



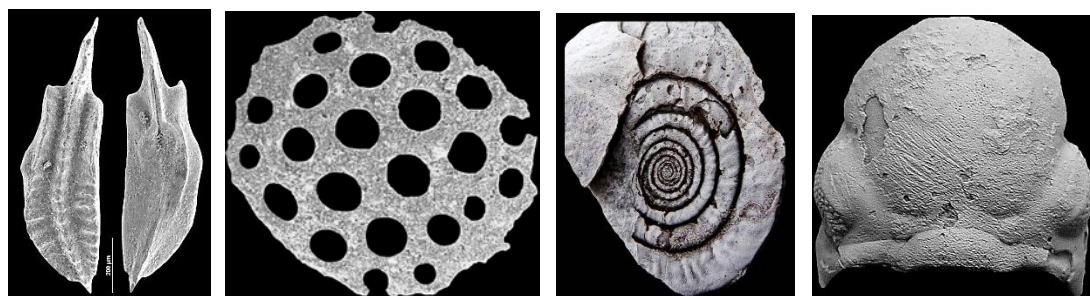
INTERNATIONAL UNION OF  
GEOLOGICAL SCIENCES  
COMMISSION ON STRATIGRAPHY

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**SUBCOMMISSION ON  
DEVONIAN STRATIGRAPHY**

**NEWSLETTER No. 27**

R.T. BECKER, Editor  
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Germany



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## SDS NEWSLETTER 27

### Editorial

The SDS Newsletter is published annually by the International Subcommission on Devonian Stratigraphy of the IUGS Subcommission on Stratigraphy (ICS). It publishes reports and news from its membership, scientific discussions, Minutes of SDS Meetings, SDS reports to ICS, general IUGS information, information on past and future Devonian meetings and research projects, and reviews or summaries of new Devonian publications.

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## MESSAGE FROM THE CHAIRMAN

### Dear SDS Members,

this is the last time that I address you in my function as Chairman of our Subcommission. I have terribly enjoyed my work in the last almost eight years and I like to thank all of you for your support, your active involvement, and especially those, who took a special burden by organizing our conferences and excursions. We have made significant achievements but the many tasks ahead, new stratigraphical methods, and more detailed data and interpretations coming from new areas and the re-study of long-known successions will ensure that Devonian stratigraphy continues to be a fascinating and advancing field of science. I have agreed to continue to edit this Newsletter, with the immense help by Mrs. KLAUS.

From the forthcoming IGC at Brisbane on, our current Secretary, John MARSHALL, will take over as SDS Chairman. I am glad that he accepted the unanimous vote by almost all TMs (two votes did not arrive). The same applies to Carl BRETT, our future Vice-Chairman. Whilst John will certainly stimulate more work on the important marine-terrestrial correlation, Carl will probably push sequence and cyclic stratigraphy and the correlation between physical and biostratigraphy. With the new positive attitude of ICS towards substages, progress in that field will be important in the next voting period. There will be three new TMs, Carlo CORRADINI, our webmaster, Ladislav SLAVIK (who replaces Jindra HLADIL), and ZHU Wangyou from Nanjing. My deepest thanks goes to our current Vice-Chairman Ahmed EL HASSANI and to the outgoing TMs Jindra, ZHU Min and Gavin YOUNG, who promised to continue as CMs.

A very active year 2011 was overshadowed by the unexpected loss of several highly respected Devonian workers from Germany. Personally, I was most hit by the accidental death of my friend Volker EBBIGHAUSEN. He was not a formal SDS Member but took a very active role in two SDS field trips (1999 and 2004) to Morocco. We also lost our former CM ZAGORA, the famous ostracod worker A. RABIEN, and H.-J. ANDERLE, an active member of the German SDS for many years.

The positive highlight of the last year was our symposium in Novosibirsk, with a pre-conference field trip to the Urals, and a long post-conference excursion to the Salair and Kuznetsk Basin. Once again, I like to thank all our Russian organisators, especially Kolya BAKHAREV, Olga OBUT, Nadya IZOKH, and Olga ARTYUSHKOVA. As during our 2005 meeting, the set-up of the field camps and all organization were just wonderful. I realize that all this would have been impossible without the most engaged help of so many people that are not named here. Of course, all was also only possible by the

