cystophrentis* Assemblages) and brachiopods (e.g., *Trifidorostellum longhuiensis* Assemblage). This event is probably corresponding to the diachronous Dasberg Events from the upper Lower *expansa* to the basal Middle *expansa* Zones (BECKER & HARTENFELS 2008, HARTENFELS 2011).

Hangenberg Event

In the pelagic facies areas of South China, the D/C boundary shale (Changshun Shale or Gedongguan Bed), which corresponds with the Hangenberg Event (Fig. 8: Unit 2 of Huangmao section), is widespread. Carbon isotope data show a general decreasing trend from ~2‰ to about 1‰ in the limestone sequence (BAI et al. 1994); whereas in the neritic facies, the trend is opposite, from ~1.3‰ to ~2.3‰ in the Lijiaping section. The thickness from the Upper *expansa*-Lower *praesulcata* through the *sulcata* Zones in the pelagic facies is generally 5

to 10 m, including Huangmao, Lali, Zhaisha, and Muhua sections.

In the shallow water carbonate facies areas of South China, accurate conodont zonation can hardly be established. The Hangenberg Event level is commonly considered to be close to the Devonian/Carboniferous boundary (Fig. 8: Sujiaping section). The event may be represented by a sandstone-siltstone layer (nearshore clastic and carbonate sequence in central Hunan) or fenestral limestone (limestone sequence in southern Hunan) (TAN et al. 1994, HOU et al. 2011). Benthic faunas show a distinct turnover across the event. The pre-event corals were represented by the *Cystophrentis* Assemblage, replaced by the post-event *Pseudouralinia* (= *Uralinia*) Assemblage; whereas the pre-event cyrtospiriferids-bearing fauna (Brachiopoda) was replaced by the *Spirifer-Unispirifer* fauna, which is considered to be of the Carboniferous (Fig. 8). Detailed studies of the event interval, whether in pelagic or benthic facies, are still needed.

Acknowledgments

A number of colleagues and students are thanked for their help during our previous field work, including KUANG Guodun (Guangxi Institute of Geology, Nanning), YIN Bao'an (Guangxi Regional Geological Survey), TAN Zhengxiu (Hunan Regional Geological Survey), WEI Longming (Guilin University of Technology), and a number of students. Special thanks are due to Prof. BAI Shunliang, who guided the senior author to a number of key sections. His unexpected death stimulated us to compile the present review in commemoration of him. This work was supported by National Natural Science Foundation of China (Grants 41290260 and 40872007).

References

- ABOUSSALAM, Z.S. 2003. Das "Taghanic-Event" im höheren Mittel-Devon von West-Europa und Marokko. – *Münstersche Forschungen zur Geologie und Paläontologie*, **97**: 1-332.
- BAI, S.-L. 1995. *High resolution correlation, Milankovitch cyclicity and nickel event - evidence from the Devonian of South China*. - 62 pp., Peking University Press (Beijing).
- BAI, S.-L., BAI Z.-Q., MA, X.-P., WANG, D.-R. SUN, Y.-L. 1994. *Devonian Events and Biostratigraphy of South China*. - 303 pp., 45 pls., Peking University Press (Beijing).
- BAI, S.-L., JIN, S.-Y. & NING, Z.-S. 1982. *Devonian biostratigraphy of Guangxi and adjacent area*. – 203 pp., Peking University Press (Beijing) (in Chinese).
- BECKER, R.T. 1992. Zur Kenntnis von Hemberg-Stufe und *Annulata*-Schiefer im Nordsauerland (Oberdevon, Rheinisches Schiefergebirge, GK 4611 Hohenlimburg). – *Berliner geowissenschaftliche Abhandlungen*, **E3**: 3-41 (in German with English summary).
- BECKER, R.T. 2007. Correlation of the proposed Middle Givetian Substage with the global ammonoid record. - *SDS Newsletter*, **22**: 17-23.
- BECKER, R.T. & ABOUSSALAM, Z.S. 2011. Emsian chronostratigraphy - preliminary new data and a review of the Tafilalt (SE Morocco). - *SDS Newsletter*, **26**: 33-43.
- 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.
- CHEN, D.-Z., QING, H.-R. & LI, R.-W. 2005. The Late Devonian Frasnian - Famennian (F/F) biotic crisis: Insights from $\delta^{13}\text{C}_{\text{carb}}$, $\delta^{13}\text{C}_{\text{org}}$ and $^{87}\text{Sr}/^{86}\text{Sr}$ isotopic systematics. - *Earth and Planetary Science Letters*, **235**: 151-166.
- CHEN, D.-Z. & TUCKER, M. E. 2003. The Frasnian-Famennian mass extinction: insights from high-resolution sequence stratigraphy and cyclostratigraphy in South China. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **193**: 87-111.
- CHEN, D.-Z., TUCKER, M. E., JIANG, M.-S. & ZHU, J.-Q. 2001a. Long-distance correlation between tectonic controlled, isolated carbonate platforms by cyclostratigraphy and sequence stratigraphy in the Devonian of South China. - *Sedimentology*, **48**: 57-78.
- CHEN, D.-Z., TUCKER, M. E., ZHU, J.-Q. & JIANG, M.-S. 2001b. Carbonate sedimentation in a starved pull-apart basin, Middle to Late Devonian, southern Guilin, South China. - *Basin Research*, **13**: 141-167.
- CHEN, D.-Z., WANG, J.-G., RACKI, G., LI, H., WANG, C.-Y., MA, X.-P. & WHALEN, M.T. 2013. Large sulphur isotopic perturbations and oceanic changes during the Frasnian-Famennian transition of the Late Devonian. - *Journal of the Geological Society*, **170**: 465-476.
- COEN, M. & GROESSENS, E. 1996. Conodonts from the Devonian-Carboniferous transition beds of central Hunan, South China. - *Mémoires de l'Institut Géologique de l'Université de Louvain*, **36**: 21-28.
- DU, Y.-S., GONG, Y.-M., ZENG, X.-W., HUANG, H.-W., YANG, J.-H., ZHANG, Z. & HUANG, Z.-Q. 2008. Devonian Frasnian-Famennian transitional event deposits of Guangxi, South China and their

- possible tsunami origin. - *Science in China, Series D: Earth Sciences*, **51**: 1570-1580.
- GARCÍA-ALCALDE, J. L. 1997. North Gondwanan Emsian events. - *Episodes*, **20**: 241-246.
- 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.
- GONG, Y.-M., LI, B.-H., SI, Y.-L. & WU, Y. 2002. The Late Devonian red tide and mass extinction. - *Chinese Science Bulletin*, **47**: 554-560.
- GONG, Y.-M., XU, R., TANG, Z.-D., SI, Y.-L. & LI, B.-H. 2005. Relationships between bacterial-algal proliferating and mass extinction in the Late Devonian Frasnian-Famennian transition: Enlightening from carbon isotopes and molecular fossils. - *Science in China Series D: Earth Sciences*, **48**: 1656-1665.
- HARTENFELS, S. 2011. The global *Annulata* Events and The Dasberg Crisis (Famennian, Upper Devonian) of Europe and North Africa - High resolution conodont stratigraphy, carbonate microfacies, palaeoecology, and palaeodiversity. - *SDS Newsletter*, **26**: 78-81.
- HOU, H.-F. 2008. *A comprehensive research report on the Shaodong Stage (Devonian)*. - In: The third National Stratigraphical Council of China (Ed.), Report on regional stages of major stratigraphic intervals in China (2001-2005): 324-332, Geological Publishing House (Beijing) (in Chinese).
- HOU, H.-F., JI, Q., XIAN, S.-Y. & WANG, J.-X. 1986. *Middle-Upper Devonian Boundary in Maanshan of Xiangzhou, Guangxi*. - 137 pp., 49 pls., Geological Publishing House (Beijing) (in Chinese).
- HOU, H.-F. & XIAN, S.-Y. 1975. Early and Middle Devonian brachiopods from Guangxi and Guizhou. - *Professional Papers of Stratigraphy and Palaeontology*, **1**: 1-85, pls. 1-32 (in Chinese).
- HOU, H.-F., ZHOU, H.-L. & LIU, J.-B. 2011. Microbial sediments occurring after the end-Devonian extinction event on the Hunan platform. - *Acta Geologica Sinica*, **85**: 145-156.
- HOUSE, M.R. 2002. Strength, timing, setting and cause of mid-Palaeozoic extinctions. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **181**: 5-25.
- JI, Q. 1986. Conodonts and conodont biofacies of the Shaodong Formation in Jieliang, central Hunan. - *Professional Papers of Stratigraphical Palaeontology*, **15**: 73-79 (in Chinese with English abstract).
- JI, Q. 1989/1990. On the Frasnian-Famennian mass extinction event in South China. - *Courier Forschungsinstitut Senckenberg*, **117**: 275-301, pls. 1-4.
- KUANG, G.-D, ZHAO, M.-T. & TAO, Y.-B. 1989. *The standard Devonian section of China: Liujing section of Guangxi*. - 154 pp., 48 pls., China University of Geosciences Press (Wuhan) (in Chinese with English abstract).
- LI, H., MA, X.-P. & WEI, L.-M. 2009a. A new Middle-Upper Devonian boundary section in the open platform-platform margin facies of Guilin, South China. - *Acta Geologica Sinica*, **83**: 524-534.
- LI, H., MA, X.-P. & WEI, L.-M. 2009b. Sedimentary facies and sea-level change across the Middle-Upper Devonian boundary at Caiziyan section, Guangxi: The mid-Givetian regression and its timing in South China. - *Journal of Palaeogeography*, **11**: 503-512 (in Chinese with English abstract).
- LIAO, W.-H. & MA, X.-P. 2007. The assemblage sequences and characteristics of the Devonian Givetian and Frasnian rugose corals in near-shore facies from South China. - *Acta Palaeontologica Sinica*, **46**: 213-224 (in Chinese with English abstract).
- MA, X.-P. & BAI, S.-L. 2002. Biological, depositional, microspherule, and geochemical records of the Frasnian/Famennian boundary beds, South China. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **181**: 325-346.
- MA, X.-P., BAI, Z.-Q., SUN, Y.-L., ZHANG, Y.-B. & WANG, J.-H. 2004. Lithologic and biostratigraphic aspects of the Shetianqiao section, the stratotype section for the Upper Devonian Shetianqiao Stage of China. - *Professional Papers of Stratigraphy and Palaeontology*, **28**: 89-110, pls.1-4 (in Chinese with English abstract).
- MA, X.-P., BECKER, R.T., LI, H. & SUN, Y.-Y. 2006. Early and Middle Frasnian brachiopod faunas and turnover on the South China shelf. - *Acta Palaeontologica Polonica*, **51**: 789-812.
- MA, X.-P., LIAO, W.-H. & WANG, D.-M. 2009. The Devonian system of China, with discussion on sea-level change in South China. - In: KÖNIGSHOF, P. (Ed.), Devonian Change: Case Studies in Palaeogeography and Palaeoecology. Geological Society, London, *Special Publications*, **314**: 241-262.
- MA, X.-P. & SUN, Y.-L. 2008. Brachiopod faunal successions and the subdivision of the Famennian in South China. - *SDS Newsletter*, **23**: 32-34.

- MA, X.-P., SUN, Y.-L., HAO, W.-C., & LIAO, W.-H. 2002. Rugose corals and brachiopods across the Frasnian-Famennian boundary in central Hunan, South China. - *Acta Palaeontologica Polonica*, **47**: 373-396.
- MA, X.-P., WANG, C.-Y., RACKI, G. & RACKA, M. 2008. Facies and geochemistry across the Early-Middle Frasnian transition (Late Devonian) on South China carbonate shelf: comparison with the Polish reference succession. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **269**: 130-151.
- MA, X.-P. & ZONG, P. 2010. Middle and Late Devonian brachiopod assemblages, sea level change and paleogeography of Hunan, China. - *Science China (Earth Sciences)*, **53**: 1849-1863.
- 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.
- MARSHALL, J.E.A. 2008. Famennian correlation chart. - *SDS Newsletter*, **23**: 45.
- MU, D.-C. 1978. *Devonian tentaculitid zonation in South China*. - In: Inst. Geol. Min. Res. (Ed.), Symposium on the Devonian System of South China: 270-279, Geological Publishing House (Beijing) (in Chinese).
- RUAN, Y.-P. 1981. Devonian and earliest Carboniferous ammonoids from Guangxi and Guizhou. - *Memoirs of Nanjing Institute of Geology and Palaeontology, Academia Sinica*, **15**: 1-151 (in Chinese with English abstract).
- SANDBERG, C. A. 2007. Comment on proposed uppermost Famennian "Substage". - *SDS Newsletter*, **22**: 41-43.
- SHEN, J.-W. 1995. Middle-Upper Devonian conodont succession and sea-level change in Guilin. - *Acta Micropalaeontologica Sinica*, **12**: 251-273.
- STREEL, M., MAZIANE-SERRAJ, N., MARSHALL, J.E.A. & THOREZ, J. 2007. A reference section for neritic facies at the transition late to latest Famennian. - *SDS Newsletter*, **22**: 34-40.
- TAN, Z.-X., DONG, Z.-C., JIN, Y.-L., LI, S.-Q., YANG, Y.-C. & JIANG, S.-G. 1987a. *The Late Devonian and Early Carboniferous strata and palaeobiocoenosis of Hunan*. - 200 pp., 31 pls., Geological Publishing House (Beijing). (in Chinese with English abstract).
- TAN, Z.-X., DONG, Z.-C. & TANG, X.-S. 1987b. On the Qiziqiao Limestone. - *Journal of Stratigraphy*, **11**: 77-90 (in Chinese with English abstract).
- TAN, Z.-X., DONG, Z.-C., ZENG X.-Y et al. 1992. *Division and correlation of the Upper Devonian of Hunan. Regional Geological Survey, Bureau of Geology and Mineral Resources of Hunan Province*. - 145 pp., 30 pls. (in Chinese with English abstract).
- TAN, Z.-X., ZHU, L.-J., REN, X.-H. & LI, G.-B. 1994. On the Menggong'ao Formation. - *Regional Geology of China*, **1994** (2): 165-171 (in Chinese with English abstract).
- WANG, C.-Y. 1982. Upper Silurian and Lower Devonian conodonts from Lijiang of Yunnan. - *Acta Palaeontologica Sinica*, **21**: 436-477 (in Chinese with English abstract).
- WANG, C.-Y. 1989. Devonian conodonts of Guangxi. - *Memoirs of Nanjing Institute of Geology and Palaeontology, Academia Sinica*, **25**: 1-212. (in Chinese with English abstract)
- WANG, G.-X., JING, Y.-J., ZHUANG, J.-L., ZHANG, C.-F. & HU, W.-Q. 1986. Stratigraphical system of Devonian-Lower Carboniferous Epoch of Xikuangshan area in central region of Hunan. - *Hunan Geology*, **5**: 48-65, **6**: 36-50. (in Chinese with English abstract).
- WU, Y., GONG, Y.-M. & DU, Y.-S. 1997. *Devonian sequence stratigraphy and sea level change of South China*. - 110 pp., China University of Geosciences Press (Wuhan) (in Chinese with English abstract).
- WU, Y.-B., FENG, Q. & GONG, Y.-M. 2013. Blooming of bacteria and algae is a biokiller for mass-extinction of Devonian coral-stromatoporoid reef ecosystems. - *Science China (Earth Sciences)*, **56**: 1221-1232.
- XU, B., GU, Z.-Y., LIU, Q., WANG, C.-Y. & LI, Z.-L. 2003. Carbon isotopic record from Upper Devonian carbonates at Dongcun in Guilin, southern China, supporting the world - wide pattern of carbon isotope excursions during Frasnian-Famennian transition. - *Chinese Science Bulletin*, **48**: 1259-1264.
- XU, R., GONG, Y.-M. & ZENG, J.-W. 2008. Coupling relationships between brachiopods and *Girvanella* during the Late Devonian F-F transition in Guilin, South China. - *Science in China Series D: Earth Sciences*, **51**: 1581-1588.
- YIN, B.-A. 2008. *A comprehensive research report on the "Unnamed Stage" (Yangshuo Stage) of the Upper Devonian*. - In: The third National Stratigraphical Council of China (Ed.), Report on regional stages of major stratigraphic intervals in China (2001-2005): 345-356, Geological Publishing House (Beijing) (in Chinese).
- YIN, B.-A., TAN, J.-Z., LU, J.-P., TANG, Z.-H., LI, Y.-K. & XU, Z.-X. 2012. *A comprehensive research report on the Donggangling Stage of the Upper Devonian*. - In: The third National Stratigraphical Council of China (Ed.), Report on

regional stages of major stratigraphic intervals in China (2006-2009): 196-208, Geological Publishing House (Beijing) (in Chinese).

YU, C.-M. & LIAO, W.-H. 1978. Lower Devonian rugose corals from Alengchu of Lijiang, NW Yunnan. – *Acta Palaeontologica Sinica*, **17** (3): 245-265 (in Chinese with English abstract).

YU, C.-M., XU, H.-K., PENG, J., XIAO, S.-T. & LIU, Z.-H. 1983. *The Devonian of Hunan and its mineral resources*. - In: The editorial team for the symposium on the siderite ore deposits (Ed.), Papers submitted to the symposium on the siderite ore deposits: 262-298, Science Press, (Beijing) (in Chinese).

YU, C.-M., XU, H.-K., PENG, J., XIAO, S.-T. & LIU, Z.-H. 1990. Devonian stratigraphy, palaeogeography and mineral resources in Hunan. - *Palaeontologia Cathayana*, **5**: 85-138.

ZENG, J.-W., XU, R. & GONG, Y.-M. 2011. Hydrothermal activities and seawater acidification in the Late Devonian F-F transition: Evidence from geochemistry of rare earth elements. - *Science China (Earth Sciences)*, **54**: 540-549.

ZHAO, W.-J., HERTEN, U., ZHU, M., MANN, U., & LÜCKE, A. 2010. Carbon isotope stratigraphy across the Silurian-Devonian transition in Zoige (West Qinling), China. - *Bollettino della Società Paleontologica Italiana*, **49**: 35-45.

ZHAO, W.-J., WANG, N.-Z., ZHU, M., MANN, U., HERTEN, U. & LÜCKE, A. 2011. Geochemical Stratigraphy and Microvertebrate Assemblage Sequences across the Silurian/Devonian Transition in South China. – *Acta Geologica Sinica*, **85**: 340-353.

ZHONG, K., WU, Y., YIN, B.-A., LIANG, Y.-L., YAO, Z.-G., PENG, J.-L. 1992. *Stratigraphy of Guangxi, China, Part 1: Devonian of Guangxi*. – 384 pp., 16 pls., China University of Geosciences Press (Wuhan) (in Chinese with English abstract).

ZONG, P., BECKER, R.T. & MA, X. 2014. Upper Devonian (Famennian) and Lower Carboniferous (Tournaisian) ammonoids from western Junggar,

Xinjiang, northwestern China – stratigraphy, taxonomy and palaeobiogeography. – *Palaeobiology and Palaeoenvironments*, doi 10.1007/s12549-014-0171-y.

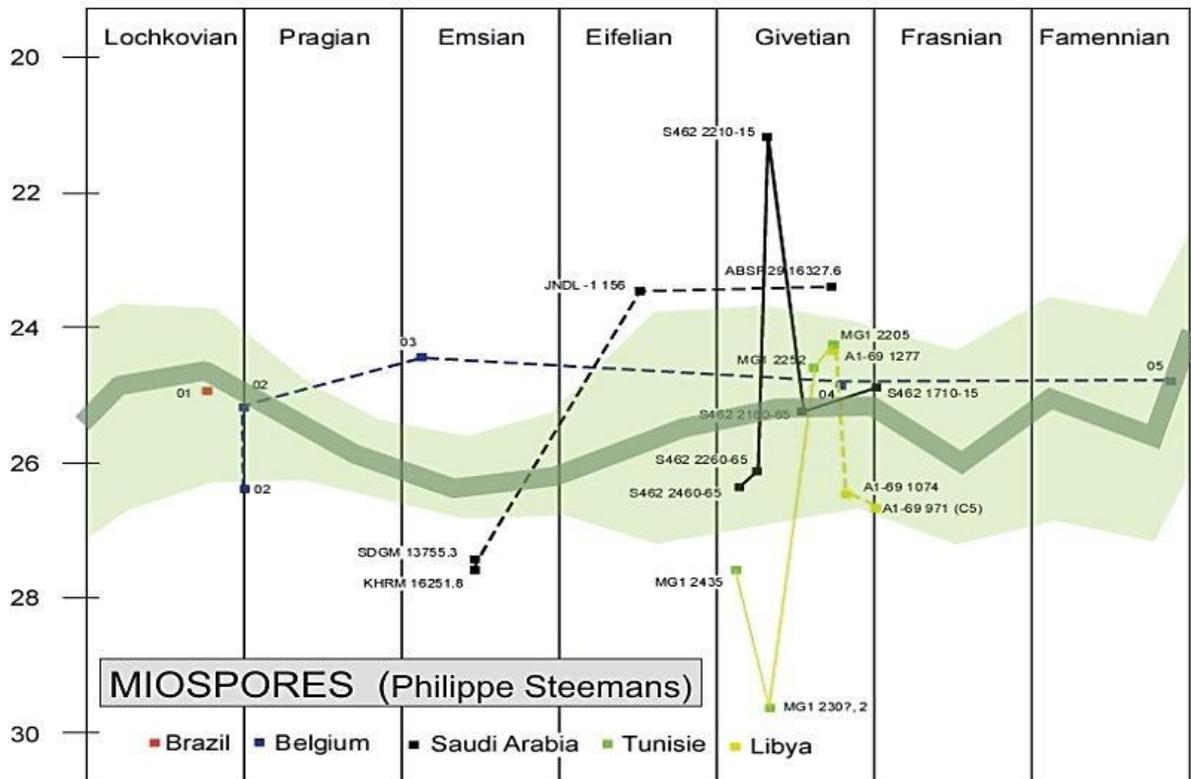
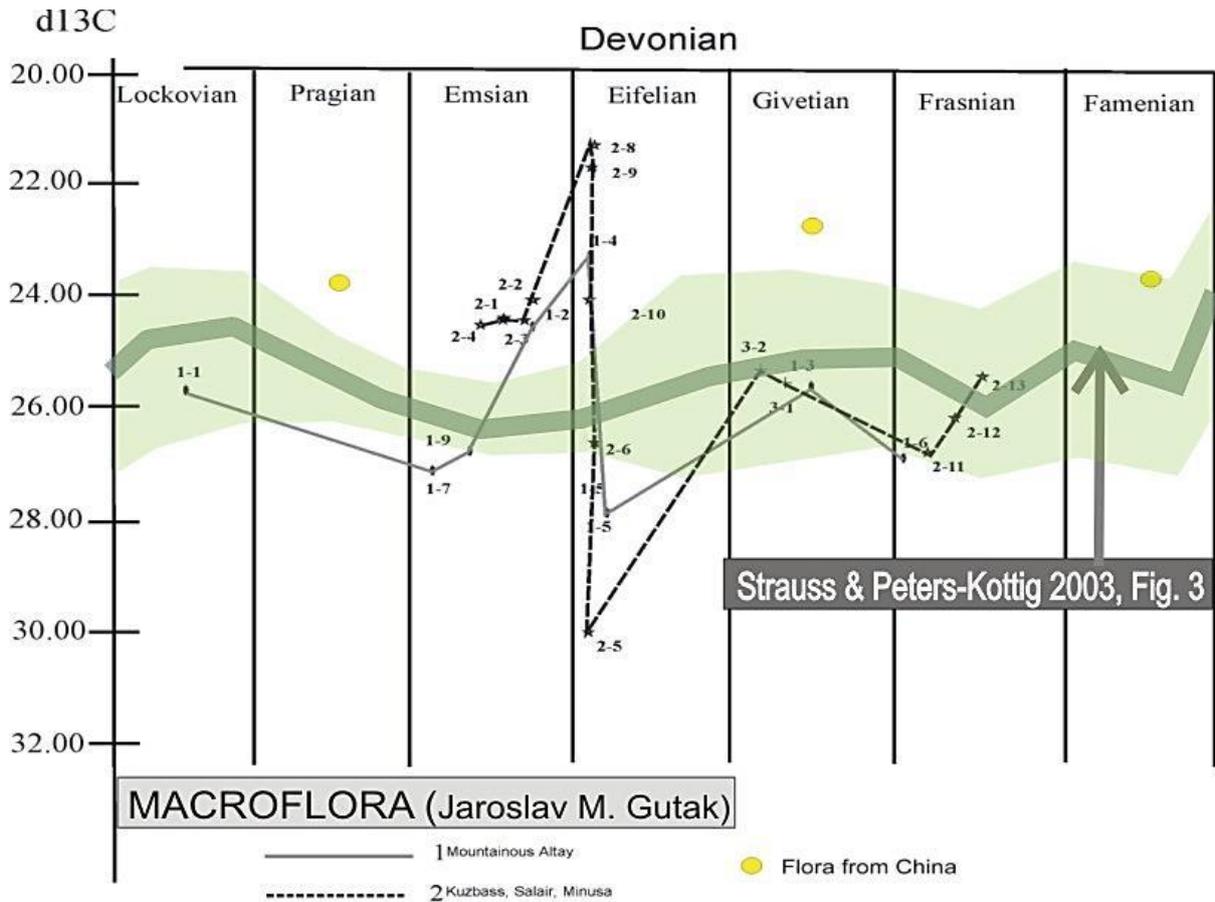
CARBON ISOTOPE RATIOS IN DEVONIAN TERRESTRIAL ORGANIC MATTER – CALL FOR SAMPLES

G. RACKI & M. JOACHIMSKI

Since three years we are studying carbon isotope ratios in terrestrial organic matter, with the aim (1) to construct a high-resolution $\delta^{13}\text{C}_{\text{org}}$ curve for the entire Devonian time, and (2) to compare/correlate this refined chemostratigraphic pattern with the well-studied and eventful Devonian marine isotopic record.

First results, based on Siberian carbonized macrofloral material, provided by J.M. GUTAK, were very promising but limited mostly to the Emsian-Givetian interval. These intra-stage data suggest large-scale changes in the terrestrial carbon record (contrasting with a balanced general trend; STRAUSS & PETERS-KOTTIG 2003, G3). However, miospore samples supplied by P. STEEMANS from 5 distant regions, exhibit a more chaotic and incomparable time series (potentially the variation in the carbon isotope ratios was partly promoted by marine palynomorph “contamination”), as shown in the figure below.

Therefore, we would be very grateful for the support from SDS members in this still unsuccessful search for terrestrial organic carbon samples. Supplying WELL-DATED carbonized plant remains (or palynomorphs) of terrestrial origin, especially from the lowermost and Upper Devonian stages, is highly welcome and would contribute to a better understanding of the evolution of the Devonian carbon cycle.





4TH INTERNATIONAL PALAEOLOGICAL CONGRESS



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

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



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

Contributions to Special Session IGCP 596 / SDS – IPC, Argentina

The list is a suggested order of contributions (O = oral presentations; P = Poster presentations)
The Special Session will take place on Friday, 3rd of October, 2014

	Morning Session	Friday October 3rd
No	List of authors	Title of the contribution
O-1	Peter Königshof, Thomas J. Suttner, Iliana Boncheva, Nadya G. Izokh ⁴ , Ta Hoa Phuong, Thasinee Charoentitirat, Johnny A. Waters, Wolfgang Kiessling and Erika Kido	CLIMATE CHANGE AND BIODIVERSITY PATTERNS IN MID-PALAEOZOIC (IGCP 596) – INTRODUCTION AND REPORT
O-2	Willian Matsumura, Roberto Iannuzzi, Rodrigo S. Horodyski and Elvio Bosetti ²	LAND PLANT ASSEMBLAGE TAPHOFACIES IN MIDDLE DEVONIAN OF PARANÁ BASIN, SOUTHERN BRAZIL
O-3	Willian M.K. Matsumur, Mercedes di Pasquo, Roberto Iannuzzi, Sol Noetinger and Elvio Bosetti	DEVONIAN FLORA SUCCESSION IN GONDWANA: STATE OF ART IN SOUTH AMERICA
O-4	Pierre Breuer	THE SIGNIFICANCE OF THE EARLY DEVONIAN D3B PALYNOSUBZONE TO REGIONAL CORRELATIONS AND SEQUENCE STRATIGRAPHY OF THE JAUF FORMATION, SAUDI ARABIA
O-5	Ana P. S. Franciso and Sandro M. Scheffler	THE DECLINE OF THE MALVINOKAFFRIC STALKED ECHINODERMS FAUNA (CRINOIDEA; BLASTOIDEA) FROM PARANÁ BASIN (PONTA GROSSA AND SÃO DOMINGOS FORMATIONS), STATE OF PARANÁ, BRAZIL
O-6	Johnny A Waters	ECHINODERM COMMUNITY EVOLUTION IN THE LATE DEVONIAN AND MISSISSIPPIAN
O-7	John E. A. Marshall and Olga P. Tel'nova	THE FRASNIAN-FAMENNIAN MASS EXTINCTION
O-8	S. Hartenfels and R. Thomas Becker	NEW DATA ON UPPER DEVONIAN BLACK SHALE EVENTS IN THE EASTERN PART OF THE CENTRAL MOROCCAN MESETA
O-9	R. Thomas Becke ¹ and Z. Sarah Aboussalam	DEVONIAN GLOBAL EVENTS IN THE MOROCCAN MESETA – AN UPDATE
	Afternoon Session	Friday October 3rd
O-10	Tomáš Weiner and Jiří Kalvoda	THE <i>ANNULATA</i> EVENTS IN THE MORAVIAN KARST – REMARKS ON STRATIGRAPHY (FAMENNIAN, CZECH REPUBLIC)
O-11	Jay Zambito and Jed Day	NEW INSIGHTS INTO THE STRATIGRAPHIC FRAMEWORK OF THE MIDDLE-UPPER DEVONIAN TRANSITION IN THE MICHIGAN BASIN, U.S.A.
O-12	Carlo Corradini, Maria G. Corrigan, Erika Kido, Monica Pondrelli, Hans Peter Schönlaub, Luca Simonetto, Claudia Spalletta and Thomas Suttner	LOCHKOVIAN (LOWER DEVONIAN) CONODONT STRATIGRAPHY OF THE CARNIC ALPS (ITALY-AUSTRIA)

O-13	Tomas Kumpan, Ondrej Babek, Jiri Kalvoda, Tomas Matys Grygar, Jiri Fryda	CORRELATIONS OF THE EUROPEAN DEVONIAN-CARBONIFEROUS BOUNDARY SUCCESSIONS: AN INTEGRATED STRATIGRAPHIC APPROACH
O-14	Jau-Chyn Liao and José I. Valenzuela-Ríos	APPLICATION OF THE INTENDED GIVETIAN SUBDIVISION (MIDDLE DEVONIAN) SENSU SDS IN THE SPANISH CENTRAL PYRENEES: SUPPORT FOR GLOBAL CORRELATIONS
O-15	Katarzyna Narkiewicz	SYSTEMATICS OF THE MIDDLE DEVONIAN ICRIODIDS RELATED TO <i>I. ORRI</i> KLAPPER ET BARRICK: AN EXAMPLE OF TAXONOMIC PROBLEMS INVOLVED IN DEFINITION OF CONODONT SPECIES
O-16	Ulrich Jansen, Nihat Bozdoğan, Rainer Brocke, Kaya Ertuğ, Robert M. Finks, Helga Groos-Uffenorde, Raimund Haude, Hüseyin Kozlu, Gonça F. Nalcioğlu, Atike Nazik, Recep Özkan, R. Hayrettin Sancay, D. Gülnur Saydam-Demiray, Eberhard Schindler, Emine Şeker, Karsten Weddige, Achim Wehrmann, Volker Wilde, M. Namık Yalçın and Isak Yılma	NEW PALAEONTOLOGICAL DATA FROM THE DEVONIAN OF TURKEY
O-17	Tonarová, P. , Hints, O. , Königshof, P. , Suttner, T.J. , Kido, E. , Da Silva, A.C., Pas, D.	MIDDLE DEVONIAN SCOLECODONTS OF THE EIFEL AREA, GERMANY
O-18	Hans-Georg Herbig ¹ , Michael R.W. Amler ¹ & Christian J. Nyhuis ¹	MAXIMUM COMPLETENESS EPIBOLE – A NEW TYPE OF TAPHONOMIC EPIBOLES FROM LATE VISEAN (LATE MISSISSIPPIAN) BASINAL SETTINGS IN GERMANY
	Poster Session	Friday October 3rd
P	Peter Königshof, Anne-Christine Da Silva, Thomas J. Suttner, Erika Kido, Johnny A. Waters, Sarah K. Carmichael, Ulrich Jansen, Damien Pas, Simo Spasso ⁵ and Michael M. Joachimski	SHALLOW WATER FACIES SETTING AROUND THE KACAK EVENT – A MULTIDISCIPLINARY APPROACH
P	José I. Valenzuela-Ríos	THE LOCHKOVIAN (LOWER DEVONIAN) CONODONT SEQUENCE IN THE SPANISH CENTRAL PYRENEES: A REFERENCE FOR GLOBAL STUDIES ON PELAGIC FACIES
P	Dmitry P. Plax	LATE EIFELIAN ICHTHYOFAUNA OF BELARUS
P	Tomáš Weiner, Jiří Kalvoda, Peter Müller and Hedvika Poukarová	NEW DATA ON MISSISSIPPIAN TRILOBITES FROM THE MORAVIAN KARST (CZECH REPUBLIC)



Joint meeting IGCP-580 & IGCP-596 : Geophysical and Geochemical Techniques:

A Window on the Palaeozoic World - Calgary, Canada, 27 Aug. - 1st Sept. 2013



Organized by:

Michael WHALEN, Kirk OSADETZ, Barry RICHARDS, Pavel KABANOV, John WEISSENBERGER, Ken POTMA, Peter KOENIGSHOF, Thomas SUTTNER, Erika KIDO & Anne-Christine DA SILVA

Devonian contributions:

BAHRAMI, A., BONCHEVA, I., SAFARI, Z. & YAZDI, M. – Middle Devonian environment and pre-Taghanic event in Central Iran.

BENNETT, C.E., KEARSEY T., DAVIES, S.J. MILLWARD, D., CLACK, J., MARSHALL, J.E.A., SMITHSON, T., FRASER, N., LENG, M.J., SMITHSON, K., BROWNE, M.A.E. & ROSS, A. – Rebuilding terrestrial ecosystems after the end-Devonian mass extinction: insights from the TW:eed Project.

CHEN, D. & JIANG, M. – Cyclic platform carbonate deposition and post-extinction biotic recovery during the Famennian of Late Devonian in Guangxi, South China: Insights from high-resolution cycle and sequence Stratigraphy.

DA SILVA, A.C., GEORGE, A.D., CHOW, N. & SPASSOV, S. – Characterisation of cyclicity and relative sea-level fluctuations using magnetic susceptibility, Late Devonian (Frasnian) Hull platform, Canning Basin, Australia.

DA SILVA, A.C., KERSHAW, S., BOULVAIN, F., HUBERT, B. L. M., MISTIAEN, B., REYNOLDS, A. & REITNER, J. – Spicules or no spicules in Devonian stromatoporoids, that's the question?

DAY, J., WITZKE, B.J., ROWE, H. & ELLWOOD, B. – Magnetic susceptibility and carbon isotope stratigraphies through the Devonian-Carboniferous boundary interval in the western Illinois basin-central North America.

DE VLEESCHOUWER, D., BOULVAIN, F., DA SILVA, A. C., PAS, D., LABAYE, C. & CLAEYS, P. – The astronomical calibration of the Givetian (Middle Devonian) time scale (Dinant Synclinorium, Belgium).

DEVLEESCHOUWER, X., YANS, J., DELLE VIGNE, A., PETITCLERC, E., SPASSOV, S., CASIER, J.-G. & PRÉAT, A. – Changes in carbonate production and detrital influx in relation with the Frasnian

Event (Sourd d'Ave section, Belgian Ardennes): new insights from multi-proxy analyses.

DEVLEESCHOUWER, X., SOBIEN, K., KUMPAN, T., SPASSOV, S., CHEN, D. & BÁBEK, O. – Multi-proxy study of shallow platform carbonates at the Devonian/Carboniferous boundary (Ertoucan and Nanbiancun, South China): a diachronous detrital event.

GOUWY, S.A., KIDO, E. & SUTTNER, T. – Mid-Devonian biodiversity and the Paleobiology Database.

GOUWY, S.A., DAY, J. & MACLEOD, K. G. – Lower and Middle Devonian conodont biostratigraphy and Conodont Apatite $\delta^{18}O$ variations in the Southern Illinois Basin, USA.

GUO, Z. & CHEN, D. – Magnetic susceptibility variations across the Frasnian-Famennian boundary successions of interplatform basinal carbonates, South China.

HUBERT, B.L.M., DEVLEESCHOUWER, X., MISTIAEN, B., BRICE, D., NICOLLIN, J.-P., CAMBIER, G., VALLET, F., POTY, E. & MOTTEQUIN, B. – Macrofauna, rock magnetism and sedimentology in the Etroeungt Limestone ('Strunian', Uppermost Famennian) at Avesnelles (northern France).

KUMPAN, T., BABEK, O., SOBIEN, K., DEVLEESCHOUWER, X., KALVODA, J. & MATYS GRYGAR, T. – Element geochemistry, gamma-ray spectrometry and magnetic susceptibility as correlative tools for the Devonian-Carboniferous boundary interval in Europe.

SERSMAA, G., KIDO, E., SUTTNER, T., WATERS, J.A. & ARIUNCHIMEG, Y. -- Middle to Late Devonian deposits of the Baruunhuurai Terrane, western Mongolia.

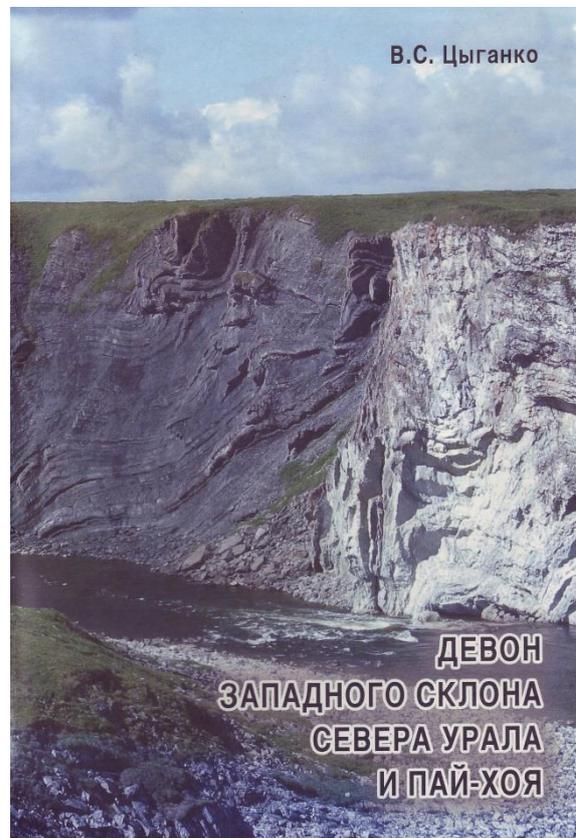
WHALEN, M.T., DE VLEESCHOUWER, D., ŚLIWIŃSKI, M.G., DAY, J.E. & CLAEYS, P. – Geochemistry and Cyclostratigraphy of Magnetic Susceptibility data from the Frasnian-Famennian event interval in western Canada: Insights into the pattern and timing of a biotic crisis.

Abstracts available on:

<http://www2.ulg.ac.be/geolsed/MS/13meetingCalgary.html>

Devonian Western Slope of the Northern Urals and Pay Khoy (stratigraphy, separation principles, correlation)

V. S. TSYGANKO



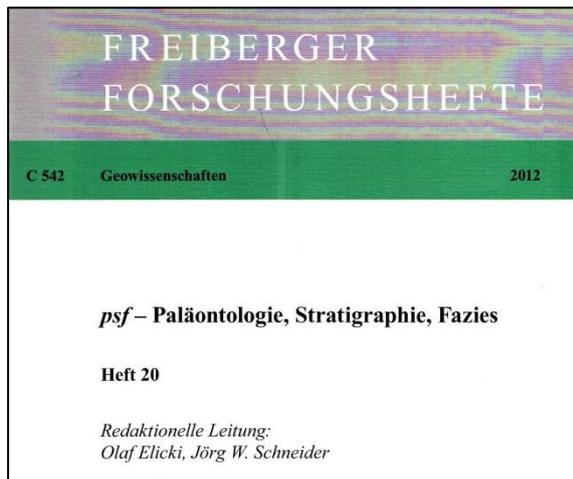
355 pp., 142 figs., Ekaterinburg (UB RAS 2011)

The detailed description of sections of the Devonian northern pre-Ural foredeep, western slope of the Northern Urals and Pay-Khoy is presented. The separation and correlations of sections were conducted considering world standards for boundaries of stages and subdivisions. Fifteen new subregional and local lithological units and members – potentially mapable rock bodies, were recognized. The study resulted in definitions of principles of boundaries for strata of variable ranges as well as in general and regional methods for the correlation of heterofacial sediments. [edited English summary]

The volume contains a wealth of data on the litho- and biostratigraphy of the region, with many faunal records, especially of conodonts, corals, brachiopods, stromatoporoids and ostracods. There are many section logs and outcrop photos but no illustration of the rich faunas.

DEVONIAN PUBLICATIONS

**FREIBERGER FORSCHUNGSHEFTE,
psf – Paläontologie, Stratigraphie, Fazies,
volumes 20 and 21**



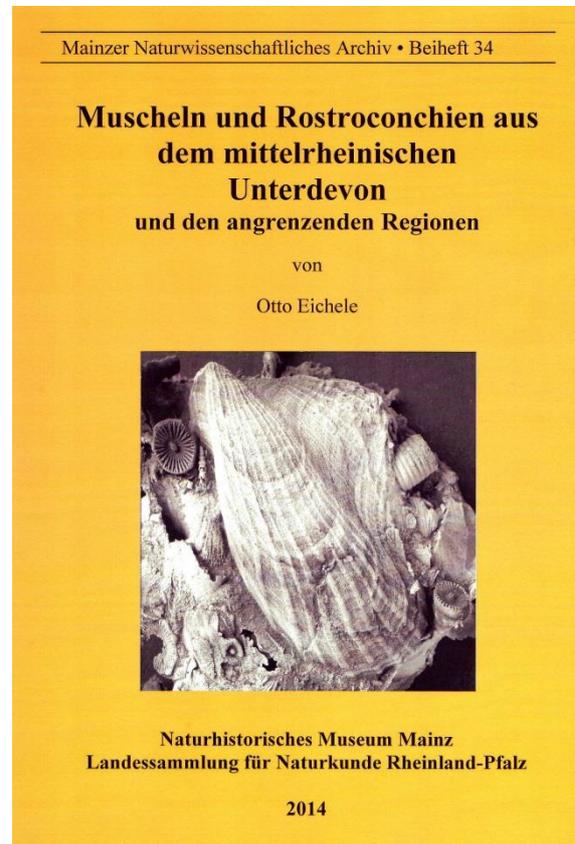
BARTZSCH, K. & WEYER, D. 2012. Zur Stratigraphie des Breternitz-Members (Obere Clymenien-Schichten, Oberdevon) von Saalfeld (Schwarzburg-Antiklinorium, Thüringisches Schiefergebirge). – *Freiberger Forschungshefte*, C 542 (psf 20): 1-54 (in German with English Abstract). [new Taxa: *Kiaborisia* n. gen. for the *Biloclymenia aktubensis* Group]

KONONOVA, L.I. & WEYER, D. 2013. Upper Famennian conodonts from the Breternitz Member (Upper Clymenioid Beds) of the Saalfeld region, Thuringia (Germany). – *Freiberger Forschungshefte*, C 545 (psf 21): 15-97. [new Taxa: *Bispathodus ultimus bartzschi* n. ssp., *Neopolygnathus margaretae* n. sp.]

Both publications are of highest importance for our current attempt to define formally an Uppermost Famennian substage. They deal with the co-occurring ammonoid and conodont faunas of the classical, strongly cyclic topmost Devonian of Thuringia. The new evidence, unfortunately, proves that the *Bispathodus ultimus* Group has taxonomic problems and that it CANNOT be easily used for substage definitions. Its first morphotypes and possible subspecies seem to overlap in time with *Goniclymenia* ammonoid faunas of Famennian V (Dasbergian of German terminology) but critical specimens of both groups still need to be figured. These important results, unfortunately, require further investigations and will delay our vote on the substage definition. [R.T. BECKER]

**Muscheln und Rostroconchien aus dem
mittelrheinischen Unterdevon
und den angrenzenden Regionen**

Otto Eichele



229 pp., including 35 pls., ISSN 0174-6626

This very helpful monograph of the bivalves (165 species and subspecies) and rostroconchs (3 species) of the Lower Devonian in the more southern Rhenish Massif appeared rather unexpectedly. It was prepared by the Palaeontological Working Group of Koblenz and tries to summarize the regional distribution of all established taxa, including descriptions and stratigraphic distributions. Four species are new: *Cornellites siegeniensis* n. sp., *C. quinquecostatus* n. sp., *C. confluentinus* n. sp., and *Goniophora rhensiensis* n. sp. The applied generic taxonomy may not fully conform with the state of the art, but despite this, the monograph now allows an easy access to the literature and diversity of both fossil groups. [R.T. BECKER]

MEMBERSHIP NEWS

CM Olga ARTYUSHKOVA and the Ufa Group

During the last year I continued with a mapping project in the north of the South Urals (western slope) bordering on the Middle Urals. It wasn't field work last summer but there were many laboratory investigations on conodonts from limestones and cherts. The preliminary results are very interesting. For the first time in the western Southern Urals, within Mayaktau Clipp, the intervals with *Gondwania juliae* (LANE & ORMISTON), *Polygnathus pirenea* (BOERSMA), *Polygnathus kitabicus* YOLKIN et al., and *Polygnathus serotinus* TELFORD were discovered in successive, condensed siliceous-carbonate units. Conodonts are numerous but very small in size and not of satisfactory preservation.