support of the Novosibirsk Trofimuk Institute of Petroleum Geology and Geophysics, the Siberian Branch of the Russian Academy of Sciences, the Institute of Geology at the Ufa Scientific Center of the Russian Academy of Sciences, and the Siberian Research Institute of Geology, Geophysics, and Mineral Resources. In the field there were many occasions for intensive and partly controversial discussions, despite the hot sun or heavy rain. Interesting and new fossil discoveries were made, such as Eifelian goniates from the new "Aubry Bed" at Section B-8333 near Zarechnoe Village, or the first large-eyed Frasnian phacopids from the left bank of Tom River (Section B-8153). The new knowledge will facilitate a better and more precise international correlation of the Russian successions that we visited. We have agreed with the main editors at the Senckenberg Institute at Frankfurt, to produce a proceedings issue of the conference in the "Palaeodiversity and Palaeoenvironments" journal. More than twenty manuscripts have been announced. The deadline for the submission of high quality papers is at the end of July.

This year our Annual Business Meeting will take place in conjunction with the 34<sup>th</sup> International Geological Congress in Brisbane. I realize, as in the case of past IGCs, that not too many members can afford to come but all subcommissions have been asked to attend. Therefore, I proposed a symposium on "The Devonian of Asia and Australia" (Symposium 35.6). Other Devonian talks will be given in the session of IGCP 596 (Symposium 3.8) and in a session in honor of our long-time Australian member John TALENT (Symposium 23.2). At Brisbane plans will be finalized to produce another Devonian volume in the Special Publications series of the Geological Society of London. These books are now SQI listed and allow online pre-publication of individual chapters. Therefore, authors won't have to wait for the last manuscript to be submitted. A volume, with the working title "Devonian climate, sea level and evolutionary events", could include still unpublished contributions from the London IPC. We also have to join our forces with IGP 596. The Moroccan meeting next year is a positive example for such productive cooperation. In Novosibirsk we agreed to take part in the 4<sup>th</sup> IPC in Argentine in 2014. But there are many other options for future meetings.

The large amount of Membership News in this issue gives evidence that our subcommission is alive and healthy, with a high amount of diverse activities. I added a new Forum section for texts that are suitable for controversial discussions. A new set of GSSP illustrations has been prepared for our homepage and should be available soon.

With my best wishes to all, R. Thomas BECKER

## OBITUARY

**Volker EBBIGHAUSEN**  
10.02.1941 – 3.06.2011

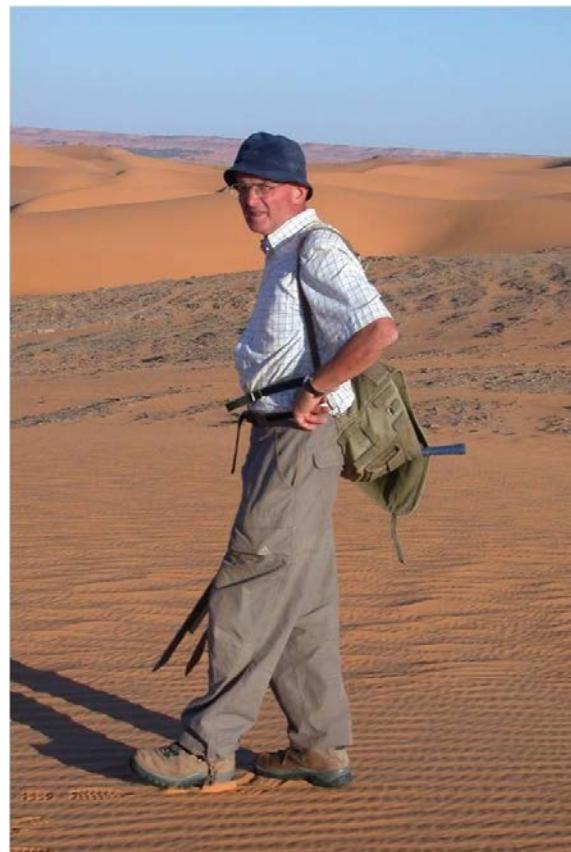
R. THOMAS BECKER

There is a long history of fossil collectors and amateur palaeontologists that made major contributions to research. Volker, who became a close and good friend over the last ca. 15 years, certainly deserves to be regarded as a specialist that conducted Devonian and Lower Carboniferous research far beyond any amateur level. His many important science contributions, often jointly with his close friend Jürgen BOCKWINKEL and with Dieter KORN, Dieter WEYER, or with myself and others from our Münster Group, keep the highest standard and include innovative ways to deal with the taxonomy of Palaeozoic ammonoids.