In August there was a cooperative field work with Chelyabinsk geologists in the east of the South Urals bordering on Kazakhstan. The Palaeozoic deposits in this area are represented by metamorphic volcano-sedimentary rocks from Cambrian to Carboniferous. Only some limestones are dated with macrofaunal finds. Unfortunately, conodonts weren't found to date these volcano-clastic rocks.

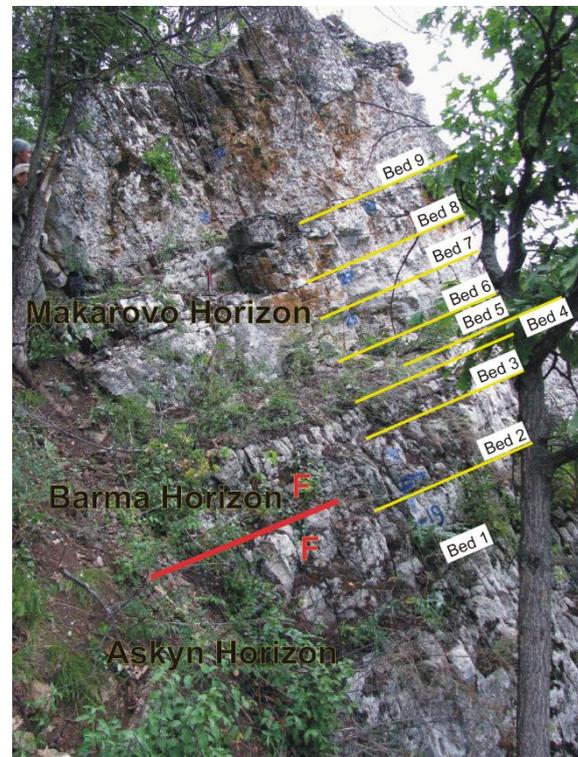
Last year I had a good experience in a core study from bores in the Tsarychansk area nearby the Orenburg gas-oilfield. It was interesting for me to find the first *Skeletognathus norrisi* (UYENO) in this region.

Tatyana MAVRINSKAYA busily continued her work on Lochkovian to Pragian conodonts from the Mindigulovo section on the Belaya River. The first results on Lochkovian conodonts were published this year in *Bulletin of Geosciences*, **88** (2) and were presented at the Field Symposium conference in Morocco.

In July 2013 it was our joint Devonian group field work. It was short and concentrated on the detailed re-sampling of the Mid-Upper Lochkovian boundary beds. This interval is well exposed in natural outcrops. We can see it being complicated by tectonics and dolomitization. Probably the mid-upper boundary is placed within dolomitic beds marked by the disappearance of *trigonicus* Zone taxa and by the appearance of upper Lochkovian species *Pandorinellina postoptima* (FARRELL), *P. kylieae* (FARRELL), and *P. exigua philipi* (KLAPPER). Unfortunately, *Masaraella pandora morphotype beta* (MURPHY et al.) was not found. This interval has an abrupt reduction in conodont numbers and diversity in opposite to the Mid-Lochkovian. The upper Lochkovian is represented mainly by the genera *Oulodus* and *Wurmiella* and at least *Pandorinellina*. Below the lower Pragian beds

with *Eognathodus sulcatus* Morphotype Eta, *Pedavis gilberti* (VALENZUELA-RIOS) was found, which supplied the upper Lochkovian zone of the same name. Thus the Mindigulovo section contains an almost complete Lochkovian conodont succession. The interval-zones *pandora* Morphotype Beta-*gilberti* and *gilberti-sulcatus* Morphotype Eta may be marked out in the upper Lochkovian, being correlated with the global conodont scale (BECKER, GRADSTEIN & HAMMER 2012).

Since May 2013 Tatyana MAVRINSKAYA also studied Pridolian and lower-mid Lochkovian conodonts from bore holes on the Russian Platform, bordering on the Timan-Petchora Oil Province. The interbedding clays, limestones and dolomites contain Pridolian conodont succession with the *eosteinhornensis* and *detortus* zone complexes and lower-mid Lochkovian *hesperius* and *omalpha-leanorae* zones.



The Kuk-Karauk-I section: Lower Famennian Barma (Bed 2 – upper part), Makarovo (Beds 3-8) and Murzakai (Bed 9) regional horizons.

Rezeda TAGARIEVA continued her Ph.D. project on conodont taxonomy and biodiversity across the F/F boundary in the western South Urals. Last summer she made a careful re-study of the Lower Famennian interval in the Ryauzyak section to compare with the Kuk-Karauk-I section.

She studied the Famennian *triangularis*-Upper *marginifera* conodont zone interval (Barma and Makarovo horizons) in the Kuk-Karauk-I section (see Fig.) in the western South Urals. She established a total of 35 species belonging to the

genera *Palmatolepis* (28 taxa), *Polygnathus* (3 taxa), *Icriodus* (2 taxa), and *Polylophodonta* (2 taxa). Also, a preliminary detailed conodont zonation was proposed for the Famennian Barma and Makarovo deposits. It's incomplete. The Upper *triangularis* and Middle - Uppermost *crepida* zones are absent. If one takes the Lower/Middle Famennian boundary at the base of the *marginifera* Zone, then the Kuk-Karauk-I section is suitable, where the base is at the base of Bed 5. This level is marked in lithology, with straticulate grey ferruginous grainstones.

Rezeda TAGARIEVA made a report on her results at the International Field Symposium in Morocco (March 2013).

Publications: Abstracts

ARTYUSHKOVA, O.V. 2013. Conodont characteristic of the Emsian-Eifelian deposits in the Sakaska section (the South Urals). - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, "The Devonian and Lower Carboniferous of northern Gondwana", Abstracts Book, *Document de l'Institut Scientifique*, Rabat, **26**: 20-22.

ARTYUSHKOVA, O.V., MASLOV, V.A., MAVRINSKAYA, T.M. & TAGARIEVA, R.C. 2013. Current state of Devonian stratigraphy in the South Urals: achievements and problems. - In: FEDONKIN, M.A., GLADENKOV, Y.B., ZAKHAROV, V.A. & IPPOLITOV A.P. (Eds.), General Stratigraphic, Scale of Russia: current state and ways of. perfection, All-Russian meeting, May 23-25, 2013, Collector of articles, Geological Institute of RAS (Moscow).

MAVRINSKAYA, T. & SLAVIK, L. 2013. Lochkovian conodont biostratigraphy in the South Urals. - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, "The Devonian and Lower Carboniferous of northern Gondwana", Abstracts Book, *Document de l'Institut Scientifique*, Rabat, **26**: 83.

TAGARIEVA, R.C. 2013. Pathological forms of conodonts from F/F boundary deposits on the Western South Urals. - In: Modern palaeontology: classical and newest methods, Abstracts, The tenth all-Russian scientific school for young scientists in paleontology, October 7-9, 2013: 39-40, Borissiak Paleontological Institute RAS (Moscow).

TAGARIEVA, R.C. 2013. Famennian conodont zonation in the Barma and Makarovo deposits at the Kuk-Karauk-I section (South Urals). - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, "The Devonian and Lower Carboniferous of northern Gondwana", Abstracts Book, *Document de l'Institut Scientifique*, Rabat, **26**: 120-122.

Papers

MAVRINSKAYA, T. & SLAVIK, L. 2013. Correlation of Early Devonian (Lochkovian-early Pragian) conodont faunas of the South Urals (Russia). - *Bulletin of Geosciences*, **88** (2), 283-296.

TAGARIEVA, R.C. 2013. 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

Due to increased department chair responsibilities, I was less involved with Devonian-related research activity during the annum 2013 period. However, field work relating to end-Devonian correlation efforts was directed to regions in northern and central Ohio (Cleveland and Columbus areas); this culminated in a post-meeting field trip and guidebook associated with the Eastern Section of the American Association of Petroleum Geologists Pittsburgh conference, in May, 2013 (see publications). Mapping work was also carried out in northwest Pennsylvania during the summer and autumn of 2013. This led to compilation of another field trip guidebook article, linked to the 85th Annual Meeting of the New York State Geological Association, coordinated by myself and others at Fredonia, New York in September, 2013. I also worked with Andrew ZAFFOS and Carlton BRETT (University of Cincinnati), as well as Alex BARTHOLOMEW (SUNY New Paltz) on paleoenvironmental gradients in the Middle Devonian Moscow Formation in western New York that was also linked to that conference. Finally, I have been involved with numerous other Devonian specialists in a large project, coordinated by Chuck VER STRAETEN (NYS Museum) to revise the time-rock stratigraphy of the Devonian System in New York State and adjacent Pennsylvania. This led to presentation of papers at the Northeast GSA Section conference held in March.

Publications:

BAIRD, G. C., HANNIBAL, J. T., WICKS, J. L., LAUGHREY, C. D. & MACK, E. A. 2013. *Field Trip 7 Guidebook: Stratigraphy and depositional setting of Upper Devonian Ohio black shale divisions and the overlying Bedford/Berea sequence in northeastern Ohio*. - American Association of Petroleum Geologists Annual Convention, 58 pp. (Pittsburgh).

BAIRD, G. C., MCKENZIE, S. C., HARPER, J. A. & SULLIVAN, J. S. 2013. *End-Devonian geology in the northwest Pennsylvania region and highlights of New York and Pennsylvania gas-oil history*. - In: DEAKIN, A. K. & LASH, G. G. (Eds.), *Field Trip Guidebook*, New York State

Geological Association, 85th Annual Meeting, Fredonia: 1–53.

BRETT, C. E., ZAFFOS, A., BAIRD, G. C. & ALEX J. BARTHOLOMEW. 2013. *Fossil beds, facies gradients, and seafloor dynamics in the Middle Devonian Moscow Formation, western New York*. – In: DEAKIN, A. K. & LASH, G. G. (Eds.), *Field Trip Guidebook, New York State Geological Association, 85th Annual Meeting, Fredonia: 68–101*

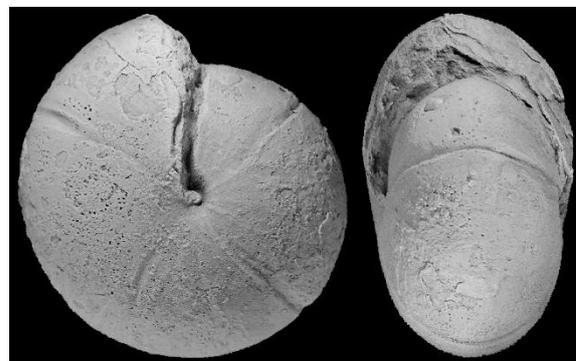
OVER, D. J., BAIRD, G. C. & KIRCHGASSER, W. T. 2013. Upper Devonian strata along the Lake Erie shore, western New York. - In: DEAKIN, A. K. & LASH, G. G. (Eds.), *Field Trip Guidebook, New York State Geological Association, 85th Annual Meeting, Fredonia: 182–219*.

TM R. Thomas BECKER and the Münster Group

2013 turned out to be a difficult time because of serious eye problems developed straight after the wonderful Morocco Field Symposium. This delayed the editing of the last newsletter and of many publications, which were close to completion. However, subsequently it became possible to complete a “monograph” on important and very interesting new Famennian and Tournaisian ammonoid faunas from Xinjiang, NW China, in cooperation with MA Xueping and led by his Ph.D. student ZHONG Pu. Apart from some new species, new regional records, and the palaeobiogeography, three aspects are especially important: 1. the recognition of global event levels in the successions, 2. the recognition of a probably global, specific time-interval (UD IV-C to V-B) with very large-sized taxa, 3. the discovery of the globally most diverse ammonoid assemblage in the Lower Hangenberg Event interval (age based on previous conodont and miospore dates). It is clear that more research is required in the region, which is done in parallel by our SDS friends from Nanjing, Australia, Austria, and North America. This October a Ph.D. student, WANG Zhihong, from a third Xinjiang research team (China University of Geosciences, Wuhan) will visit Münster to work on his conodont faunas. From here he will continue to Michael JOACHIMSKI at Erlangen for stable isotope work.

More Asian activities led to the involvement with a review of Malaysian Devonian-Carboniferous successions, led by Meor Amir HASSAN and colleagues. CM AUNG Aye-Ko send pictures of new Frasnian conodont faunas from Malaysia that require a detailed study. His search for Frasnian conodonts from the ammonoid-bearing area of Myanmar is still continuing.

The main focus lay on the joint DFG research project on the Eovariscan evolution of the northern and southern external Variscides with Sarah and Ahmed EL HASSANI. In this frame Tobias FISCHER compared in his M.Sc. Thesis the ontogenetic morphometry of Famennian Prionoceratidae from the Rhenish Massiv, Franconia, Thuringia, the Moroccan Meseta, and Anti-Atlas. He found significant differences in taxa that were previously thought to be the same along the palaeolatitudinal and plate tectonic transect. This provides evidence that upper/uppermost Famennian Eovariscan movements in the western Prototethys were strong enough to restrict the faunal exchange and to cause isolation and regional speciations. In this context the comparison of Meseta and Anti-Atlas ammonoid faunas is especially interesting. Currently a focus lies on the new, rich faunas from the Frasnian of Boudouda and from the upper Famennian of Oued Aricha, both in the Benahmed region.



“False *Rectimitoceras lineare*” with minor shell constrictions and flank lips from the uppermost Famennian of the Maider (photo T. FISCHER).

Field work in spring 2014, together with Sven, Ahmed (partly) and Stephan EICHHOLT, included areas south of Rabat (Oued Cherrat Zone, its southern prolongation, and the adjacent Tournaisian), near Oulmes, of the Azrou to Mrirt region, and towards Fes (Immouzer-al-Kandar). The latter succession yielded unexpectedly first Upper Givetian and Upper Frasnian to lower Famennian goniatites. On the way back we started to sample the Lower/Middle Devonian of Jebel Ben Arab, which, unfortunately, is rather poor in macrofauna.

Together with Sarah and the family we spent a week in the Tinerhir and Tafilalt/Maider regions to continue sampling of allochthonous complexes, of the well-developed Kacak Event at Oued Ferkla, of the Frasnian of the Tafilalt, and of the Famennian just south of the important Lalla Mimouna D/C boundary section. But it was damned hot in the middle of April, reaching 40°C at lunchtime. One day I tried to collect trilobites at Bou Tchrafine at six in the evening - despite strong wind it was still 38°C in the evening sun.

The continuing collaboration with Jürgen BOCKWINKEL on Upper Givetian ammonoids concentrated on material from the northern Maider, where phraciceratids and tornoceratids occur in a brachiopod-rich goniatite shale, that is very different from the goniatite shales of Hassi Nebech that were published in 2013. There is more to do on phraciceratid faunas of the eastern Tafilalt, of the Dra Valley, or from the German iron ores. Raimund FEIST sent some interesting Frasnian and Famennian faunas from southern Algeria, which includes a new lower Famennian genus. At the Götting annual meeting of the Paläontologische Gesellschaft, the new evidence from Morocco for a significant (global) carbonate crisis associated with the global Hangenberg Event was summarized.

Concerning research students working in Morocco, Klaus SCHWERMANN described in his M.Sc. project the distribution of sharks in time and space in the Devonian of Morocco. Screening all of our conodont samples, he found new, rare taxa and added new records. Sören STICHLING finished his investigation of the stratigraphy and facies history of two sections at the northern margin of the Maider, which end with biostromal, coral-rich beds of the Middle Givetian. He found the largest Middle Devonian conodont we have ever seen, a 3.7 mm long *Linguipolygnathus*. But the specimen got lost in the SEM – for heaven's sake. We still have to relocate the precise original bed. Sören was very good to document all the various fossil groups. Marie-Kristin RYTINA finished her study on the allochthonous Devonian blocks SE of Tinerhir. Dustin WARD used all our thickness data for well-defined lithostratigraphic units of the Tafilalt/Maider to produce new GIS-based isopache sheets for the region. His series of maps clearly show the gaps in our data sets. He also documented in detail the autochthonous Oued Ferkla section at the northern margin of stable Gondwana (Tinejdad region, see preliminary data in last year's field guide). Sebastian POMMERERUNG started a B.Sc. Thesis on the palaeopathology of Givetian ammonoids from the eastern Dra Valley (Tata region).

In the Rhenish Massive field work continued in collaboration with Dirk JUCH and Günter DROZDZEWSKI in the Velbert region, with a focus on reef dating and facies developments. There are strong differences between the Hofermühle and Wülfrath Reefs, where results of the M.Sc. of H. NOWAK form the base of a manuscript that is close to completion. In the same complex, Timo GEHRLING investigated the Frasnian-Famennian transition, with a well-developed, black Upper Kellwasser level and subsequent erosion, in a core of the Silberg Quarry. The subsequent lower Famennian is also developed in black shale facies. Unfortunately, for our Devonian team, he decided to continue his studies in Bristol. Julia RICHTER and Matthias KRUSE (Bonn University) conducted

geological mapping projects in the Devonian of the Hönne Valley, northern Sauerland. Two new B. Sc. students in our group, Nadine VERKERK and Anna SAUPE, look into the impact of Famennian black shale events on foraminifere assemblages of the Rhenish Massive and Saxothuringia.

Stephan EICHHOLT continued his Ph.D. on the comparison of Givetian/Frasnian reef facies on the southern (mostly Moroccan Meseta) and northern (Rhenish Massive) shelf of the Prototethys. He presented results concerning the Oued Cherrat Zone at the Göttingen meeting and these were turned into a manuscript that is almost finished. A second paper on the reef development of the Oulmes region will follow quickly afterwards.



Proof for a Givetian age: a *Stringocephalus* cross-section from back-reef limestones at Ain Khira (Oued Cherrat Zone, Moroccan Meseta).

Stephan HELLING continues his studies for a Ph.D. on Devonian trilobites from Morocco. Work on *Gerastos* (Proetida) is still ongoing, as is the description of biogeographically important small faunas from Taourirt n'Khellil (SE of Tinerhir, Götting presentation) and of a different allochthonous block further to the east. Another paper to be finished deals with the new Middle Frasnian proetids and phacopids of the central Tafilalt.

CM Sven HARTENFELS

is deeply involved with the supervision of research students and took part in the Malaysian IGCP 596 meeting in autumn 2013. He joined the Morocco field work in spring 2014, with a focus on the Famennian successions of the Azrou and Ziyar areas. New results on the *Annulata* Event in the latter succession will be presented at the IPC in Mendoza in early October. He finished his conodont and microfacies parts for joint papers with Thomas on the *Gonioclymenia* Limestone of the central/southern Tafilalt and on the *Annulata* Events in the Rheris Basin of the northern Tafilalt (see 2013 abstract; contribution for the Geol. Soc. volume of SDS). The palaeobiogeographical relationships of Famennian conodonts from the allochthonous



Field lunch 2013, at El Atrous. Lahcen BAIDER distributes the delicious berber “pizza”.

Tinerhir Devonian were outlined in a contribution to the Göttingen meeting.

Field work in the Rhenish Massive was done in cooperation with various colleagues from Czechia and Poland, who concentrate on modern stratigraphic techniques around Famennian black shale events. In this context conodont and microfacies studies of the famous Ballberg and Oberrödinghausen sections continued. Together with Thomas, there is also an ongoing revision of the well exposed but rather neglected type section for the Wocklum Limestone SE of Balve (Borkewehr). More to the west, a revision of the Riescheid section, jointly with Christoph HARTKOPF-FRÖDER (Krefeld), required the tedious cleaning of the section. In the Velbert region, there are new lower Famennian conodont faunas from just above the last, microbialitic limestones of the Wülfrath and Hofermühle reef complexes. Not to be forgotten – Sven won the faculty teaching prize for 2013, which gives him funds to attend the Mendoza IPC.

CM Sarah Z. ABOUSSALAM

Sarah worked busily on the wealth of new conodont samples from the Emsian to Tournaisian of the Moroccan Meseta, the Anti-Atlas, and Rhenish Massive. Apart from many surprisingly different ages than previously assumed, this led to considerable refinements for the extinction of reefs, both in Morocco and Germany, and for the dating of Eovariscan reworking events. It is now clear that in the Meseta major reworking could take place throughout the Devonian, with peaks high in the Givetian and in the middle/upper Famennian. A first Lochkovian reworking event was recognized in the “Skoura succession” north of Ouarzazate, just above upper Silurian black shales. There are also many new data for the allochthonous Devonian of the Tinerhir-Tinejdad region at the suture between Variscan Morocco and stable Gondwana. A manuscript on the dating of reef growth and

extinctions in the Meseta is planned for the Geol. Soc. volume. A supposed Upper Devonian succession of neritic limestones at Boudouda (Benahmed region) yielded fragmented, very small conodonts of various age, which all seemed to be reworked. In fact, the beds also contain good Viséan foraminiferes, which will be described jointly with Jiri KALVODA and Thomas.



Not so bad: The “2013 SDS / Tafilalt Headquarter” - after all the tired geologists eventually went to bed.

In the eastern Rhenish Massive final samples from the Blauer Bruch allowed a precise re-location of the Taghanic and Frasnian Events. This resulted in a joint presentation (given by Thomas) at the annual meeting of the German SDS in spring 2014 in the Kellerwald. Incredibly rich, diverse but partly deformed Frasnian conodonts were recovered from the various sections and boreholes of the Velbert Anticline (Wülfrath and Hofermühle reefs).

Continuing work on Anti-Atlas sections resulted in a long “monograph” together with Thomas and Pierre BULTYNCK on the Pragian to basal Eifelian conodont stratigraphy of the Tafilalt, Maider and Dra Valley regions. It includes significant data for the current Emsian revision and substage discussion but polygnathids, unfortunately, show regionally a rather episodic occurrence. Parallel polygnathid and icriodid zonation will be proposed; they give a good correlation with Spain and other regions.



The supposed Famennian “griotte” at Bou Khedra (SW of Azrou) produced Emsian conodonts.

Publications:

HASSAN, M.H.A., AUNG, A.-K., BECKER, R.T., RAHMAN, N.A.A., FATT, N.T., GHANI, A.A. & SHUIB, M.K. 2014. Stratigraphy and palaeoenvironmental evolution of the mid- to upper Palaeozoic succession in Northwest Peninsular Malaysia. - *Journal of Asian Earth Sciences*, **83**: 60-79.
doi: <http://dx.doi.org/10.1016/j.jseaes>.

BECKER, R.T. & NIKOLAEVA, S.V. 2014. Comment on a proposal to reinstate as available the species-group names proposed for Devonian ammonoids (Mollusca, Cephalopoda) by Sobolev (1914a, 1914b) (Case 3600). - *Bulletin of Zoological Nomenclature*, **71** (2): 1-4.