Volker was born in the Emsland (Lengerich, Tecklenburg County, northern Germany) and visited until February 1963 the gymnasium in Aalen. Subsequently, until 1969, he moved to Munich to study chemistry. At the same time he intensified his second long-time hobby apart from fossil collecting, horse riding. In summer 1972 he received his Ph.D. in chemistry in Munich and soon (1973) found a leading position in the analytical laboratories of the famous Bayer AG in Leverkusen. He worked with this large company until early retirement in 2001. He got married, had two sons, Rodion and Johannes. He started to explore the highly fossiliferous Devonian regions of Bergisch Gladbach and the Eifel region from his home in Odenthal. Over many years and together with friends he assembled a huge fossil collection in his living and basement rooms, not only of

Devonian age. He was engaged in a regional group of mineral and fossil collectors (Fossilien- und Mineralienbörse Bergisch Gladbach) and became a member of the Paläontologische Gesellschaft. Together with Jürgen BOCKWINKEL (who provided the photos) and others, he started to travel to Morocco and fell in love with the country, its wonderful scenery, people and most impressive geology and fossil richness.



When I first met Volker and Jürgen at one of the annual meetings of the Paläontologische Gesellschaft, they had already accumulated an impressive suite of Cretaceous, Tertiary, and Devonian fossils from Morocco. During many and highly enjoyable subsequent field trips to the Anti-Atlas, in the beginning with Michael HOUSE, later with Sarah ABOUSSALAM, Sandra KAISER, Sven HARTENFELS, and others, many localities and sections were sampled in detail. A wealth of new discoveries and the (mostly) calm nights out in the desert were a palaeontologists dream. Volker (and Jürgen) learned quickly about taxonomy, the sediments and high-resolution stratigraphy and got deeply involved in first joint publications (EBBIGHAUSEN et al. 2002, BOCKWINKEL et al. 2002, BECKER et al. 2000, 2002). Their work provided significant contributions to the SDS Field Trips to Morocco in 1999 (Tafilalt/Maider) and 2004 (Dra Valley). Subsequently they became very independent researchers (BOCKWINKEL & EBBIGHAUSEN, 2006, EBBIGHAUSEN &

BOCKWINKEL 2007) and Volker was accepted as reviewer for manuscripts published in international journals (e.g., DE BAETS et al. 2010). A focus on the topmost Devonian to Lower Carboniferous goniatite biostratigraphy of the eastern Anti-Atlas emerged (KORN et al. 2002, 2003a, 2003b, 2007, KLUG et al. 2006, EBBIGHAUSEN & KORN 2007). Together with Dieter KORN and Dieter WEYER, they had several trips to the isolated desert regions of southern Algeria, which resulted in a series of important publications (EBBIGHAUSEN et al. 2004, KORN et al. 2008, and five papers in Fossil Record, vol. 13 (1), 2010). Other Moroccan regions that were explored were the Dra Valley (ABOUESSALAM et al. 2004, BECKER et al. 2004a, 2004b, 2004c, EBBIGHAUSEN et al. 2004, 2010), Jerada Basin (KORN & EBBIGHAUSEN 2008), and the Moroccan Meseta. There are taxonomic and systematic descriptions of specific ammonoid groups, such as the pharciceratids (BOCKWINKEL et al. 2009, 2012 in prep.) and beloceratids (KORN et al. 2011), mostly based on Moroccan collections.



Volker's favourite hobby: fossil hunting ("nothing shall be left behind")

Interest in the closer Devonian of the Rhenish Massif never stopped and also led to publications (e.g., EBBIGHAUSEN et al. 2007, MA et al. 2008, SARTENAER & EBBIGHAUSEN 2007). Brachiopods became his second main interest in palaeontology and he had a very large collection from the Eifel, Bergisch Gladbach region, and southern Morocco. Volker was very generous to give important material that he would not work on himself to other specialists. This contributed significantly to papers

on gastropods (e.g., BANDEL 1993, with *Hesperiella ebbighauseni*, BANDEL & FRYDA 1998), rhynchonellids (e.g., SARTENAER 1998, 1999, 2000, 2006, 2008), trilobites (e.g., HAHN & HAHN in HAHN et al. 2004, with *Maghrebaspis ebbighauseni*, BASSE 2004, with *Dechenella ebbighauseni*, HAHN et al. 2012 in press), crinoids (e.g., WEBSTER et al. 2005, with *Moroccocrinus ebbighauseni*), and bivalves (ROGALLA & AMLER 2000, with *Teranota ebbighauseni*, NAGEL-MYERS & AMLER 2007, NAGEL-MYERS et al. 2008, 2009). He would even give away goniatites (BECKER 1995, 2002, RICHTER 2002). His voluminous and first class ammonoid work was honored by KLUG (2002) with the naming of *Sellanarcestes ebbighauseni* from the Tafilalt.