ZHONG, P., BECKER, R.T. & MA X. 2014. Upper Devonian (Famennian) and Lower Carboniferous (Tournaisian) ammonoids from western Junggar, Xinjiang, northwestern China - stratigraphy, taxonomy and palaeobiogeography. - *Palaeobiology and Palaeoenvironments*, doi 10.1007/s12549-014-0171-y.

ABOUSSALAM, Z.S., BECKER, R.T. & BULTYNCK, P. 2014 (submitted). Emsian (Lower Devonian) conodont stratigraphy and correlation of the Anti-Atlas (Southern Morocco). - *Bulletin of Geosciences*.

Published abstracts:

ABOUSSALAM, Z.S., BECKER, R.T., EICHHOLT, S., EL HASSANI, A., BENFRIKA, E.M. & EL KAMEL, F. 2013. The precise timing of Devonian reef growth and extinctions in the Moroccan Meseta. - In: REITNER, J., YANG, Q., WANG, Y. & REICH, M. (Eds.), *Palaeobiology and Geobiology of Fossil Lagerstätten through Earth History*, Abstract Volume: 13 (Universitätsverlag Göttingen).

BECKER, R.T., ABOUSSALAM, Z.S., HARTENFELS, S., EL HASSANI, A. & BAIDDER, L. 2013. The global carbonate crisis at the Devonian-Carboniferous transition in Morocco. - In: REITNER, J., YANG, Q., WANG, Y. & REICH, M. (Eds.), *Palaeobiology and Geobiology of Fossil Lagerstätten through Earth History*, Abstract Volume: 19 (Universitätsverlag Göttingen).

EICHHOLT, S. & BECKER, R.T. (2013): Microfacies and Devonian reef development in the Oued Cherrat Zone, Moroccan Meseta. - In: REITNER, J., YANG, Q., WANG, Y. & REICH, M. (Eds.), *Palaeobiology and Geobiology of Fossil Lagerstätten through Earth History*, Abstract Volume: 40 (Universitätsverlag Göttingen).

FISCHER, T. & BECKER, R.T. 2013. Morphometry, taxonomy, autecology and palaeobiogeography of Prionoceratidae (Ammonoidea). - In: REITNER, J., YANG, Q., WANG, Y. & REICH, M.

(Eds.), *Palaeobiology and Geobiology of Fossil Lagerstätten through Earth History*, Abstract Volume: 51 (Universitätsverlag Göttingen).

HELLING, S. & BECKER, R.T. 2013. A Lower Devonian trilobite fauna from a Carboniferous olistostrome at Taourirt n'Khellil (Tinerhir region, SE Morocco). - In: REITNER, J., YANG, Q., WANG, Y. & REICH, M. (Eds.), *Palaeobiology and Geobiology of Fossil Lagerstätten through Earth History*, Abstract Volume: 68 (Universitätsverlag Göttingen).

HARTENFELS, S., RYTINA, M.-K. & BECKER, R.T. 2013. Famennian conodont faunas in olistostromes at Taourirt n'Khellil (Tinerhir region, SE Morocco) - lost Devonian at the "Southern Variscan Front". - In: REITNER, J., YANG, Q., WANG, Y. & REICH, M. (Eds.), *Palaeobiology and Geobiology of Fossil Lagerstätten through Earth History*, Abstract Volume: 63 (Universitätsverlag Göttingen).

STICHLING, S., BECKER, R.T., ABOUSSALAM, Z.S., HELLING, S., RYTINA, M.-K. & WARD, D. 2013. Devonian successions at the northern margin of the Maider (S-Morocco): microfacies, palaeoecology and stratigraphy. - In: REITNER, J., YANG, Q., WANG, Y. & REICH, M. (Eds.), *Palaeobiology and Geobiology of Fossil Lagerstätten through Earth History*, Abstract Volume: 158 (Universitätsverlag Göttingen).

HASSAN, M. H. A., AUNG, A.-K., BECKER, R. T., RAHMAN, N. A. A., FATT, N.T., GHANI, A.A., SHUIB, M.K. 2014. Carboniferous (Mississippian) dropstones and diamictite from the Chepor Member, basal Kubang Pasu Formation: Earliest record of glacial-derived deposits in Peninsular Malaysia. - National Geoscience Conference, Grand Central, Hotel Kuala Trengganu, 13-14th June 2014, Proceedings: 38-39.

Devonian Theses:

GEHRLING, T. 2013. Stratigraphie und Mikrofazies devonischer Sedimente der Bohrung Silberberg (SIL_1206, Velberter Sattel, Rheinisches Schiefergebirge). - B. Sc. Thesis, 66 pp., 9 pls.

KRUSE, M. 2013. Geologische Diplomkartierung Oberrödinghausen - Asbeck - Eisborn. - Diplomkartierung 93 pp.

RICHTER, J. 2013. Field mapping in the region of Beckum-Hövel (Nordsauerland, Blatt 4613 Balve. - B. Sc. Thesis, 55 pp., 1 map.

RYTINA, M.-K. 2013. Faziesentwicklung des mittleren Palaeozoikums am Südrand der Varisziden (Tinerhir-Region, SE Marokko). - M. Sc. Thesis, 91 pp, 13 pls.

- SCHWERMANN, A. 2014. Devonian shark teeth from Morocco – taxonomy, stratigraphy, and facies distribution. – M. Sc. Thesis, 80 pp.
- STICHLING, S. Biostrom-Abfolgen am Nordrand des Maioder (S-Marokko): Mikrofazies, Paläoökologie und Stratigraphie. – M. Sc. Thesis, 87 pp. + 15 pls. + appendices.
- WARD, P.D. 2013. GIS based paleogeographical evolution of the Devonian in the eastern Anti-Atlas (Tinejdad region, Tafilalt, Maider). – M. Sc. Thesis, 117 + 18 pp.

TM Alain BLIECK

Interest in Early Devonian vertebrates is still the base of my main research programme. Several unpublished data on Early Devonian ichthyofaunas from the Arctic regions are to be transformed into publications, incl. Spitsbergen (new horizon with heterostracans in the Lochkovian), Severnaya Zemlya (new taxa of heterostracans, in collaboration with V.N. KARATAJUTE-TALIMAA), the Canadian Arctic (in collaboration with D.K. ELLIOTT & H.-P. SCHULTZE)... Several new Early Devonian localities of the Ardenne Massif in Belgium and the Grand Duchy of Luxembourg have yielded various vertebrates such as heterostracans, osteostracans, placoderms, sarcopterygians... They deserve being published. A review of Early Devonian heterostracan-bearing localities of the Rhenish Slate Massif (Rheinisches Schiefergebirge) of Germany should also be finalised, with inclusion of new taxa from Waxweiler, Odenspiel, etc. (in collaboration with P. BARDENHEUER, A. LOPEZ-ARBARELLO, etc.). Additionally, the discovery of pre-Eifelian tetrapods would be the best test of GEORGE & BLIECK's (2011, PLoS ONE 6 (7): e22136) « prediction » that this group of derived sarcopterygians appeared in the Early Devonian...

Publications:

- MARK-KURIK, E., BLIECK, A., BURROW, C.J. & TURNER, S. 2013. Early Devonian fishes from coastal De Long Strait, central Chukotka, Arctic Russia. - *Geodiversitas*, **35** (3): 545-578. [http://www.mnhn.fr/museum/front/medias/publication/54391_g2013n3a3.pdf]
- BLIECK, A., CUVELIER, J. & OUDOIRE, T. 2013. Euryptérides des collections de paléontologie de Lille: collections du Musée d'Histoire Naturelle de Lille (VII) et collections de l'Université Lille 1 (Catalogue I). - *Annales de la Société Géologique du Nord. 2^e série*, **20**: 31-42 [in French, with English abstract].
- BLIECK, A. & DE BAERE, J.-P. Eds. 2013. *Annales de la Société Géologique du Nord. 2^e série*, **20**: 70 + 132 p [Séance spécialisée à la mémoire d'Antoine BONTE « L'urbain c'est demain ! Les

enjeux « naturels » du développement urbain: les métiers de demain [in French or English; incl. papers on Devonian palaeontology and stratigraphy]

Abstracts:

- BLIECK, A. & MEILLIEZ, F. 2013. *La Société géologique du Nord et les sciences de la Terre dans le nord de la France: science, industrie et société*. - In: BOURROUILH, R. & ARGYRIASDIS, I. (Org.), Journées scientifiques – Hommage au Professeur Michel DURAND-DELGA (Paris, 3-4 déc. 2013), Résumés: 19, Académie des sciences, MNHN, SGF & COFRHIGEO, Paris. [concerned with a general view of the SGN, incl. its importance in Palaeozoic geosciences]

A COMMENT ON CONODONT AFFINITIES

In 2010, a paper has been published in collaboration with a series of experts of either early vertebrates or conodonts. This paper was a review of the phylogenetic relationships of conodonts with vertebrates. It concluded that conodonts could not be considered as vertebrates (or "stem gnathostomes" as declared by a group of British palaeontologist, whose results had been used in several other papers and handbooks):

- TURNER, S., BURROW, C.J., SCHULTZE, H.-P., BLIECK, A., REIF, W.-E.†, REXROAD, C.B., BULTYNCK, P. & NOWLAN, G.S. 2010. False teeth: conodont-vertebrate phylogenetic relationships revisited. - *Geodiversitas*, **32** (4): 545-594;
- also: BLIECK, A., TURNER, S., BURROW, C.J., SCHULTZE, H.-P., REXROAD, C.B., BULTYNCK, P. & NOWLAN, G.S. (2011). Fossils, histology, and phylogeny: Why conodonts are not vertebrates. - *Episodes*, **33** (4) [2010]: 234-241.

A recent paper published in Nature finally came to the conclusion that the mineralized tissues of conodonts (crown lamellar tissue, white matter, basal filling) are not homologous to vertebrate mineralized tissues (enamel, dentine, bone), thus destroying the hypothesis of a close phylogenetic relationships of conodonts with vertebrates: MURDOCK D.J.E et al. 2013. The origin of conodonts and of vertebrate mineralized skeleton. - *Nature*, **502** (24 oct. 2013): 546-549 + Extended data. This however, does not solve the problem. Conodont-bearing animals (or Conodontophorida) remain enigmatic organisms whose place among either protostomians or deuterostomians is still unknown.

TM Carlton E. BRETT

During summer of 2013 I spent about two weeks working with colleagues Eberhard SCHINDLER and Rainer BROCKE (Senckenberg Institute, Frankfurt, Germany) on Devonian sequences and cycles in the Eifel region of western Germany, as a continuation of ongoing collaboration funded by the Humboldt Foundation. A major new breakthrough for our Eifel Devonian research projects was the drilling of a series of cores by the local water companies and quarries. These cores have been made available to the Senckenberg Institute. We spent several days logging and photographing a series of long drill cores that provide a lot of new data on rocks that are poorly exposed in the Eifel region. Cores will also be sampled for microfacies, petrology and geochemistry. This project has provided a major impetus for to complete several projects including paleoenvironments palynology, and cycle stratigraphy of the Givetian strata in this classic region.

I am presently collaborating with Charles Ver Straeten, New York State Geological Survey, Gordon BAIRD (SUNY College Fredonia), Alex BARTHOLOMEW (SUNY New Paltz), Jay ZAMBITO (Wisconsin Geological Survey), and several other New York stratigraphers in the revision of the New York State Devonian Stratigraphic Correlation Chart, which is intended to comprise a series digital charts showing the 2012 geological time scale, biostratigraphy, stratigraphic units, facies changes, bioevents and others. In addition to an overview chart of the entire Devonian, there will be supplemental charts of particular intervals expanded to show details. An accompanying book will outline changes in stratigraphic terminology, correlation, biostratigraphy, chemo- and sequence stratigraphy for all major units. I will be working with Gordon BAIRD and Alex BARTHOLOMEW on the Hamilton Group chapter.

During 2013, UC Ph.D. student Andrew ZAFFOS and I continued sampling particular well-defined condensed intervals in the Middle Devonian Hamilton through western and central New York State to establish quantitatively defined faunal gradients at several levels within the approximately 3 million year span of this interval. The intent is to compare gradients through time and test for ecological stability of the component taxa. We also documented patterns of microstratigraphy, faunal gradients, and paleotopography recorded in the Windom Shale (Moscow Formation) in western New York and ran a conference field trip on this topic for the New York State Geological Association Meeting hosted by Gordon BAIRD and others at Fredonia, NY.

Finally, I would note that attendance of the outstanding field excursions of the SDS Meeting in

Erfoud, Morocco during March, 2013, led to renewed interest in comparative studies of sequence and event stratigraphy and bioevents of the outstanding Anti-atlas exposures. Over the next five years I intend to collaborate with colleagues from the Senckenberg Institute (Frankfurt, Germany) and with Thomas BECKER (Muenster University), comparative event and sequence stratigraphy and relative sea level variations in Morocco, Avalonia (Germany, England) and North America.

Publications:

- BAIRD, G.C., 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*, **367-368**: 121-136.
- 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.
- FERRETTI, A., HISTON, K., MCLAUGHLIN, P.I. & BRETT, C.E., 2012. Time-specific facies: The color and texture of biotic events. - *Palaeogeography, Palaeoclimatology, Palaeoecology* **367-368**:1-2.
- NAGEL-MYERS, J., DIETL, G., HANDLEY, J. & BRETT, C.E. 2013. Abundance is not enough: The need for multiple lines of evidence in testing for ecological stability in the fossil record. - *Plos One*, **8** (5): e63071. doi:10.1371/journal.pone.0063071.
- WILSON, D.D. & BRETT, C.E. 2013. Concretions as sources of exceptional preservation, and decay as a source of concretions: Examples from the Middle Devonian of New York. - *Palaios*, **28**: 305-316.
- ZAMBITO, J.J., 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, Middle Devonian, New York State. - *Paleobiology*, **38** (4): 664-681.

Guidebook articles:

- BRETT, C.E., ZAFFOS, A., BAIRD, G.C. & BARTHOLOMEW, A.J. 2013. Fossil beds, facies gradients and seafloor dynamics in the Middle Devonian Moscow Formation, western New York. - *New York State Geological Association, 85th Annual Meeting Guidebook, Fredonia, NY*: 68-101.

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.

Publications/abstracts

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. AND 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.

CM Pierre BULTYNCK

Progress that has been made in the taxonomy and in the stratigraphic distribution of latest Pragian, Emsian and earliest Eifelian conodonts in some sections of the north-eastern Dra Valley and in the north-eastern Tafilalt since the paper by BULTYNCK & HOLLARD (1980). In the Eastern Dra Valley, the El Ansha or El Anshour section has been resampled in much more detail. In the north-west Tafilalt it concerns the Western and northern Bou Tchrafine sections and the Hamar Lagdad section. The study of the new conodont material is finished and is discussed in a manuscript that will be published in a paper in collaboration with Sarah ABOUSALLAM and Thomas BECKER. I participated in the "International Field Symposium: The Devonian and Lower Carboniferous of northern Gondwana.

And presented a talk: "Latest Pragian and Emsian conodont succession of the north-western and the eastern Dra Valley".

CM Carole BURROW

continues collaborating with Jan den BLAAUWEN (the Netherlands), Bob DAVIDSON (Scotland), John LONG (Adelaide), John MAISEY (New York), Mike NEWMAN (Wales), Kate TRINAJSTIC (Perth), Sue TURNER (Brisbane), and Gavin YOUNG (Canberra) on various Devonian early vertebrate faunas. Carole is a CI with Gavin, Kate, John, and Tim SENDEN on an ARC Discovery project (mid2010-2014), the "Origin of jaws - the greatest unsolved mystery of early vertebrate evolution".

BURROW, C.J. 2013. Reassessment of *Ischnacanthus? scheii* SPJELDNAES (Acanthodii, Ischnacanthiformes) from the latest Silurian or earliest Devonian of Ellesmere Island, arctic Canada. - *Canadian Journal of Earth Sciences* **50** (8): 945-954. dx.doi.org/10.1139/cjes-2013-0068.

BURROW, C.J., TRINAJSTIC, K. & LONG, J.A. 2012. First acanthodian from the Upper Devonian (Frasnian) Gogo Formation, Western Australia. - *Historical Biology*, **24** (4): 349-357. doi 10.1080/08912963.2012.660150.

BURROW, C.J. & YOUNG, G.C. 2012. New information on *Culmacanthus* (Acanthodii: Diplacanthiformes) from the ?Early-Middle Devonian of southeastern Australia. - *Proceedings of the Linnean Society of New South Wales*, **134**: 21-29. http://ojs-prod.library.usyd.edu.au/index.php/LIN/article/view/5935/6517.

BURROW, C.J. & TURNER, S. 2012. Scale structure of putative chondrichthyan *Gladbachus adentatus* HEIDTKE and KRATSCHEMER, 2001 from the Middle Devonian Rheinisches Schiefergebirge, Germany. - *Historical Biology*, **25** (3): 385-390. http://dx.doi.org/10.1080/08912963.2012.722761

BURROW, C.J., NEWMAN, M.J., DAVIDSON, R.G. & DEN BLAAUWEN J.L. 2013. Redescription of *Parexus recurvus*, an Early Devonian acanthodian from the Midland Valley of Scotland. - *Alcheringa*, **37**: 1-23. doi: 10.1080/03115518.2013.765656.

MARK-KURIK, E., BLIECK, A., BURROW, C.J. & TURNER, S. 2013. Early Devonian fishes from coastal De Long Strait, central Chukotka, Arctic Russia. - *Geodiversitas*, **35** (3): 545-578. http://dx.doi.org/10.5252/g2013n3a3.

NEWMAN, M.J., DAVIDSON, R.G., DEN BLAAUWEN, J.L., BURROW, C.J. (2012) The Early Devonian acanthodian *Uraniacanthus curtus* n. comb. from

the Midland Valley of Scotland. – *Geodiversitas*, **34** (4): 739-759.
<http://dx.doi.org/10.5252/g2012n4a2>

BURROW, C.J. & TURNER, S. 2012. *Fossil fish taphonomy and the contribution of microfossils to documenting Devonian vertebrate history*. - In TALENT, J.A. (Ed.) *Earth and Life: Global biodiversity, extinction intervals and biogeographic perturbations through time*. Springer's Legacy Series, International Year of Planet Earth: 189-223. doi 10.1007/978-90-481-3428-1_8.

TM Jean-Georges CASIER

In September 2013, with K. KAIHO and his students of the University Tohoku (Sendai, Japan), I revisited several sections in Montagne Noire (Southern France). Among them, the D/C boundary at La Serre and at Puech de la Suque. The ostracod study and sedimentological analysis of the La Serre D/C GSSP had demonstrated that this section is totally reworked and also the presence of a tectonic discontinuity below the boundary (CASIER *et al.*, 2002). Moreover, recently, KAISER *et al.* (2007) found *Siphonodella sulcata* in a bed below the D/C boundary and consequently a work group was constituted in order to design a new GSSP. I take advantage of this report to draw the attention of SDS members on the Puech de la Suque section. The Puech de la Suque section is continue, rich in fossils, exposes the Hangenberg Event and conodont are well represented. Moreover, the access to this section, located along a track, is very easy, and its conservation is assured. The Puech de la Suque section has been studied by FEIST (1995, 1990), GIRARD (1996) and CASIER & PRÉAT (2001).

In 2013, I contributed to a biogeochemical study of the Sinsin section located 54 km East of Senzeille, the historic stratotype for the F/F boundary. The study of organic molecular indices, carried out in the Department of Geology and Paleontology of the Tohoku University, indicates combustion of land vegetation close the F/F boundary and displays that flooded by a global sea-level rise, coasts provided abundant nutrients and massive mud supply to marine ecosystems, which may have contributed to the extinction of shallow marine organisms (KAIHO *et al.*, 2013). This analysis may support the ALGEO *et al.* (1995) hypothesis that the spread of vascular land plants resulted in higher pedogenic weathering rates and increased the flux of soil-derived nutrients to marine ecosystems causing the Late Devonian mass extinction.

In collaboration with A. PRÉAT (University of Brussels) for the sedimentological analysis, I finished also the study of ostracods from the stratotype of the Mont Hauris Fm at Givet. This study is the last of a

series on ostracods from the Mont d'Hauris geological structure. Finally, a total of 116 ostracod species have been recognized in the Early Givetian at the Mont d'Hauris, from the upper part of the Hanonet Fm to the upper part of the Mont d'Hauris Fm. They belong exclusively to the Eifelian Mega-Assemblage and give evidence for very rapid changes of environmental conditions during the Early Givetian in the type locality: lagoonal, semi-restricted, agitated shallow to deep calm marine environments are recognized.

Finally, during this year, I draw the attention on the Neuville railway section located in the Dinant Synclinorium, close to the historic stratotype for the F/F boundary at Senzeille. In the Neuville railway section, the paroxysmal phase of the Late Devonian mass extinction might be fixed with precision owing to the Entomozoidea (Ostracoda), in a relatively thick (5.5 m) and continue series belonging to the Matagne black shale Fm. This paroxysmal phase coincides with the *splendens* Zone / *sigmoidale* Zone boundary of the Parachronology established on entomozoid ostracods.

Publications:

CASIER, J.-G., DEVLEESCHOUWER, X., MAILLET, S., PETITCLERC, E. & PRÉAT, A. 2013. Ostracods and rock facies across the Givetian/Frasnian boundary interval in the Sourd d'Ave section at Ave-et-Auffe (Dinant Synclinorium, Ardenne, Belgium). - *Bulletin of Geosciences*, **88** (2): 241-264.

CASIER, J.-G. 2013. La Formation des schistes noirs de Matagne (partie supérieure du Frasnien) et l'extinction massive du Dévonien Supérieur. - *Revue de Paléobiologie*, **32** (2) : 209-214.

CASIER, J.-G. & PRÉAT, A. 2013. Ostracodes et lithologie du stratotype de la Formation du Mont d'Hauris (Givétien, Synclinorium de Dinant). - *Revue de Paléobiologie*, **32** (2): 187-207.

KAIHO, K., YATSU, K., OBA, M., GORJAN, P., CASIER, J.-G. & IKEDA, M. 2013. A forest fire and soil erosion event during the Late Devonian mass extinction. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **392**: 272-280.

CM Leona CHADIMOVA

(previously L. KOPTÍKOVÁ)

In 2013 my activities slightly shifted from the Devonian to a little bit older rocks – to the upper part of the Silurian to Ludlow Series in the Prague Synform. Joint meeting of IGCP 580 (Application of magnetic susceptibility on Palaeozoic sedimentary rocks) and 596 (Mid-Paleozoic climate and biodiversity) projects with the theme: “Geophysical and Geochemical Techniques: A Window on the

Palaeozoic World” was held in Calgary, Canada (August 27 – September 1, 2013). I presented here the the results made on the petrophysical record of the Late Silurian shallow-water carbonate facies across the Lau Event in the Prague Synform in the Czech Republic. Core workshop at Core Research Centre in Calgary was held after the technical sessions. It was organized by Ken POTMA (Imperial Oil Resources) and John WEISSEBERGER (Husky Energy) and they provided us dozen cores from the Late Devonian of the central Alberta Subsurface for examination (funded by IGCP 580 and co-organized by Anne-Christine DA SILVA and Michael WHALEN). It provided us to see the lithology of major oil reservoir intervals of the Frasnian in the western part of the Western Canada Sedimentary basin. During field trip days in the Canmore area we saw Upper Devonian and Carboniferous rocks in the surface.

Paper on the petrophysical record of the Late Silurian Lau event in the Prague Synform and application of dynamic time warping alignment of the magnetic susceptibility logs was submitted to the Special Issue of Geological Society of London dedicated to IGCP580 and proposed in 2013: Magnetic susceptibility: a window onto ancient palaeoenvironments).

But work in the Devonian could not be missed out in 2013. Field work and high-resolution sampling for magnetic susceptibility measurements and field gamma-ray spectrometry have been launched in Central Pyrenées (Catalania) in Spain during spring 2013 within the Czech-Spanish project running by L. SLAVÍK and J.I. VALENZUELA-RÍOS. Two sections were studied: Compte 1 near Baro and Sort, in the Freixa Unit; Lochkovian – Emsian) and Segre II near Seu d'Urgell (Lochkovian – Pragian boundary). Detailed petrophysical sampling together with refinement of conodont biostratigraphy and lithological characterization is realized within this project: “Hi-resolution correlation and dating of Mid-Palaeozoic sedimentary sequences of Peri-Gondwana using integrated biostratigraphy and chemo-physical methods”. Evaluation of the results and further field work is planned for 2014.

Magnetic susceptibility measurements were carried out on samples from the Middle Devonian sections in the Carnic Alps and Graz area in Austria. Data from the Middle Devonian (Eifelian-Givetian boundary interval) were presented by KIDO et al. at the “Pre-Cenozoic climates international workshop” which was held in June 17-19, 2013 in Toulouse in France. Data acquired in the Prague Synform from the same stratigraphic level at the Jirásek Quarry in the Koněprusy Area and the potential for interregional correlations using magnetic susceptibility and gamma-ray spectrometry are evaluated.

In 2013 the Czech IGCP National Committee celebrated its 40th anniversary. A joint effort of the

Czech and Slovak IGCP National Committees and people who were (and are) involved in the IGCP activities contributed to the publication, summarizing the joint history and present activities: PAŠAVA, J. & VYMAZALOVÁ, A. (Eds.) 2013. Forty years of IGCP: from Czechoslovak to Czech and Slovak IGCP National Committees. - *Czech Geological Survey*, 112 pp. I contributed a chapter on the IGCP 580 project.

Since 2010 I have been voted member and since 2013 secretary of the Czech National Committee for IGCP.

Abstracts:

KOPTÍKOVÁ, L., VACEK, F., SOBIEN, K. & SLAVÍK, L. 2013. *Petrophysical and sedimentological record of the Late Silurian Lau event in the shallow water carbonate facies (Prague Synform, Czech Republic)*. - In: IGCP-580 & IGCP-596, Geophysical and Geochemical Techniques: A Window on the Palaeozoic World, Abstract Book: 39-40.

KIDO, E., SUTTNER, T., PONDRELLI, M., CORRADINI, C., CORRIGA, M.G., SIMONETTO, L., VODRÁŽKOVÁ, S., JOACHIMSKI, M. & KOPTÍKOVÁ, L. 2013. Eifelian – Givetian crisis: Evidence from lithological, geochemical and geophysical records of the Carnic Alps. - Pre-Cenozoic Climate International Workshop (PC2IW), *Strata*, ser. 1, 14: 36-37.

TM Carlo CORRADINI

My research is mainly devoted to conodont biostratigraphy in several North Gondwana regions (the Carnic Alps, Morocco, Sardinia, Montagne Noire, Iran), from Silurian to lower Carboniferous, especially focusing on the Silurian /Devonian and the Devonian/Carboniferous boundaries. The latter are mainly related with the International Working Group on the redefinition of the Devonian/Carboniferous Boundary (led by M. ARETZ, Toulouse).

A preliminary review of conodonts across the D/C boundary has been published and a larger manuscript is in preparation (with S.I. KAISER, H. MATYJA, and C. SPALLETTA).

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 who can give a contribution. Within this project, several sections from the Silurian to Lower Carboniferous are in study in various areas of the Carnic Alps (with L. SIMONETTO, M. PONDRELLI, M.G. CORRIGA, C. SPALLETTA, A. MOSSONI, T. SUTTNER, E. KIDO, and others).

Other projects in progress in the Carnic Alps:

- Conodonts from several upper Silurian and Lower Devonian sections (with M.G. CORRIGA): beside several new sections, some classical localities have been sampled, such as Costone Lambertenghi/Seekopf Sockel (SCHÖNLAUB 1980), Rauchkofel Boden (SCHÖNLAUB 1980), Seewarte (SUTTNER 2003), and Cellon (WALLISER 1964). A manuscript on the updated conodont stratigraphy of the Silurian part of Cellon has been submitted, and the lower Devonian part of the section is in study.
- The Kacak Event, studied in some sections in the central part of the Carnic Alps (with T. SUTTNER, E. KIDO, and others). Research deals with conodonts and other fossil groups, microfacies, isotopes, magnetosusceptibility, and gamma ray spectroscopy.
- The geology and stratigraphy of selected key areas (with several co-authors). A paper on the Upper Devonian of Mt. Freikofel has been published (PAS et al., 2013), and a manuscript on the depositional evolution of the Mt. Pizzul area, from the Late Ordovician to early Carboniferous, has been submitted (PONDRELLI et al.).
- Late Devonian and Early Carboniferous conodonts (with C. SPALLETTA and A. MOSSONI). A paper on Famennian conodonts from the Mt. Pizzul West section has been published (MOSSONI et al., 2013b), and other Lower Carboniferous sections and outcrops in the central part of the Carnic Alps are under study.
- A geo-touristic guide of the Cason di Lanza area, where rocks from Upper Ordovician to Permian are exposed, has been published.

In Sardinia research is mainly devoted to the Clymeniae Limestones of the southeastern part of the island, mainly looking for sections exposing the D/C boundary (with A. MOSSONI and C. SPALLETTA). In this respect the Monte Taccu section (CORRADINI et al., 2003) has been restudied (MOSSONI et al., 2013a), and a new section exposing the boundary is under study.

In Morocco, conodonts and crinoids across the Silurian/Devonian boundary in the Tafilalt have been studied (with M.G. CORRIGA and R. HAUDE). The sections were sampled by O.H. WALLISER and R. HAUDE in the 90ies, and the material is stored at Göttingen University. A paper on the conodont and crinoid stratigraphy of the *Scyphocrinites* beds has been published (CORRIGA et al. 2014), and another on conodont taxonomy and stratigraphy from the Ludlow to middle Lochkovian is in press.

In the Montagne Noire research deals both with the conodont stratigraphy across the S/D boundary (with M.G. CORRIGA and R. FEIST) and with 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 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 Sotori Range (Tabas area), Frasnian and Famennian of the Kerman province, and Givetian north of Isfahan.

Maria G. Corrigo is working on upper Silurian and Lower Devonian conodont taxonomy and stratigraphy. She is investigating various sections of several North Gondwana regions: Sardinia, the Carnic Alps, Montagne Noire, Spanish Pyrenees (with J.I. Valenzuela-Rios), Morocco. See above for details

Angelo Mossoni is working on a Ph.D. project on Famennian biostratigraphy in Sardinia and the Carnic Alps, with special focus around selected events (Condroz, *Annulata* and Hangenberg). In these time frames the magnetosusceptibility and geochemistry of some major elements are also studied (this part under the supervision of A.C. DA SILVA, Liege).

Publications:

- BAHRAMI A., CORRADINI C., OVER D.J. & YAZDI M. 2013. Conodont biostratigraphy of the upper Frasnian-lower Famennian transitional deposits in the Sotori Range, Tabas area, central-east Iran Microplate. - *Bulletin of Geosciences*, **88** (2): 369-388. DOI 10.3140/bull.geosci.1353.
- CORRADINI C., CORRIGA M.G., KIDO E., MUSCIO G., PONDRELLI M., SUTTNER T.J., SIMONETTO L. & SPALLETTA C. 2013. *Cason di Lanza - leggere il passato nelle rocce*. - Le guide del Geoparco della Carnia, **1**: 48 pp.
- CORRADINI C., SPALLETTA C., KAISER S.I. & MATYJA H. 2013. Overview of conodonts across the Devonian/Carboniferous boundary. - *Asociación Paleontológica Argentina, Publicación Especial*, **13**: 13-16.
- CORRIGA M.G., CORRADINI C., HAUDE R. & WALLISER O.H. 2014. Conodont and crinoid stratigraphy of the upper Silurian and Lower Devonian scyphocrinoid beds of Tafilalt, southeastern Morocco. - *GFF*, **5** pp. DOI:10.1080/11035897.2013.862849.
- GIRARD C., CORNÉE J.-J., CORRADINI C., FRAVALO A. & FEIST, R. 2013. Paleoenvironmental changes at Col des Tribes (Montagne Noire, France), a reference section for the Famennian of north Gondwana-related areas. - *Geological Magazine*, **21** pp. doi:10.1017/S0016756813000927.

MOSSONI A., CORRADINI C. & PONDRELLI M. 2013a. Famennian (Late Devonian) conodonts from the Pizzul West section (Carnic Alps, Italy). - *Gortania Geologia, Paleontologia, Palentologia*, **34**: 13-34.

MOSSONI A., CORRADINI C. & SPALLETTA C. 2013b. Conodonts from the Monte Taccu section (Famennian-Tournaisian, Sardinia, Italy). - *Asociación Paleontológica Argentina, Publicación Especial*, **13**: 85-90.

PAS D., DA SILVA A.-C., SUTTNER T., KIDO E., PONDRELLI M., CORRADINI C., BULTYNCK P., DE VLEESCHOUWER D., DOJEN C. & BOULVAIN F. 2013. Insight into the development of a carbonate platform through a multi-disciplinary approach: a case study from the Upper Devonian slope deposits of Mount Freikofel (Carnic Alps, Austria/Italy). - *International Journal of Earth Sciences*, 20 pp. DOI: 10.1007/s00531-013-0969-2.

Published abstracts:

CORRADINI C., CORRIGA M.G. & MÄNNIK P. 2013. *Revised conodont stratigraphy of the Silurian of Cellon, Carnic Alps*. - In: LINDSKOG A. & MEHLQVIST K. (Eds.), Proceedings of the 3rd IGCP 591 Annual Meeting, Lund, Sweden, 9-19 June 2013: 69-70.

CORRIGA M.G., CORRADINI C., HAUDE R. & WALLISER O.H. 2013. *Upper Silurian and Lower Devonian conodonts and crinoids from the scyphocrinoid beds of southeastern Morocco*. - In: LINDSKOG A. & MEHLQVIST K. (Eds.), Proceedings of the 3rd IGCP 591 Annual Meeting, Lund, Sweden, 9-19 June 2013: 71-72.

KIDO E., SUTTNER T.J., PONDRELLI M., CORRADINI C., CORRIGA M.G., SIMONETTO, L., VODRÁŽKOVÁ S., JOACHIMSKI M.M. & KOPTÍKOVÁ L. 2013. Eifelian-Givetian crisis: evidence from lithological, geochemical and geophysical records of the Carnic Alps. - In NARDIN, E. & ARETZ, M. (Eds.), "Pre-Cenozoic Climates", International Workshop, 17-19th June 2013, Toulouse (France), *Strata*, series 1, **14**: 36-37.

WALLISER O.H., CORRIGA M.G., CORRADINI C. & HAUDE R., 2013. *Lagerstaetten of buoy crinoids (Scyphocrinitidae, Echinodermata) thriving in Upper Silurian gyres of narrowing oceans between Africa, America and China*. - In: REITNER J., YANG Q., WANG Y.-D. & REICH M. (Eds.), Palaeobiology and geobiology of Fossil Lagerstätten through Earth History: 170-171, Universitätverlag Göttingen.

CM Anne-Christine DA SILVA

My research focusses mostly on the Upper Devonian of Belgium, with recent studies on China, Canada and Carnic Alps. We have applied a multi-proxy approach in order to get a better understanding of the paleoenvironments of these Devonian successions, through sedimentology, paleoecology of stromatoporoids, magnetic susceptibility and extra magnetic measurements and geochemistry (elemental and carbon and oxygen isotopes).

Within the framework of the IGCP-580 (Application of magnetic susceptibility as a paleoclimatic proxy on Paleozoic sedimentary rocks and characterization of the magnetic signal), we have focused on the application of magnetic susceptibility as a correlation tool, paleoenvironmental proxy and for cyclostratigraphy. A review paper was published in *Marine and Petroleum Geology* on this topic, with an integrated example from the Devonian of Belgium (DA SILVA et al. 2013).

Projects in progress are related to:

- The paleoecology of Devonian stromatoporoids, with sections in Belgium and in the Devonian and Silurian of U.K. Detailed description of the fauna and relationship with the sedimentological setting. This work is done in collaboration with S. KERSHAW, Brunel and U. BALTHASAR, Glasgow.
- Geochemistry, magnetic susceptibility, sedimentology of various Upper Devonian sections:
- Southern China (with D. CHEN, Beijing), focusing on the Frasnian-Famennian boundary: geochemistry (with M.T. WHALEN, Alaska), microfacies, Gamma Ray Spectrometry (with X. DEVLEESCHOUWER, Brussels), Magnetic Susceptibility and cyclostratigraphy (with D. DE VLEESCHOUWER, Brussels).
- Western Canada, core cutting through the Givetian Frasnian boundary (X. DEVLEESCHOUWER, Brussels and T. KUMPAN, Olomouc) and the *punctata* interval (with M.T. WHALEN, Alaska). Sampling, sedimentology, geochemistry and magnetic susceptibility in progress.
- Western Australia, two sections in the Frasnian, sedimentology, magnetic susceptibility done with A. GEORGE (Western Australia) and N. CHOW (Manitoba).
- Germany, section through the Kacak event (with Könighsof, Frankfurt), sedimentology, geochemistry ($\delta^{13}\text{C}_{\text{carb}}$, $\delta^{18}\text{O}$, TOC and sulfur content, T. SUTTNER, E. KIDO, Austria), conodont (Suttner, Könighsof), magnetic susceptibility and magnetic measurements.

Damien PAS is doing his Ph.D. in Liège university on the Paleoenvironmental evolution through the Devonian, with sections in Germany (PAS et al. 2013, collaboration with P. KÖNIGSHOF), Carnic Alps (PAS et al., 2013, collaboration with T. SUTTNER, E. KIDO, C. CORRADINI, M. PONDRELLI, and others) and Belgium (with X. DEVLEESCHOUWER).

Pauline LAMBERTY is just starting a Ph.D. on the cyclostratigraphy of selected Devonian outcrops. She did her master thesis on 3 shallow water Devonian sections from the Carnic Alps, with magnetic susceptibility, sedimentology, geochemistry and magnetic measurements (with T. SUTTNER and E. KIDO).

Publications:

DA SILVA, A.C., DE VLEESCHOUWER, D., BOULVAIN, F., CLAEYS, P., FAGEL, N., HUMBLET, M., MABILLE, C., MICHEL, J., SARDAR ABADI, M., PAS, D. & DEKKERS, M. 2013. Magnetic susceptibility as a high-resolution correlation tool and as a climatic proxy in Paleozoic rocks: merits and pitfalls: examples from the Devonian in Belgium. - *Marine Petroleum Geology*, **46**: 173-189.

PAS, D., DA SILVA, A.C., SUTTNER, T., KIDO, E., PONDRELLI, M., CORRADINI, C., BULTYNCK, P., DE VLEESCHOUWER, D., DOJEN, C. & BOULVAIN, F. in press. Insight into the development of a carbonate platform through a multi-disciplinary approach - A case study from the Upper Devonian slope deposits of Mount Freikofel (Carnic Alps, Austria/Italy). - *International Journal of Earth Sciences*, DOI: 10.1007/s00531-013-0969-2.

PAS, D., DA SILVA, A.C., CORNET, P., BULTYNCK, P., KÖNIGSHOF, P. & BOULVAIN, F. 2013. Sedimentary environments of a continuous Middle Givetian to Upper Famennian section from the fore-reef fringe of the Brilon reef-complex (Rheinisches Schiefergebirge, Germany). - *Facies*, **59**: 969-990.

Abstracts:

DA SILVA, A.C., GEORGE, A.D., CHOW, N. & SPASSOV, S. 2013. *Characterisation of cyclicity and relative sea-level fluctuations using magnetic susceptibility, Late Devonian (Frasnian) Hull platform, Canning - Basin, Australia.* - In: WHALEN, M., OSADETZ, K., RICHARDS, B., KABANOV, P., WEISSENBERGER, J., POTMA, KÖNIGSHOF, P., SUTTNER, T., KIDO, E. & DA SILVA, A.C. (Eds.): IGCP-580/596, Geophysical and Geochemical techniques - a window on the Paleozoic world: 24.

DA SILVA, A.C., KERSHAW, S., BOULVAIN, F., HUBERT, B. L. M., MISTIAEN, B., REYNOLDS, A. & REITNER, J. 2013. *Spicules or no spicules in*

Devonian stromatoporoids, that's the question? In: WHALEN, M., OSADETZ, K., RICHARDS, B., KABANOV, P., WEISSENBERGER, J., POTMA, KÖNIGSHOF, P., SUTTNER, T., KIDO, E. & DA SILVA, A.C. (Eds.): IGCP-580/596, Geophysical and Geochemical techniques - a window on the Paleozoic world: 25.

DA SILVA, A.C., KERSHAW, S., BOULVAIN, F., HUBERT, B., MISTIAEN, B., REYNOLDS, A. & REITNER, J. 2013. *First record of Demosponge spicules in a late Devonian stromatoporoid basal skeleton (Frasnian, Belgium).* - In: Abstracts, Ninth world sponge conference 2013:160-161 [ISBN: 978-0-9874158-3-].

DE VLEESCHOUWER, D., BOULVAIN, F., DA SILVA, A. C., PAS, D., LABAYE, C. & CLAEYS, P. 2013. *The astronomical calibration of the Givetian (Middle Devonian) time scale (Dinant Synclinorium, Belgium).* - In: WHALEN, M., OSADETZ, K., RICHARDS, B., KABANOV, P., WEISSENBERGER, J., POTMA, KÖNIGSHOF, P., SUTTNER, T., KIDO, E. & DA SILVA, A.C. (Eds.): IGCP-580/596, Geophysical and Geochemical techniques a window on the Paleozoic world: 28.

DE VLEESCHOUWER, D., BOULVAIN, F., DA SILVA, A.C., PAS, D., LABAYE, C. & CLAEYS, P. 2013. *The astronomical calibration of the Givetian (Middle Devonian) time scale (Dinant Synclinorium, Belgium).* "An astrochronology for the Givetian". - AGU.

DE VLEESCHOUWER, D., DA SILVA, A.C., BOULVAIN, F. & CLAEYS, P. 2013. *Cyclostratigraphic implications of Devonian climate astronomical forcing.* - In: AGU, Session N°. 229, Recent Advances in Paleoclimatology/Paleoceanography, Abstract 229-1, 8:00 am.

KERSHAW, S. & DA SILVA, A.C. 2013. *Stromatoporoid diversity and growth in late Wenlock reefs and associated facies (Silurian) at Wenlock Edge, UK.* - In: LINDSKOG, A. & MEHLQVIST, K (Eds.), Proceedings of the 3rd IGCP 591 Annual Meeting Lund, Sweden, 9-19 June 2013:157.

KÖNIGSHOF, P., DA SILVA, A.C., SUTTNER, T.J., KIDO, E., WATERS, J., CARMICHAEL, S.A., JANSEN, U., PAS, D. & SPASSOV, S. 2013. *Shallow water facies setting around the Kačák Event - Microfacies, MS studies, and geochemical proxies.* - In: ICPSEA3 2013: The 3rd International Conference on the Palaeontology of South-East Asia, Abstract book: 34.

KÖNIGSHOF, P., DA SILVA, A.C., PAS, D., SUTTNER, T.J., KIDO, E. & JANSEN, U. 2013. *Shallow water facies setting around the Kačák Event - a*

multidisciplinary approach. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 68.

KÖNIGSHOF, P., RACKI, G., SAVAGE, N., DA SILVA, A.C., DOPIERALSKA, J., BELKA, Z. & APSORN, S. 2013. *Depositional facies settings and geochemical proxies of Late Devonian sequences in northwestern Thailand*. - In: ICPSEA3 2013, The 3rd International Conference on the Palaeontology of South-East Asia, Abstract book: 35.

Editorial:

WHALEN, M., OSADETZ, K., RICHARDS, B., KABANOV, P., WEISSENBERGER, J., POTMA, KÖNIGSHOF, P., SUTTNER, T., KIDO, E., DA SILVA, A.C. (Eds.) 2013. *IGCP-580/596, Geophysical and Geochemical techniques: a window on the Paleozoic world*. - 47 pp.

CM James R. EBERT

Based on the co-occurrence of scyphocrinitid loboliths and a positive $\delta^{13}\text{C}$ excursion, we have localized the position of the Přídolí-Lochkovian (Silurian-Devonian) boundary in New York. The boundary occurs within the thin, but widespread Green Vedder Member of the Manlius Formation (Helderberg Group). This position is significantly lower than our earlier interpretations of the position of the boundary at the disconformable contact between the Manlius Formation and the Coeymans Formation (Howe Cave Unconformity). Studies of chitinozoans are ongoing in an effort to confirm the placement of the boundary.

In addition, my colleague Damon MATTESON and I have been participating in the group organized by TM Chuck VER STRAETEN that is working toward a revised correlation chart for the Devonian of New York.

Publications (abstracts):

EBERT, J.R. & MATTESON, D.K. 2013. Preliminary multitaxa biostratigraphy and sequence stratigraphy of the Přídolí (Late Silurian) and Lochkovian Stages (Early Devonian) in the Appalachian Standard Succession of New York. - *Geological Society of America Abstracts with Programs*, **45** (1): 52.

VER STRAETEN, C.A., BAIRD, G.C., BARTHOLOMEW, A., BRETT, C., EBERT, J.R., KIRCHGASSER, W.T., OVER, D.J. & ZAMBITO, J.J. 2013a. The Classic New York Devonian: Toward a New Stratigraphic Synthesis and Chronostratigraphic Chart. - *Geological*

Society of America, Abstracts with Programs, **45** (1): 51.

VER STRAETEN, C.A., BAIRD, G.C., BARTHOLOMEW, A., BRETT, C., CSONKA, J., EBERT, J.R., MATTESON, D.K., OVER, D.J., SMITH, G. & ZAMBITO, J.J. 2013b. The New York Devonian: a new stratigraphic synthesis and chronostratigraphic chart for the North American Standard. - *Geological Society of America, Abstracts with Programs*, **45** (7): 476.

CM Lenka FERROVÁ and CM Jiří FRÝDA

The last two years we continued to work as members of the five-year project " *Multidisciplinary approach in Mid-Paleozoic biotic crisis assessment - Devonian Daleje and Kačák events, Prague Basin, Czech Republic*" (PI Stanislava VODRÁŽKOVÁ)", financed by the Czech Science Foundation. In addition we worked on a three-year project financed by the Czech Geological Survey focused on a) high-resolution $\delta^{13}\text{C}$, $^{87}\text{Sr}/^{86}\text{Sr}$, and $\delta^{53}\text{Cr}/^{52}\text{Cr}$ chemostratigraphy of Late Silurian-Early Devonian, and b) Early Devonian integrated tentaculite, conodont and $\delta^{13}\text{C}$, $^{87}\text{Sr}/^{86}\text{Sr}$ stratigraphy. Main results and activities are summarized as follows:

- Ongoing research of the Zlíchovian/Dalejan boundary in the deeper parts of the Barrandian area is consistent with published results (FERROVÁ et al. 2012). Newly gathered data support the proposal of the base of the *Nowakia elegans* Biozone as a level for the definition of the Emsian substage (stage) boundary (i.e., the lower/upper Emsian boundary). Analysis of a new material collected in Zinzilban (Uzbekistan) revealed an occurrence of *barrandei-elegans* Subzone of the *N. elegans* Zone at different paleocontinent (in prep.) and suggest its extraordinary stratigraphic potential. Detailed discussion of published proposal of the base of the *Nowakia elegans* Biozone as a level for splitting of the Emsian could be found in FERROVÁ et al. 2012.
- Analysis of high-resolution tentaculite biostratigraphy across the Pragian stage (in its original sense, i. e. roughly corresponding to the Praha Formation) in the Barrandian area revealed a distinct faunal turnover located close to the so-called graptolite-bearing interval. Results of the latter study are prepared for publishing (LUKEŠ et al.).
- New high-resolution $\delta^{13}\text{C}$ and $^{87}\text{Sr}/^{86}\text{Sr}$ chemostratigraphic data across the Lochkov and Praha formations of the Barrandian area suggests their rather high potential for integrated chemo- and bio stratigraphy (in prep.)

Publications:

EBBESTAD, J.O.R., FRÝDA, J., WAGNER, P., HORNÝ,

- R., ISAKAR, M., STEWART, S., PERCIVAL, I., BERTERO, V., ROHR, D.M., PEEL, J.S., BLODGETT, R.B. & HÖGSTRÖM, A.E.S. 2013. Biogeography of Ordovician and Silurian gastropods, monoplacophorans and mimospirids, 191–212. - In: HARPER, D. A. T. & SERVAIS, T. (Eds.), *Early Palaeozoic Biogeography and Palaeogeography, Geological Society, London, Memoirs*, **38** (1): 199–220.
<http://dx.doi.org/10.1144/M38.15>.
- FREY, L., NAGLIK, C., HOFMANN, R., SCHEMM-GREGORY, M., FRÝDA, J., KRÖGER, B., TAYLOR, P.D., WILSON, M.A. & KLUG, C. 2014. Alpha diversity and palaeoecology of invertebrate associations of the Early Devonian in the Tafilalt (Morocco, Anti-Atlas). - *Bulletin of Geosciences*, **89** (1): 75–112.
- FRÝDA, J. 2013. *Fossil Invertebrates: Gastropods*. - In: Reference Module in Earth Systems and Environmental Sciences, 2013.
<http://dx.doi.org/10.1016/B978-0-12-409548-9.02806-2> (Elsevier, ISBN 9780124095489)
- FRÝDA, J., FERROVÁ, L. & FRÝDOVÁ, B. 2013. Review of palaeozygopleurid gastropods (Palaeozygopleuridae, Gastropoda) from Devonian strata of the Perunica microplate (Bohemia), with a re-evaluation of their stratigraphic distribution, notes on their ontogeny, and descriptions of new taxa. - *Zootaxa*, **3669** (4): 469–489.
- FRÝDA, J. & MANDA, Š. 2013. A long-lasting steady period of isotopically heavy carbon in the late Silurian ocean: evolution of the $\delta^{13}\text{C}$ record and its significance for an integrated $\delta^{13}\text{C}$, graptolite and conodont stratigraphy. - *Bulletin of Geosciences*, **88** (2): 463–482.
- GOCKE, M., LEHNERT, O. & FRÝDA, J. 2013. Facies development across the Late Silurian Lau Event based on temperate carbonates of the Prague Basin (Czech Republic). - *Facies*, **59** (3): 611–630. DOI 10.1007/s10347-012-0328-y.
- KUMPAN, T., BÁBEK, O., KALVODA, J., FRÝDA, J. & GRYGAR, T. M. 2013 (online). A high-resolution, multiproxy stratigraphic analysis of the Devonian-Carboniferous boundary sections in the Moravian Karst (Czech Republic) and a correlation with the Carnic Alps (Austria). - *Geological Magazine*.
10.1017/S0016756812001057
- LOYDELL, D.K., BUTCHER, A. & FRÝDA, J. 2013. The middle Rhuddanian (lower Silurian) 'hot' shale of North Africa and Arabia: An atypical hydrocarbon source rock. - *Palaeogeography, Palaeoclimatology, Palaeoecology*, **386**: 233–256.
<http://dx.doi.org/10.1016/j.palaeo.2013.05.027>
- LOYDELL, D.K., FRÝDA, J., BUTCHER, A. & LOVERIDGE, R.F. 2013 (online): A new high-resolution $\delta^{13}\text{C}_{\text{carb}}$ isotope curve through the lower Wenlock Series of Buttington Quarry, Wales. - *GFF*.
- MANDA, Š. & FRÝDA, J. 2013 (online): Evolution of the late Ludlow to early Lochkovian brachiopod, trilobite and bivalve communities of the Prague Basin and their link with the global carbon cycle. - *GFF*.
- SLAVÍK, L., ŠTORCH, P., MANDA, Š. & FRÝDA, J. 2013 (online): Integrated stratigraphy of the Ludfordian in the Prague Synform. - *GFF*.
- SUTTNER, T. J., KIDO, E., CHEN, X.-Q., MAWSON, R., WATERS, J. A., FRÝDA, J., MATHIESON, D., MOLLOY, P.D., PICKETT, J., WEBSTER, G.D. & FRÝDOVÁ, B. 2013. Stratigraphy and facies development of the marine Late Devonian near the Boulongour Reservoir, northwest Xinjiang, China. - *Journal of Asian Earth Sciences*, **80**: 101–118.
<http://dx.doi.org/10.1016/j.jseas.2013.11.001>
- TASÁRYOVÁ Z., SCHNABL P., ČÍŽKOVÁ K., PRUNER P., ŠTORCH P., MANDA Š., JANOUŠEK V., RAPPRICH V. & FRÝDA J. 2013 (online): Gorstian palaeoposition and geotectonic setting of Suchomasty volcanic centre (Prague Basin, Teplá-Barrandian Unit, Bohemian Massif). - *GFF*.
- VODRÁŽKOVÁ, S., FRÝDA, J., SUTTNER, T.J., KOPTÍKOVÁ, L. & TONAROVÁ, P. 2013. Environmental changes close to the Lower-Middle Devonian boundary, the Basal Choteč event in the Prague Basin (Czech Republic). - *Facies*, **59** (2): 425–449. DOI 10.1007/s10347-012-0300-x.

Abstracts:

- FERROVÁ, L., FRÝDA, J., LUKEŠ, P. & FRÝDOVÁ, B. 2013. New data on the Daleje Event from the Barrandian (Bohemia) as a key for progress in Emsian stratigraphy. - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), *International Field Symposium, "The Devonian and Lower Carboniferous of northern Gondwana"*, Abstracts Book, *Document de l'Institut Scientifique, Rabat*, **26**: 44–45 (ISBN 0251-4249).

- FRÝDA, J. 2013. Phylogeny of Palaeozoic gastropods inferred from their ontogeny: How many higher-level clades lived during Palaeozoic Era? - In: FRIAS MARTINS, A. M. DE, COSTA, A.C., DA CUNHA, R.T., AVILA, S., MNOTEIRO, S. C. & RAPOSEIRO, P. (Eds.), *World Congress of Malacology 2013, Abstracts*, 121, *Acoreana, Suplemento*, **8**: 391 pp. (ISSN 0874-0380).

- FRÝDA, J., RACHEBOEUF, P. R., FRÝDOVÁ, B., FERROVÁ, L. & MERGL, M. 2013. Quo vadis, *Platyceras*? - New protoconch data reveals a

- diphyletic origin of platyceratid gastropods. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 46-47 (ISBN 0251-4249).
- KUMPAN, T., BÁBEK, O., KALVODA, J. & FRÝDA, J. 2013. Multi-proxy stratigraphic analysis of the Devonian-Carboniferous boundary sections in the Central, Western and Southern Europe: a pathway to the better interregional correlations. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 69-71 (ISBN 0251-4249).
- LOYDELL, D., BUTCHER, A. & FRÝDA, J. 2013. *The middle Rhuddanian (lower Silurian) ‘hot’ shale of North Africa and Arabia: an atypical hydrocarbon source rock.* - In: LINDSKOG, A. & MEHLQVIST, K. (Eds.), Proceedings of the 3rd IGCP 591 Annual Meeting - Lund, Sweden, 9-19 June 2013: 197, Lund University.
- MANDA, Š. & FRÝDA, J. 2013.: *Evolution of the late Ludlow and early Lochkovian benthic communities of the Prague Basin and their link to global carbon cycle.* - In: LINDSKOG, A. & MEHLQVIST, K. (Eds.), Proceedings of the 3rd IGCP 591 Annual Meeting - Lund, Sweden, 9-19 June 2013: 203-204, Lund University.
- NÜTZEL, A., COOK, A., FRÝDA, J., GRÜNDEL, J. & KAIM, A. 2013. A review of the heterobranch fossil record and its meaning for phylogeny. – In: FRIAS MARTINS, A. M. DE, COSTA, A.C., DA CUNHA, R.T., AVILA, S., MNOTEIRO, S. C. & RAPOSEIRO, P. (Eds.), World Congress of Malacology 2013, Abstracts, 121, *Acoreana, Suplemento*, **8**: 391 pp. (ISSN 0874-0380).
- ŠTORCH, P., MANDA, Š. & FRÝDA, J. 2013. *Candidate sections for new international boundary stratotypes of the lower Silurian Aeronian and Homertian stages in the Prague Synform, Czech Republic.* - In: LINDSKOG, A. & MEHLQVIST, K. (Eds.), Proceedings of the 3rd IGCP 591 Annual Meeting - Lund, Sweden, 9-19 June 2013: 307-308, Lund University.
- direct evidence of late Frasnian glaciation, the F/F extinction event remains speculative. However, a search for field evidence (dated palynologically) continues in the Andes. George promotes the theme of extraordinary short-term sealevel fall accompanying the glaciation as a consequence of a significant climate change by latest Famennian time. Combined with the proposed ice extent in Gondwana are relatively new discoveries of ice-related deposits in the US Appalachians, from Pennsylvania through Virginia. The climate shift is not a new paradigm, but incorporating it with extensive ice provides for a nicely integrated system. The whole concept has been challenged from the standpoint that rising Acadian (North America), Arequipa terrane (central Andes) and Pampean Massif (NW Argentina) simply provided alpine-related glaciation that could not be responsible for significant sealevel change. Best evidence for a continental ice sheet has been known for many years in Brasil, where Mario CAPUTO and colleagues have shown bedding plane striations (Parnaíba Basin) and other ice-contact phenomena. Further, glacial beds are recognized across Brasil and in the northern Bolivia subsurface. I highly recommend George’s marvelously well-written book for Devonian aficionados.
- Together with George GRADER, other colleagues, and students I am working on a study of late Famennian and D-C boundary “proxy beds” equivalent to the late Famennian glacials. Focus is on the Three Forks and Sappington formations of Idaho and Montana, where very thin beds of alternating sandstone, black shale and carbonate appear to be punctuated by erosional surfaces. The Sappington is a surface exposure equivalent of the famous Bakken Formation, the Woodford Shale (Oklahoma) and the Bedford Shale (Kentucky), all of which have significant TOC values. (Interesting to note is a very high TOC content in Bolivian glacial beds.) We are pursuing a careful biostratigraphic study of this interval, primarily through palynology by Mercedes DI PASQUO (Argentina), who has found a good diversity of acritarchs and miospores, with evidence of recycling in some beds. Dating of these subequatorial Late Devonian units should give further insight into 3rd and 4th order glacioeustatic cycles and timing(s) of glacial ice advances and retreats.

CM Peter ISAACSON

2013 witnessed the publication of a stunning book by George MCGHEE: *When the invasion of land failed: The legacy of Devonian extinctions*, Columbia University Press, New York. In the book, George employs the Late Devonian glaciation event as the probable cause for the end-Devonian extinction event. Inasmuch as to date there is no

TM Nadezhda G. IZOKH and the Novosibirsk Group

During the year 2013 our team continued the investigation of Devonian stratigraphy in the south of West Siberia and in the lower reaches of 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, and T.A. SHCHERBANENKO. In addition, there are Dr. O.P. IZOKH from the SOBOLEV Institute of Geology and Mineralogy SB RAS and Master students from the Novosibirsk State University: E.S. ANDREEVA, I.V. SKORITSKY and D.V. BURKOVA.

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,
Tanyana A. SHCHERBANENKO – brachiopods,
 M. Sc. student **Ekaterina S. ANDREEVA** – conodonts,
 M. Sc. student **Ivan V. SKORITSKY** – conodonts,
 M. Sc. student **Dariya V. BURKOVA** – ostracods.

Main results obtained in 2013.

- New data on conodonts, brachiopods, ammonoids, and ostracods from the Stolb Island section indicate the predominantly Early Famennian (*triangularis*–Lower *rhomboidea* zones) age of sedimentation. The Upper Kellwasser global biotic event, which marks the Frasnian/Famennian boundary, was distinguished for Arctic Siberia. It was found that carbonate-terrigenous sediments in the section have a basin character. Fine-clastic material was supplied to the sediments from different sources. A flow of dolomite debris is associated with the most distant source — areas of evaporite sedimentation. The presence of calcareous fragments is due to the destruction of skeletal material (close provenance areas). Siliciclastics, which make up a considerable part of the sediments, were produced by partial rewashing and eolian differentiation of felsic pyroclastics. The existence of organic-rich horizons and beds of well-washed and well-sorted clastic sediments suggests that the Upper Devonian sediments have quite a high general petroleum potential.
- The biodiversity of Upper Devonian conodont associations from the Kuznetsk Basin was investigated. The Lower Famennian section along the Tom River is characterized by *Polygnathus brevilaminus* BRANSON & MEHL, *Icriodus alternatus alternatus*, *I. alternatus helmsi*, *Icriodus iowaensis* YOUNGQUIST & PETERSON, *Polygnathus izmensis* ZHURAVLEV, *Palmatolepis triangularis* SANNEMANN, *Pa. minuta minuta* BRANSON & MEHL, and *Pa. praetriangularis* ZIEGLER & SANDBERG and others. From the other Famennian section along

the Yaya River, conodonts belonging to the *triangularis* and *praesulcata* zones have been found. The absence in the succession of conodonts characteristic for the *crepida*, *rhomboidea*, *marginifera*, *trachitera*, *postera* and *expansa* zones most probably is evidence of a stratigraphic gap for most parts of the Famennian. The occurrence of a depositional break in the Famennian of the Kuznetsk Basin was mentioned before [BELSKAYA 1960: 168].

- A revision of the *L. zmeinogorskiana* Zone (brachiopods, Emsian Stage, Lower Devonian) was done. It was found that in different regions leptodontellids occurred at different stratigraphic levels, characterizing three conodont zones: *nothoperbonus* Zone (Salair, Rudny Altai and probably Russian Far East), *serotinus* Zone (Salair, Gorny Altai and probably several localities in Mongolia) and *patulus* Zone (Mongolia and probably Russian Far East). The *L. zmeinogorskiana* Zone is aligned with the *nothoperbonus* - *patulus* zones of the conodont standard. In Eifelian strata *L. zmeinogorskiana* (PEETZ in BUBLICHENKO), *L. planuscula* (KHALFIN) and *L. acuta* KHALFIN were not found. Furthermore, a correlation of the *zmeinogorskiana* Zone with the *Megastrophia uralensis* - *Zdimir baschkiricus* Zone is recognized to be erroneous. The latter is aligned with the *serotinus* (upper part) – *patulus* zones; the stratigraphic range is considerably limited.
- New data were obtained on radiolarians and conodonts from the Char ophiolite zone, east Kazakhstan (Central Asian orogenic belt). Radiolarians were obtained from cherts and siliceous rocks of the Late Devonian Urumbaev (*rhomboidea*-Lower *marginifera* zones) and Late Devonian-Early Carboniferous Karabaev (?*gracilis* - *duplicata* zones) formations and the Early Carboniferous Verochar Formation (*isosticha*–Upper *S. crenulata* - lower *typicus* zones); these ages were proven and specified by findings of conodonts. Upper Devonian radiolarian assemblages are characterized by *Trilonche*, *Astroentactinia*, *Tetraentactinia*, *Stygmospaerostylus* and *Archocyrtium*, while Lower Carboniferous assemblages include *Trilonche*, *Stygmospaerostylus*, *Archocyrtium* and several species of *Albaillella*.

Field trips

In the year 2013 field investigations in the Altai-Sayan Folded Area (Salair, Kuznetsk Basin, Gorny Altai) were carried out. Rock samples from Cambrian, Ordovician, Silurian, Devonian and Carboniferous sequences were collected for different analysis: microfauna (SSF, conodonts, ostracods, radiolarians), macrofauna (trilobites, brachiopods), for lithological and geochemical studies.

Publications:

YAZIKOV, A.Yu., BAKHAREV, N.K., IZOKH, N.G., RODINA, O.A., SARAEV, S.V. & SHCHERBANENKO, T.A. 2012. *Age of the Izyly Horizon by paleontological data.* – In: Regional Stratigraphy of Upper Precambrian and Paleozoic of Siberia: 146-155, SNIIGGIMC (Novosibirsk) [in Russian].

YAZIKOV, A.Y., IZOKH, N.G., SARAEV, S.V., BAKHAREV, N.K., GONTA, T.V. & SOBOLEV, E.S. New data on the Upper Devonian biostratigraphy and sedimentology of Stolb Island (Lena River delta). - *Russian Geology and Geophysics*, **54** (8): 780-791.

Abstracts:

BAKHAREV, N.K., IZOKH, N.G. & YAZIKOV, A.Y. 2013. New Data on the stratigraphy of the Lower and Middle Devonian of Salair (West Siberia, Russia). – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 25-27.



Kolya BAKHAREV, in the middle of stratigraphic discussions during the Morocco 2013 Field Symposium.

IZOKH, N.G. 2013. *Upper Devonian Frasnian-Famennian conodonts from the north margin of the Kuznetsk Basin.* – In: Interekspo Geo-Siberia-2013, IX International conference “Subsurface management Mining. New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk, 15-26. April, 2013. vol. **1**: 116-119, SGGA (Novosibirsk) [in Russian, Abstract in English].

IZOKH, N.G. & ANDREEVA, E.S. 2013. *Upper Devonian conodonts Siphonodella praesulcata Zone from NE Kuznetsk Basin.* - In: Interekspo Geo-Siberia-2013, IX International conference “Subsurface management Mining. New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk,

15-26. April, 2013. vol. **1**: 120-122, SGGA (Novosibirsk) [in Russian, Abstract in English].

OBUT, O.T. & IZOKH N.G. 2013. Devonian-Carboniferous radiolarians and conodonts from the South of the Char Ophiolite Zone. - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 103-104.

SKORITSKY, I.V. & IZOKH, N.G. 2013. *Middle Devonian conodont characteristic of West Siberia and its global correlation.* – In: The 3rd International Conference on the Palaeontology of South East Asia (ICPSEA 3) (Ipoh, Malaysia, 30th September -13th October 2013): Program and Abstracts, Ipoh, 2013: 45

YAZIKOV, A.Y. 2013. *Volume and correlation potential of the Leptodontella zmeinogorskiana interregional Zone (brachiopods, Devonian).* – In: Interekspo Geo-Siberia-2013: IX International conference “Subsurface management/Mining, New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk, 15-26 April, 2013,). Vol. 1: 53-57, SGGA (Novosibirsk) [in Russian, Abstract in English].

YAZIKOV, A.Y. 2013. Evolution of Devonian brachiopods from the Altai-Sayan folded area and the Saltation Theory of Speciation. - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 130-131.

YAZIKOV, A.Y., BAKHAREV, N.K., IZOKH, N.G., GONTA, T.V., OBUT, O.T., ANASTASIEVA, S.A., SARAEV, S.V. & SOBOLEV, E.S. 2013. The Devonian and Carboniferous of Lena River Delta (Arctic Russia, Yakutia, Northern Kharaulakh). - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 128-129.

YAZIKOV, A.Yu., IZOKH, N.G., BAKHAREV, N.K., SARAEV, S.V., SOBOLEV, E.S. & GONTA, T.V. 2013. *On the boundary of the Frasnian and Famennian in the section of the Stolb island (Republic of Sakha, R. Lena delta).* - In: Interekspo Geo-Siberia-2013, IX International conference “Subsurface management Mining. New trends and techniques for prospecting, exploration and exploitation of mineral resources”, Novosibirsk, 15-26. April, 2013. vol. **1**: 47-50, SGGA (Novosibirsk) [in Russian, Abstract in English].

TM Ulrich JANSEN

Investigation of Lower Devonian brachiopod faunas from the Rhenish Massif has been continued to complete a comprehensive monograph. A separate paper on the Rhenish Strophomenida has appeared online and is now in press in *Bulletin of Geosciences* (scheduled for the first volume in 2014).

In cooperation with K. DE BAETS (University of Erlangen), S. GOOLAERTS (Royal Belgian Institute of Natural Sciences, Brussels), T. RIETBERGEN (Leiden) and C. KLUG (University of Zurich) an ammonoid-brachiopod fauna from the Lower Devonian of Belgium was studied. The co-occurrence of the anetoceratine genus *Ivoites* with taxa of *Euryspirifer* and *Arduspirifer* suggest a Singhofen to Vallendar age of the locality and further corroborates a post-Ulmen age of parts of the Hunsrück Slate.

I contributed to a Turkish-German cooperation programme (DECENT, N. YALCIN, Istanbul & E. SCHINDLER, Frankfurt) focusing on Devonian sections in the central and eastern Taurids (southern Turkey), their implications on Devonian stratigraphy, events and palaeo(bio)geography. In October 2013 I participated in field works. Newly collected brachiopods will mainly contribute to refine the biostratigraphy of the sections.

In cooperation with P. KÖNIGSHOF (Senckenberg, Frankfurt), A. C. DA SILVA, D. PAS (Univ. Liège), T. SUTTNER, E. KIDO (Univ. Graz), J. WATERS, S. K. CARMICHAEL (Univ. Boone/NC), and S. SPASSOV (Roy. Meteor. Inst., Brussels), shallow water successions around the Kačák Event in the Blankenheim Syncline (Eifel region) are investigated in a multidisciplinary approach. A joint paper is prepared for the forthcoming Devonian volume in the Special Publications of the Geological Society of London.

Publications:

- JANSEN, U. 2012. On the traditional Siegenian-Lower Emsian successions in the Rhenish Slate Mountains, in special consideration of the basal Emsian boundary and its supraregional correlation. – *Subcommission on Devonian Stratigraphy Newsletter*, **27**: 21-27. [ISSN 2074-7268]
- JANSEN, U. 2012. Die Welt des frühen Devons aus der Sicht der Brachiopodenforschung. – *Senckenberg Natur Forschung Museum*, **142** (1/2): 44-51.
- JANSEN, U. 2013 (online). Strophomenida brachiopods from the Rhenish Lower Devonian. – *Bulletin of Geosciences*, **89** (1): 113–136. <http://www.geology.cz/bulletin/contents/art1443>.
- DE BAETS, K., GOOLAERTS, S., JANSEN, U., RIETBERGEN, T. & KLUG, C. 2013. The first record of Early Devonian ammonoids from Belgium and their significance. – *Geologica Belgica*, **16** (3): 148-156. <http://www.geologicabelgica.be> (open access).
- Abstracts:**
- JANSEN, U. 2012. Late Silurian to earliest Middle Devonian evolution of Rhenish brachiopods. – *Terra Nostra*, Schriften der GeoUnion Alfred-Wegener-Stiftung, **2012** (3): 86. [ISSN 0946-8978]
- JANSEN, U. 2012. Revision of Rhenish Lower Devonian Brachiopoda. – *Terra Nostra*, Schriften der GeoUnion Alfred-Wegener-Stiftung, **2012** (3): 86-87. [ISSN 0946-8978]
- JANSEN, U. 2012. *Open Sesam(e)!* – Application of the Senckenberg Collection Management system to palaeontological collections. – In: DigitalFossil Berlin 2012, 24.-26.09.2012, (Museum für Naturkunde Berlin).
- JANSEN, U. 2013. Early Devonian brachiopod faunas, palaeoenvironments and bioevents in the Rhenish Massif (Germany). – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 66.
- KÖNIGSHOF, P., DA SILVA, D., PAS, D., SUTTNER, T.J., KIDO, E. & JANSEN, U. 2013. Shallow water facies setting around the Kačák Event – a multidisciplinary approach. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 68.
- SCHINDLER, E., YALÇIN, M.N., YILMAZ, I. & WILDE, V., WEHRMANN, A., WEDDIGE, K., SAYDAM-DEMIRAY, D.G., ÖZKAN, R., NAZIK, A., JANSEN, U., BROCKE, R. & BOZDOĞAN, N. 2013. The Devonian of the Turkish Taurides – new biostratigraphic insights. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 113-116.

CM Elga MARK-KURIK

A joint paper on the Early Devonian fish fauna of a very distant area of the Eurasian continent – Chukotka - was published in 2013 in “*Geodiversitas*”, **35** (3): 545-578. Four author, Alain BLIECK, initiator of this research, Susan TURNER, Carole BURROW and E. M.-K., were busy with rather rare but limited material, consisting mainly of

microremains. The latter was obtained in an original way. Late Svetlana CHERKESOVA, well known stratigrapher and palaeontologist, working all her life in Russian Arctic, collected carefully tiny rock pieces, remaining after preparing brachiopods. The samples sent to Tallinn for acid treatment, yielded almost 30 scales and fragments of representatives of five different groups: heterostracans, thelodonts, acanthodians, placoderms (acanthothoracids) and a sarcopterygian. Lochkovian age of two local stratigraphical units, the Enmakaj and Pil'hikaj Formations of the De Long Strait coastal area was confirmed. Close connections during Early Devonian, based on fish fauna, were established between different Arctic regions: Chukotka, Severnaya Zemlya, Spitsbergen and others.

One more remote area of Siberia, the Yenisej River basin near Turukhansk yielded a new arthrodire (actinolepidoid) genus *Eukaia* of probable Pragian age. It is described in the "*Estonian Journal of Earth Sciences*", **62** (3): 131-138. The specimen was found in the lower part of the Razvedochnyj Formation. Fish fauna of this part of the Lower Devonian is comparatively poor, though contains also characteristic heterostracans - amphiaspids as also the underlying Kurejka Fm of Lochkovian age. The structure of *Eukaia* skull, the only specimen of this fish, is a real riddle, as shows characters, resembling in a way the curious Australian wuttagoonaspids, also possessing rather exceptional dorsally placed nasal openings etc.

It is surprising that a small and seemingly uninteresting fragment of a psammosteid heterostracans may appear to be of great scientific value. Among specimens of the Middle Devonian giant jawless fishes in collections of the Institute of Geology, Tallinn University of Technology, there are exoskeletal plates, showing bite marks of predatory fish. One fragment, some centimetres long and with a little pit in it revealed a complicated process of bone repair. Different modern methods were applied to the detailed histological study. A thorough paper was published in 2013 in "*Biology letters*" **9**: 1-5. Six scientists, mostly from UK participated in this extraordinary research; the main authors were Zerina JOHANSON and Moya SMITH. E. M.-K., who collected the fish fossils, checked the stratigraphical and taxonomical data.

In autumn psammosteids became rather popular. Two young scientists, Vadim GLINSKY from Saint Petersburg University, Russia, and Marek DEC from Institute of Paleobiology, Polish Academy of Sciences studied our presentable collections (Vadim during a month). But placoderms also attracted attention. John LONG from Flinders University, Adelaide, Australia, came to Tallinn in September for some few days, which he spent here very productively.

But in early autumn the 'stars' of fossils fishes became altogether sarcopterygians. A group of Ordovician workers of our institute visited the oil shale quarry in the NE Estonia near Narva city. In the quarry Ordovician rocks are covered with Devonian dolostone that lacks economical value and forms huge talus. Here numerous Middle Devonian, Eifelian fish remains of the Vadja Formation were found, including large pieces of perfectly preserved squamation of *Glyptolepis*. Even a journalist came to the institute to admire the specimens, and next day a page of the daily newspaper was decorated with photos of the remarkable discovery.

TM John E. MARSHALL

Last year work continued on our 2 major NERC projects on 'Devonian afforestation' and 'ROMER'S Gap'.

In the Devonian afforestation project the post-doc Jenny MORRIS with colleagues from Sheffield and NYS completed the drilling of a series of shallow boreholes through palaeosols beneath progymnosperm and cladoxylopsid trees. These cores are now being geochemically profiled in Southampton. Ph.D. student **Dave CARPENTER** has largely completed a long time series of Palaeozoic micro-charcoal abundance in Gondwana.

It has been a busy year in ROMER'S Gap. The cored BGS borehole through the Tournaisian Ballagan Formation was successfully completed. It has been logged (Leicester University and the BGS) and extensively sampled. Southampton Ph.D. student **Emma REEVES** is now working on this material. I am working on the parallel outcrop section from Burnmouth. Importantly we are finding pre-CM spore assemblages and can date some of the newly discovered tetrapods to the start of ROMER'S Gap. We also had a week of consortium fieldwork in the Scottish Borders.

In collaboration with Ian TROTH (BG) work continued on Devonian section from Bolivia. This includes studies by Ph.D. student **Jon LAKIN** on the D-C boundary.

During the summer in collaboration with Franz-Josef LINDEMANN from the Natural History Museum in Oslo and Sarah FINNEY from the Sedgwick Museum we visited sections on Triungen in Svalbard. This was to recollect and palynologically date localities where F-J had discovered tetrapod bones.

But most of my time this year has been spent completing joint work with Olga TEL'NOVA (Syktyvkar) on the Frasnian-Famennian boundary in the Timan.

Conferences attended were the SDS meeting in Morocco, pre-Cenozoic climate in Toulouse,

STRATI 2013 in Lisbon, the AASP annual meeting in San Francisco and the Palaeontological Association in Zurich that was excellently organised by our SDS colleague Christian KLUG.

CM Marek NARKIEWICZ

Sedimentological and palaeoecological study of the early tetrapod trackway-site (Eifelian, Poland) was finished by the end of 2012 and the results have been partly published (NARKIEWICZ & RETALLACK, published online in November 2013) or have been submitted for a publication (Grabowski et al., results on magnetic susceptibility and depositional cyclicity).

The research (with Katarzyna NARKIEWICZ) on conodont biofacies record of the Taghanic transgression has been continuing (to be finished in 2014) and the resulting paper has been submitted to the GSL Special Publication "Devonian Climate, Sea-Level and Evolutionary Events". It appeared that construction of a universal model for the studied interval is difficult due to biogeographic bias and problems with high-resolution correlation of sections. Nevertheless it was possible to propose a biofacies scheme fairly representative of the Euramerican conodont assemblages.

Joint Polish-Belarusian project on the presumed Kačak Event(s) in shallow-marine facies of Belarus and Poland has been continued. Part of the conodont taxonomic/biostratigraphic results was presented during the SDS Field Symposium in Morocco, March 2013. In the current year 2014 the main phase of biostratigraphic and petrological studies will be conducted.

Korczmin IG 1 borehole section – important stratotype of the Frasnian of SE Poland – has been a subject of the field investigations including core description, sampling and MS measurements. The study, to be finished by the end of 2014, will hopefully result in refinement of the conodont biostratigraphy (by applying an alternative polygnathid- and icriodid-based zonation). A separate aim of the study is interpretation of well-defined depositional cyclicity of different orders, partly controlled by eustatic events.

Publications/abstracts:

NARKIEWICZ, K., BULTYNCK, P. & NARKIEWICZ, M. 2013. Revision of the conodont species *Icriodus orri* KLAPPER & BARRICK and its significance for the Eifelian biostratigraphy. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, "The Devonian and Lower Carboniferous of northern Gondwana", Abstracts Book, *Document de l'Institut Scientifique*, Rabat, **26**: 93-95.

NARKIEWICZ, M. & RETALLACK, G.J., 2014 - Dolomitic paleosols in the lagoonal tetrapod track-bearing succession of the Holy Cross Mountains (Middle Devonian, Poland). - *Sedimentary Geology*, **299**: 74-87. doi: 10.1016/j.sedgeo.2013.10.008 (published online in November 2013)

TM Jeff OVER

New zircon U-Pb dates from Upper Devonian ash horizons

Collaborative work with Mark Schmitz and Vladimir DAVYDOV at Boise State University has produced zircon U-Pb dates from Upper Devonian ash beds. The preliminary study, an undergraduate honors thesis by Amanda LANIK, was presented at the Geological Society of America meeting in October 2013. The abstract:

Conodont biostratigraphy and new zircon dates of the Upper Devonian Belpre ashes, Chattanooga shale, Tennessee, and lower Rhinestreet shale, New York, eastern North America

LANIK, Amanda¹, OVER, D. Jeffrey², SCHMITZ, MARK D.³ & HOGANCAMP, N.¹ 2013. *Geological Society of America, Abstracts with Programs*, **45** (7): 836.

(1) Geological Sciences, SUNY-Geneseo, Geneseo, NY 14454, akl6@geneseo.edu, (2) Geological Sciences, S.U.N.Y. Geneseo, Geneseo, NY 14454-1401, (3) Department of Geosciences, Boise State University, 1910 University Drive, Boise, ID 83725-1535

The Frasnian (Upper Devonian) Belpre Ash Suite consists of numerous discrete ash beds in the Dwelltown Member of the Chattanooga Shale. At Little War Gap, Tennessee, conodonts between the ash horizons in a 1 m thick interval include *Palmatolepis punctata*, *P. housei*, *P. ljaschenkoae*, *Ancyrognathus barba*, and *Ancyrodella nodosa*, which indicate placement in MN Zone 8. Ash "6" yielded a single-crystal U-Pb date of 375.40 +/- 0.13 Ma from euhedral zircon phenocrysts using the chemical abrasion (CA-TIMS) method at Boise State University. A 1 cm thick pyrite-rich ash horizon in the Rhinestreet Shale on Eighteenmile Creek – the uppermost and thickest of three ash horizons in the upper Cashequa and lower Rhinestreet in western New York - yielded a statistically identical U-Pb zircon date of 375.32 +/- 0.14 Ma. Conodonts within a 4 meter thick interval from the adjacent shale and concretions above the ash horizons include *Palmatolepis ljaschenkoae*, *Polygnathus dubius*, and *A. nodosa*. The conodonts and absolute dates indicate the middle Frasnian ashes in New York State are Belpre and provide a precise date for MN Zone 8. The Rhinestreet ashes underlie the *Naplesites iynx* epibole horizon which has been correlated with MN Zone 7.

In other activity: Collaboration with Mark SCHMITZ and Vladimir DAVYDOV continued, with interesting magnetic susceptibility studies in D-C boundary strata in western Canada in addition to conodont work and collection of ash beds; our field work benefited from time spent with Barry RICHARDS. Magnetic susceptibility and carbon/oxygen isotope work on the D-C Boundary interval in cores from Indiana is underway with Jed DAY and Brad CRAMER. I also continue to work with Gordon BAIRD on northern Appalachian Basin D-C boundary strata; collaborative work with Gordon BAIRD, Carl BRETT, and Chuck VER STRAETEN on the type Marcellus (Eif-Giv) and the biostratigraphy of the same unit is underway looking at conodonts in the central Appalachian Basin with John REPETSKI. Tentaculitids from the Frasnian-Famennian carbonate platform and slope of the Alberta Basin have been studied by Jenna KOHN – Geneseo undergraduate – who is working up her results, I continue to work on the conodonts.

TM Maria Christinia PERRI

In 2013 I focused on conodont biostratigraphy across the Frasnian–Famennian boundary in the Southern Alps for identifying the lower limit of the Lower *triangularis* Zone in that region. The biostratigraphic study is tied in with extremely detailed sedimentologic analysis supported by geochemistry data and with evaluation of the conodont biodiversity and abundance variation pre- and post- the uppermost Frasnian (Upper Kellwasser) biologic crisis. Several colleagues are involved in that project. I am also involved in the Devonian–Carboniferous boundary problem.

In July our Argentine conodont friends turned on a superb meeting for the 3rd ICOS (International Conodont Symposium) in Mendoza. The event was in association with IGCP project 591: Regional Field Meeting. The 62 oral and poster presentations and the rich cultural program mounted by the Organizing Committee made it a very special meeting. Six short papers and eight abstracts dealing with Devonian conodonts were published as a book, *Conodonts from the Andes, Publicación Especial N° 13* of the *Asociación Paleontológica Argentina*. Our Argentine friends are an exceptionally warm group of people!

A PANDER Society Workshop will be mounted in Bologna (27 February–1 March 2014). It will be a convivial meeting that, *inter alia*, will set in train organisation for the next ICOS meeting in Europe in 2016. Participants from anywhere in the world will be very welcome. For more information, please contact:

Claudia SPALLETTA (claudia.spalletta@unibo.it).

As president of the Pander Society, embracing all people interested in conodonts, I draw your attention to the reinvigorated Pander Society website—accomplished by our webmaster, Mark PURNELL, at: <http://www2.le.ac.uk/departments/geology/hosted-sites/conodont/pander>

TM Eberhard SCHINDLER

In 2013, a good portion of time was dedicated to the survey the move of the famous (and voluminous) collections of the geological/palaeontological department of the University of Marburg which had been closed down about ten years ago. These collections – containing a large amount of Palaeozoic material – are now housed at Senckenberg (more detailed information to come as short notes in scientific journals).

In spring, I participated in the wonderful SDS Meeting in Morocco (thanks again to all organizers and guides!) where most of us met Mena SCHEMM-GREGORY for the last time (an obituary is included in this newsletter).

Research activities were mainly concentrated on three topics:

The Turkish–German cooperation project on “Devonian Cycles and Global Events in the Northern Gondwanan Taurides” (DECENT) was in full swing. Participation in a field campaign in the Tauride Mountains (autumn) as well as a visit of the Turkish counterparts (summer) during which a fieldtrip to the Lausitz Block, the Erzgebirge, and the Thürinisches Schiefergebirge were undertaken, are to be mentioned. Updates of the studied sections in the Taurides were presented at the SDS Morocco Meeting (SCHINDLER et al.).

Work on Middle Devonian strata in the Eifel Hills area has been continued together with Vice Chairman Carl BRETT during some days of fieldwork and in the institute.

Comparison of rocks in the interval of the Choteč Event has also been continued; additionally, samples were taken during the fieldtrip of the SDS Morocco Meeting. Results were presented in talks at this meeting (BROCKE et al.) and at the GSA Meeting (VER STRAETEN et al.).

As announced in last year’s report, a paper presenting an update on the section of the largely widened type locality of the Kellwasser Horizons in the Kellwasser Valley (Harz Mountains, Germany) together with colleagues Manfred GEREKE, Friedrich Wilhelm LUPPOLD, Matthias PIECHA and Dieter STOPPEL has been submitted.

Publications (abstracts):

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. – *Geological Society of America, Abstracts with Programs*, **45** (1): 52.

BROCKE, R., FATKA, O., LINDEMANN, R.H., SCHINDLER, E. & VER STRAETEN, C. A. 2013. New biostratigraphic insights from the early Mid-Devonian Choteč Event. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 28.

SCHINDLER, E., YALÇIN, M.N., YILMAZ, İ., WILDE, V., WEHRMANN, A., WEDDIGE, K., SAYDAM-DEMIRAY, D.G., ÖZKAN, R., NAZIK, A., JANSEN, U., BROCKE, R. & BOZDOĞAN, N. 2013. The Devonian of the Turkish Taurides – new biostratigraphic insights. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds.), International Field Symposium, “The Devonian and Lower Carboniferous of northern Gondwana”, Abstracts Book, *Document de l’Institut Scientifique*, Rabat, **26**: 113-116.

YALÇIN, M.N., SCHINDLER, E., BROCKE, R., JANSEN, U., LINDEMANN, U., WEHRMANN, A. & UHL, D. 2013. *The Palaeozoic – an „event story“*. – ICDP Scientific Conference: Imaging the past to imagine the future, Abstract Volume: 73-74; Potsdam.

CM Claudia SPALLETTA

Preliminary results of the study on stratigraphic sections at the Frasnian-Famennian boundary in the Carnic Alps were presented in Mendoza at ICOS3. The research on this theme is focused mainly on conodont biostratigraphy and taxonomy, but is also dealing with lithostratigraphy and sedimentology. It is carried out in collaboration with Enzo FARABEGOLI and M. Cristina PERRI (University of Bologna), and Monica PONDRELLI (University of Pescara).

In Mendoza were also presented two short papers on the Devonian/Carboniferous boundary written in collaboration with C. CORRADINI, S.I. KAISER, H. MATYJIA, and A. MOSSONI. Studies on the D/C boundary continue, as well as studies on Famennian conodont biostratigraphy and taxonomy from stratigraphic sections of the Carnic Alps.

Work as responsible for the definition of the Devonian pelagic limestone units, 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), continues. Within this project I am also involved in the study of the Middle to Upper Devonian transitional carbonatic units.

Publications/abstracts:

CORRADINI C., SPALLETTA C., KAISER S.I. & MATYJIA H. 2013. Overview of conodonts across the Devonian/Carboniferous boundary. - In: ALBANESI G. & ORTEGA, G. (Eds.), Conodonts from the Andes, 3rd International conodont symposium, *Asociación Paleontológica Argentina, Publicación Especial*, **13**: 13-16.

MOSSONI A., CORRADINI C. & SPALLETTA C. 2013. Famennian-Tournaisian conodonts from the Monte Taccu section (Sardinia, Italy). - In: ALBANESI G. & ORTEGA, G. (Eds.), Conodonts from the Andes, 3rd International conodont symposium, *Asociación Paleontológica Argentina, Publicación Especial*, **13**: 85-90.

Perri M.C., Spalletta C., Farabegoli E. e Pondrelli M., 2013 - The Frasnian–Famennian boundary in the Carnic Alps. - In: ALBANESI G. & ORTEGA, G. (Eds.), Conodonts from the Andes, 3rd International conodont symposium, *Asociación Paleontológica Argentina, Publicación Especial*, **13**: 148.

CM Thomas J. SUTTNER

In 2013 we achieved to finalize the proceedings volume of the IGCP 596 Opening Meeting. Thanks to Jiri Fryda and the editorial team of the *Bulletin of Geosciences* a really nice and scientifically very interesting volume (*Bulletin of Geoscience*, **88** (2): 219-482; <http://www.geology.cz/bulletin>) with 9 Devonian-related papers was published. Apart from that Erika KIDO and myself co-authored one manuscript on Mount Freikofel and a booklet on the Lanza Area (Carnic Alps). Another important publication is the volume on Austrian lithostratigraphic units of the Paleozoic Era(them). It represents a ‘state of the art’-summary of all Paleozoic units mentioned in the Austrian Stratigraphic Chart 2004. Partly based on the knowledge accumulated therein and on new data collected during the last few years, we (the Carnic Alps Working Group) are on the way to revise and formalize units of the pre-Variscan Sequence of the Carnic Alps.

Additionally we progressed with our work on the Late Devonian Boulongour Reservoir section in Xinjiang, China. A first manuscript including basic information on stratigraphy and facies is/will be published early in 2014. Together with our friends from USA and Mongolia another report on the eastern extension of Late Devonian deposits of the Junggar Basin in NW-China, the Barunhuurai

Terrane in Western Mongolia, was submitted to the Episodes. Here too, basic information mainly related to facies and lithostratigraphy is provided. Further investigations on bio- and chemostratigraphy are ongoing.

Within the frame of the projects IGCP 596 and FWF P23775 B17 (Late Eifelian climate perturbations: Effects on tropical coral communities) two meetings scheduled for 2014 shall be announced here:

1) Erlangen: 15-17.July 2014 - Short courses on Stable Isotopes, Carbonates and Paleobiology Database

2) Mongolia: 5-18.August 2014 - Multidisciplinary Field Workshop – Joint meeting with IGCP 580

Circulars and Registration forms of both meetings are available online under following link:

http://www.senckenberg.de/root/index.php?page_id=14716

Publications:

CORRADINI, C., CORRIGA, M. G., KIDO, E., MUSCIO, G., PONDRELLI, M., SUTTNER, T. J., SIMONETTO, L. & SPALLETTA, C. 2013. Cason di Lanza – Leggere il passato nelle rocce. – Le guide del geoparco della Carnia – 1, *Museo Geologico della Carnia, Comunità Montana della Carnia*: 1-48 (Udine).

HUBMANN, B., EBNER, F., FERRETTI, A., KIDO, E., KRÄINER, K., NEUBAUER, F., SCHÖNLAUB, H.-P. & SUTTNER, T.J. 2013. The Paleozoic Era(them). – In: PILLER, W.E. (Ed.), *The lithostratigraphic units of the Austrian Stratigraphic Chart 2004 (sedimentary successions)*, Vol. I. *Abhandlungen der Geologischen Bundesanstalt*, **66**: 9-133.

KIDO, E., SUTTNER, T. J., KÖNIGSHOF, P. & WATERS, J. A. 2013. Editorial preface: IGCP 596, Mid-Paleozoic climate and biodiversity: Proceedings of the Opening Meeting in Graz, Austria (September 19-24, 2011). – *Bulletin of Geosciences*, **88** (2): 219-222. DOI 10.3140/bull.geosci.1403

KIDO, E., SUTTNER, T. J., WATERS, J. A., ARIUNCHIMEG, Y., SERSMAA, G., ATWOOD, J. W. & WEBSTER, G. D. 2013. Devonian deposits of the Baruunhuurai Terrane, western Mongolia (IGCP 596 Field Workshop). – *Episodes*, **36** (4): 242-254.

PAS, D., DA SILVA, A. C., SUTTNER, T., KIDO, E., BULTYNCK, P., PONDRELLI, M., CORRADINI, C., DE VLEESCHOUWER D., DOJEN, C. & BOULVAIN, F. 2013. Insight into the development of a carbonate platform through a multi-disciplinary approach: a case study from the Upper Devonian slope deposits of Mount Freikofel (Carnic Alps, Austria/Italy). – *International Journal of Earth Sciences*. DOI 10.1007/s00531-013-0969-2.

SUTTNER, T. J., KIDO, E., CHEN, X.Q., MAWSON, R., WATERS, J. A., FRÝDA, J., MATHIESON, D., MOLLOY, P. D., PICKETT, J., WEBSTER, G. D. & FRÝDOVÁ, B. 2013. Stratigraphy and facies development of the marine Late Devonian near the Boulongour Reservoir, northwest Xinjiang, China. – *Journal of Asian Earth Sciences*, **80**: 101-118.

Abstracts:

CARMICHAEL, S.K., WATERS, J.A., SUTTNER, T.J., KIDO, E., DEREUIL, A.A., MOORE, L.M.C.C. & BATCHELOR, C. 2013. *Late Devonian Anoxic Events in the Central Asian Orogenic Belt: a Global Phenomenon.* – AGU.

DEREUIL, A.A., CARMICHAEL, S.K., WATERS, J., SUTTNER, T.J. & KIDO, E. 2013. *Recognition of the Kellwasser Event in the Late Devonian Honggueleing Formation of Northwestern China.* – In: GSA Annual Meeting in Denver: 125th Anniversary of GSA (27-30 October 2013), Abstract ID#: 225432.

GOUWY, S.A., KIDO, E. & SUTTNER, T. 2013. Mid-Devonian biodiversity and the Paleobiology Database. – In: WHALEN, M.T., OSADETZ, K., RICHARDS, B., KABANOV, P., WEISSEBERGER, J., POTMA, K., KOENIGSHOF, P., SUTTNER, T., KIDO, E. & DA SILVA, A.C. (Eds.). *IGCP 580-596 - Geophysical and Geochemical Techniques: A Window on the Palaeozoic World.* – In: Programme with Abstracts, Geological Survey of Canada and ERCB Core Research Center, 27 August – 1 September 2013: 32 (Calgary).

KIDO, E., SUTTNER, T.J., PONDRELLI, M., CORRADINI, C., CORRIGA, M. G., SIMONETTO, L., VODRÁŽKOVÁ, S., JOACHIMSKI, M.M. & KOPTÍKOVÁ, L. 2013. Eifelian – Givetian crisis: Evidence from lithological, geochemical and geophysical records of the Carnic Alps. – In: NARDIN, E. & ARETZ, M. (Eds.), “Pre-Cenozoic Climates” International Workshop, 17-19th June 2013, Toulouse (France), *Strata*, serie 1, **14**: 36-37.

KÖNIGSHOF, P., DA SILVA, A.C., PAS, D., SUTTNER, T.J., KIDO, E. & JANSEN, U. 2013. Shallow water facies setting around the Kačák Event – a multidisciplinary approach. – In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds): International Field Symposium “The Devonian and Lower Carboniferous of northern Gondwana”, Abstract Book, *Document de l’Institut Scientifique, Rabat*, **26**: 68.

KÖNIGSHOF, P., DA SILVA, A.C., SUTTNER, T.J., KIDO, E., WATERS, J., CARMICHAEL, S.A., JANSEN, U., PAS, D. & SPASSOV, S. 2013. *Shallow-water facies setting around the Kačák Event – Microfacies, MS studies, and geochemical proxies.* – In: The 3rd International

Conference on the Palaeontology of South-East Asia (ICPSEA3), Abstracts, Universiti Teknologi PETRONAS 30 September – 4 October 2013: 34.

KÖNIGSHOF, P., SUTTNER, T.J., BONCHEVA, I., IZOKH, N.G., TA HOA, P., & CHAROENTITIRAT, T., WATERS, J., KIESSLING, W. & KIDO, E. 2013. *Climate change and biodiversity patterns in Mid-Palaeozoic (IGCP 596) – Introduction and Report.* – In: The 3rd International Conference on the Palaeontology of South-East Asia (ICPSEA3), Abstracts, Universiti Teknologi PETRONAS 30 September – 4 October 2013: 15.

SERSMAA, G., KIDO, E., SUTTNER, T., WATERS, J.A. & ARIUNCHIMEG, Y. 2013. *Middle to Late Devonian deposits of the Baruunhuurai Terrane, western Mongolia.* – In: WHALEN, M.T., OSADETZ, K. RICHARDS, B. KABANOV, P. WEISSENBERGER, J. POTMA, K. KOENIGSHOF, P. SUTTNER, T. KIDO, E. & DA SILVA, A.C. (Eds.), *IGCP 580-596 - Geophysical and Geochemical Techniques: A Window on the Palaeozoic World.* – In: Programme with Abstracts, Geological Survey of Canada and ERCB Core Research Center, 27 August – 1 September 2013: 41-42 (Calgary).

SUTTNER, T.J. & KIDO, E. 2013. Development of Devonian platform deposits in the central Carnic Alps: Facies, biodiversity and geochemistry. – In: NARDIN, E. & ARETZ, M. (Eds.) “Pre-Cenozoic Climates” International Workshop, 17-19th June 2013, Toulouse (France), *Strata*, serie 1, **14**: 80-81, Toulouse.

WATERS, J., CARMICHAEL, S.K., SUTTNER, T.J., KIDO, E., MOORE, L.MCC., BATCHELOR, C.J. & DEREUIL, A.A. 2013. *Recognition of the Kellwasser and Hangenberg anoxia events in the Central Asian Orogenic Belt.* – In: GSA Annual Meeting in Denver: 125th Anniversary of GSA (27-30 October 2013), Abstract ID#: 223640.

Editorials:

KIDO, E., SUTTNER, T. J., KÖNIGSHOF, P. & WATERS, J. A. (Eds.) 2013. IGCP 596, Mid-Palaeozoic climate and biodiversity: Proceedings of the Opening Meeting in Graz, Austria (September 19-24, 2011). – *Bulletin of Geosciences*, **88** (2): 219-482.

WHALEN, M.T., OSADETZ, K. RICHARDS, B. KABANOV, P. WEISSENBERGER, J. POTMA, K. KOENIGSHOF, P. SUTTNER, T. KIDO, E. & DA SILVA, A.C. (Eds.) 2013. *IGCP 580-596 - Geophysical and Geochemical Techniques: A Window on the Palaeozoic World.* Programme with Abstracts, Geological Survey of Canada and ERCB Core Research Center, Calgary, 27 August – 1 September 2013: 1-47.

CM Chuck VER STRAETEN

2013 was a busy year, and included two meetings with the New York Devonian crew, including a number of SDS members (Carlton BRETT, Gordon BAIRD, Jeff OVER, Bill KIRCHGASSER, Jim EBERT, Alex BARTHOLOMEW, Jay ZAMBITO, and myself). We are working on a revision of the New York Devonian stratigraphic chart, with planned publication in early 2015.

Activities for 2013 included:

- Organized a session, *Refining the Iconic New York Devonian: A New Time-Rock Synthesis* for the Northeastern Section meeting of the Geological Society of America (March 2013). Presented three of thirteen talks in the session. An addition meeting in August with the same group of New York Devonian researchers worked toward publication of this project (see next).
- Continued organization of a related publication, revising the classic 1975 Correlation of the Devonian Rocks in New York, by L.V. RICKARD. A collaborative effort between thirteen New York Devonian researchers. The coming digital publication will include a series of poster-size graphics on New York's Devonian stratigraphy, various paleobiologic and geologic data, and an accompanying text volume of multiple chapters.
- Ongoing investigations of the composition of Devonian conglomerates in New York, to better understand unroofing history of the Acadian orogen.
- Bedrock mapping of the *Altamont 7.5 minute quadrangle, western Albany County, New York*. Strata on the quadrangle include basal Lochkovian to latest Eifelian carbonates and siliciclastics, thin latest Silurian carbonates, and Late Ordovician siliciclastics (turbidite facies). John Boyd THACHER State Park, on the Helderberg Escarpment west of Albany, is a key New York geological site on the Altamont quadrangle. Paleontologists and geologists from around the world who visited James HALL and the New York State Geological Survey in the nineteenth century also visited the THACHER Park area to observe the strata there, including Charles LYELL and Louis AGASSIZ. Today it remains a key geologic site in New York State, visited by such luminaries as Eberhard SCHINDLER and others.
- Ongoing study of the petrology of thick Devonian terrestrial and lesser marine siliciclastic strata in the Catskill Mountains, eastern New York, and the implications of their

weathering for modern soils, waters, and ecology.

- Renewed collaborative work on the biostratigraphy of Emsian and Eifelian strata in New York and the Appalachian Basin, eastern U.S. Current manuscript examines the Chotec interval, comparing new eastern U.S. data with data from the Czech Republic, with co-authors Rainer BROCKE, Eberhard SCHINDLER, Olda FATKA, and Richard LINDEMAN.
- Examination of rare, apparent lacustrine freshwater limestones in Middle Devonian terrestrial strata of the Catskill Mountains area, eastern New York.

Publications:

VER STRAETEN, C.A. 2013. Beneath it all: Bedrock geology of the Catskill Mountains and implications of its weathering. - *Annals of the New York Academy of Sciences, Proceedings of the Second Catskill Environmental Research and Monitoring (CERM) Conference*, **1298**: 1-29.

VAN ITEN, H., TOLLERTON, V.P., VER STRAETEN, C.A., DE MORAES LEME, J., GUIMARAES SIMOES, M. & COELHO RODRIGUES, S. 2013. Life mode of in situ Conularia in a Middle Devonian epibole. - *Palaeontology*, **56**: 29-48. doi: 10.1111/j.1475-4983.2012.01146.x.

Bedrock map:

VER STRAETEN, C.A., STANDER, E. & ENGEL, T. 2013. *Bedrock geological map of the Altamont 7.5 minute Quadrangle, Albany Co., NY*. - New York State Museum/Geological Survey (USGS State Map project), completed 2013.

Abstracts:

VER STRAETEN, C.A., BAIRD, G.C., BARTHOLOMEW, A., BRETT, C.E., CSONKA, J., EBERT, J.R., OVER, D.J., SMITH, G. & ZAMBITO, J.J. 2013. The New York Devonian: A new stratigraphic synthesis and chronostratigraphic chart for the North American Standard. - *Geological Society of America Abstracts with Programs*, **45** (7): 476.

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. In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds), International Field Symposium "The Devonian and Lower Carboniferous of northern Gondwana", Abstract Book, *Document de l'Institut Scientifique, Rabat*, **26**: 127.

BROCKE, R., FATKA, O., LINDEMANN, R.H., SCHINDLER, E. & VER STRAETEN, C.A. 2013. New biostratigraphic insights from the early Mid

Devonian Choteč Event. - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds), International Field Symposium "The Devonian and Lower Carboniferous of northern Gondwana", Abstract Book, *Document de l'Institut Scientifique, Rabat*, **26**: 28.

Abstracts for March 2013 session on New York Devonian Stratigraphy, at annual Northeastern Section meeting of the Geological Society of America. Session organized by Chuck VER STRAETEN.

<https://gsa.confex.com/gsa/2013NE/webprogram/Session31784.html>.)

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. - *Geological Society of America, Abstracts with Programs*, **45** (7): 51.

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. - *Geological Society of America, Abstracts with Programs*, **45** (7): 52.

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. - *Geological Society of America, Abstracts with Programs*, **45** (7): 52.

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. - *Geological Society of America, Abstracts with Programs*, **45** (7): 53.

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. - *Geological Society of America, Abstracts with Programs*, **45** (7): 52.

CM Stanislava VODRÁŽKOVÁ

In cooperation with my Czech colleagues (Petra TONAROVÁ, Jiří FRÝDA, Lenka FERROVÁ, Petr BUDIL, Leona CHADIMOVÁ and Michal MERGL) in the frame of the project "Multidisciplinary approach in Mid-Paleozoic biotic crisis assessment -

Devonian Daleje and Kačák events, Prague Basin, Czech Republic (Czech Science Foundation), I am currently focusing on the Kačák Event in the Prague Basin. Both deeper-water region, with abrupt onset of dark shales of the Kačák Member (Srbsko Formation) and shallow-water Koněprusy area (dark limestones of the so-called “Upper dark interval” of the *Acanthopyge* Limestone), are involved in the study. Although many workers have studied this event from different points of view, confusion regarding its exact timing and duration still exists. This can mostly be attributed to the multiphase nature of extinctions recorded within the event and the taxonomic uncertainty about key taxa. I am therefore focusing on dactyloconarid tentaculites and especially conodonts in the critical interval. *Nowakia* (*N.*) ex. gr. *otomari* BOUČEK & PRANTL and *Polygnathus ensensis* ZIEGLER & KLAPPER are regarded as crucial taxa for the event interval correlations. However, a significant intraspecific variability has been recorded in both taxa and it is a challenge to grasp it, as *Nowakia* (*N.*) ex. gr. *otomari* is not that numerous in the carbonate succession. Besides biostratigraphy I am focusing on microfacies analysis and oxygen isotope analysis using conodonts in the event interval.

Publications:

JAROCHOWSKA, E., TONAROVÁ, P., MUNNECKE, A., FERROVÁ, L., SKLENÁŘ, J. & VODRÁŽKOVÁ, S. 2013. An acid-free method of microfossil extraction from clay-rich lithologies using the surfactant Rewoquat. – *Palaeontologia Electronica*, **16** (3): 16 pp.

DOI:<http://palaeo-electronica.org/content/2013/530-microfossil-extraction>.

KLAPPER, G. & VODRÁŽKOVÁ, 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. DOI 10.2478/agp-2013-0006.

KLAPPER, G., CRÔNIER, C. & VODRÁŽKOVÁ, S. 2013. Conodont evidence for a latest Emsian to early Eifelian (Devonian) age for the phacopid trilobite *Plagiolaria kitabica* from Uzbekistan. – *Memoirs of the Association of Australasian Palaeontologists*, **44**: 25-26. [ISSN 0810-8889]

VODRÁŽKOVÁ, S., FRÝDA, J., SUTTNER, T.J., KOPTÍKOVÁ, L. & TONAROVÁ, P. 2013. Environmental changes close to the Lower–Middle Devonian boundary; the Basal Chotec Event in the Prague Basin (Czech Republic). – *Facies*, **59** (2): 425-449. DOI 10.1007/s10347-012-0300-x.

Two papers are currently being prepared for submission in 2014 – on microbial mats evidenced

by wrinkle structure recorded in the Srbsko Formation (?Givetian, Prague Basin) and microproblematica (calcspheres and parathuramminid foraminifers) from the “Upper dark interval” of the *Acanthopyge* Limestone (Koněprusy area, Prague Basin).

CM Michael WHALEN

Our research on Devonian rocks continues but publications were rather sparse during 2013. I was a co-author on a paper with Daizhao CHEN dealing with sulfur isotope perturbations at the F-F boundary in China and published three abstracts concerning the geochemistry and astronomical tuning of magnetic susceptibility data that permitted insight into the pattern and timing of the Late Devonian biotic crisis.

In August and early September I helped organize the fifth meeting of IGCP 580: Application of Magnetic Susceptibility on Paleozoic Sedimentary Rocks. This meeting was held in conjunction with IGCP 596: Climate change and palaeobiodiversity patterns in the Mid-Palaeozoic. The conference was held at the Geological Survey of Canada in Calgary and at the nearby ERCB Core Facility. We had two days of oral technical presentations and poster sessions followed by an extensive one-day core workshop hosted by Ken POTMA (Imperial Oil Resources) and John WEISSENBARGER (Husky Energy) who deserve a great deal of thanks for a tremendous tour through the Middle-Upper Devonian of the central Alberta subsurface. After the core workshop we had a two-day field trip in the Canadian Rockies examining coeval rocks on day 1 and uppermost Devonian and Lower Carboniferous rocks on day 2. Following the field trip a small subset of the participants remained in Calgary for two days of core sampling where we sampled the Upper Givetian through middle Frasnian portion of a core, including the punctata zone carbon isotope excursion, from northeastern Alberta.

Publications:

CHEN, D., WANG, J., RACKI, G., LI, H., WANG, C., MA, X. & WHALEN, M.T. 2013. Large sulphur isotopic perturbations and oceanic changes during the Frasnian–Famennian transition of the Late Devonian. – *Journal of the Geological Society, London*, **170**: 465–476. doi: 10.1144/jgs2012-037.

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, Calif., 3-7 Dec.

WHALEN, M.T., DE VLEESCHOUWER, D., ŚLIWIŃSKI, M.G., DAY, J.E. & CLAEYS, P. 2013. *Geochemistry and Cyclostratigraphy of Magnetic Susceptibility data from the Frasnian-Famennian event interval in western Canada: Insights into the pattern and timing of a biotic crisis.* – In: Calgary Alberta, IGCP 580-596 Meeting Abstracts.

WHALEN, M.T., DE VLEESCHOUWER, D., ŚLIWIŃSKI, M., DAY, J.E. & CLAEYS, P. 2013. Insights into the pattern and timing of the Frasnian-Famennian biotic crisis in western Canada from geochemistry and astronomical tuning, - *Geological Society of America, Abstracts with Programs.*

CM James J. ZAMBITO

It has been a busy but exciting year as I have started a position as Assistant Professor at the Wisconsin Geological and Natural History Survey, which is affiliated with the University of Wisconsin. I am finishing up manuscripts from my dissertation work with TM C. BRETT and CM G. BAIRD on the Taghanic interval and Middle-Upper Devonian transition in the Northern Appalachian Basin and this new position puts me in close proximity to the same age rocks of the Michigan Basin. I have been working with TM J. DAY on drill cores from the central and western Michigan Basin, and have begun study of the type sections of upper Givetian and Frasnian strata that outcrop in the northern part of the Michigan Basin. A better understanding of the Michigan Basin should provide important insights into the stratigraphic and faunal relationships between it and the Appalachian and Iowa basins. I have also continued participation with a group working to revise the Devonian correlation chart of the classic succession of New York State (USA), led by CM C. VER STRAETEN, and including CM G. BAIRD, CM A. BARTHOLOMEW, TM C. BRETT, CM J. EBERT, CM W. KIRCHGASSER, and TM J. OVER.

Publications:

ZAMBITO, J. & SCHEMM-GREGORY, M. 2013. Revised Taxonomy and Autecology for the Brachiopod Genus *Ambocoelia* in the Middle and Late Devonian Northern Appalachian Basin. - *Journal of Paleontology*, **87** (2):277-288.

Abstracts:

ZAMBITO, J., BRETT, C., BAIRD, G., JOACHIMSKI, M. & OVER, D.J. 2013. The Middle Devonian Global Taghanic Biocrisis in the Type Region, Northern Appalachian Basin, USA: New Insights from Paleoecology and Stable Isotopes. - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds),

International Field Symposium “The Devonian and Lower Carboniferous of northern Gondwana”, Abstract Book, *Document de l’Institut Scientifique, Rabat*, **26**: 132-134.

VER STRAETEN, C., BAIRD, G., BARTHOLOMEW, A., BRETT, C., EBERT, J., KIRCHGASSER, W., OVER, D.J. & ZAMBITO, J. 2013. The Classic New York Devonian: Toward a New Stratigraphic Synthesis and Chronostratigraphic Chart. - In: EL HASSANI, A., BECKER, R.T. & TAHIRI, A. (Eds), International Field Symposium “The Devonian and Lower Carboniferous of northern Gondwana”, Abstract Book, *Document de l’Institut Scientifique, Rabat*, **26**: 127.

ZAMBITO, J. 2013. *A Revised Stratigraphic Framework for the Middle and Upper Devonian of the Northern Michigan Basin.* - AAPG Annual Convention, Technical Program: 67.

VER STRAETEN, C., BAIRD, G., BARTHOLOMEW, A., BRETT, C., EBERT, J., KIRCHGASSER, W., OVER, D.J. & ZAMBITO, J. 2013. The Classic New York Devonian: Toward a New Stratigraphic Synthesis and Chronostratigraphic Chart. - *Geological Society of America, Abstracts with Programs*, **45** (1): 51.

BRETT, C., BAIRD, G., BARTHOLOMEW, A., EBERT, J., KIRCHGASSER, W., OVER, D.J., VER STRAETEN, C. & ZAMBITO, J. 2013. Building a Standard for Global Correlation: The Classic New York Devonian Section as an Exemplar of an Integrated Stratigraphic Approach, - *Geological Society of America Abstracts with Programs*, **45** (1): 53.

ZAMBITO, J., BAIRD, G. & BRETT, C.E. 2013. Stratigraphic Revision of the Middle-Upper Devonian Transition (Genesee Group) in Eastern New York State. - *Geological Society of America, Abstracts with Programs*, **45** (4): 10.

ZAMBITO, J. & DAY, J. 2013. New Insights into the Trilobite and Conodont Biostratigraphy of the Middle-Upper Devonian Genesee Group in Eastern New York State. - *Geological Society of America, Abstracts with Programs*, **45** (4): 52.

BAIRD, G., ZAMBITO, J., BRETT, C. & BARTHOLOMEW, A. 2013. Middle-Late Givetian Chronology in the Type Taghanic (“Tully Formation”) Succession, New York and Pennsylvania. - *Geological Society of America, Abstracts with Programs*, **45** (4): 52.

BARTHOLOMEW, A., BRETT, C., BAIRD, G. & ZAMBITO, J. 2013. Evolutionary-Ecological Subunit Turnover Events: Differing Models for Coordinated Faunal Turnover Events within the Devonian of the Appalachian Basin. - *Geological Society of America, Abstracts with Programs*, **45** (7): 395.

VER STRAETEN, C., BAIRD, G., BARTHOLOMEW, A.,
CSONKA, J., BRETT, C., EBERT, J., KIRCHGASSER,
W., MATTESON, D., OVER, D.J., SMITH, G. &
ZAMBITO, J. 2013. The New York Devonian: A
New Stratigraphic Synthesis and

Chronostratigraphic Chart for the North
American Standard. - *Geological Society of
America, Abstracts with Programs*, **45** (7): 476.



Tafilalt sunset, Morocco Field Meeting 2013