In recent years (since October 2009), Volker was given the status of an honorary scientist at the Berlin Museum für Naturkunde. The tragic accident that caused his sudden and unexpected death caught him in the middle of activities, unfinished manuscripts and new research incentives. He used to push work with words that he was too old to wait for too long but I would never have anticipated the sad truth in this. After all the long and adventurous trips to the desert the biggest danger were not poisonous scorpions, snakes or stray mine fields. He had proposed another field meeting in Morocco to cover both the Devonian and Carboniferous, which will take place next year – in his memory. His extensive collection has been transferred to the Museum für Naturkunde in Berlin.

Volker was a straight and upright person but had an immense sense of humor. There was no campfire night without good jokes and stories between intensive and controversial science discussions. Sometimes he liked to play the devil's advocate but he did not mind open words and irony. He was also very generous, best exemplified by active social work (Bergisch Gladbacher Tafel e.V.) in his home region and by the support to locals and organizations in Morocco. He is deeply missed, both as a person and as a renowned Devonian palaeontologist.

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## OBITUARY

**Hans-Jürgen ANDERLE**

23.01.1939 – 22.01.2012

Eberhard SCHINDLER & Gudrun RADTKE



German geologist Hans-Jürgen ANDERLE passed away on 22 January, 2012, one day before his 73<sup>rd</sup> birthday. He was born in Liberec (formerly Reichenberg) in the Sudetenland. After World War II he lived in Zittau (Saxonia) before he moved to Frankfurt am Main in 1951 where he finished school in 1960. From 1960 to 1966 Hans-Jürgen studied Geology/Palaeontology at the Johann-Wolfgang-GOETHE University in Frankfurt. He

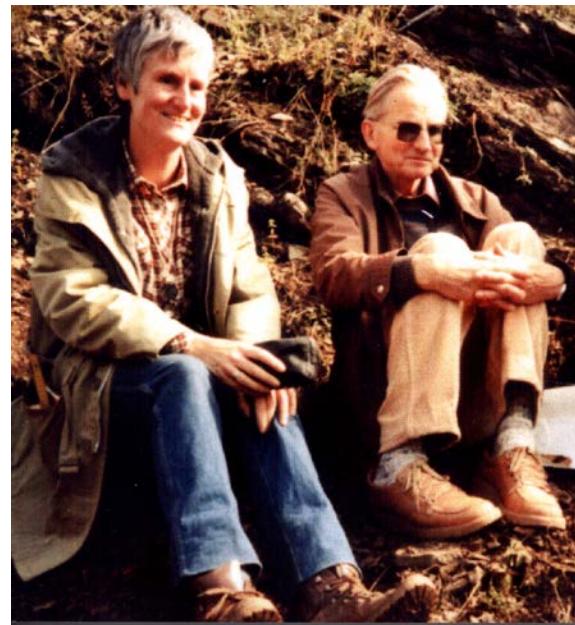
received a Diplom degree which he passed with distinction.

In 1967 Hans-Jürgen ANDERLE started at the Geological Survey of the State of Hessen (former 'Hessisches Landesamt für Bodenforschung, HLFB', now named 'Hessisches Landesamt für Umwelt und Geologie, HLUG) in Wiesbaden, first with a contract of the German Research Foundation (DFG) and later as a state employee in various positions. He was one of the nowadays rare geologists who were specialists in geological mapping. He became **the** expert of the Taunus Mountains, representing the southernmost part of the Rheinisches Schiefergebirge and lived with his wife Dragica in the northern part of Wiesbaden. He was a co-author of many regional papers and maps. Two sheets at the scale 1:25.000 were mapped and commented by him (mapsheet 5715 Idstein and mapsheet 5714 Kettenbach). Even after retirement in 2004, he worked actively on various aspects of the Taunus Mountains and its surrounding geology.

Hans-Jürgen was a long-time member of the German SDS – just recently, he had been elected as a Titular Member for the next term. But he was also a member of the German 'Subkommission Riphaeikum – Silur'. Besides many other activities (just to mention that he was a respected expert on Jazz Music owing a huge collection of albums and CDs), he was the Chairman of the 'Nassauischer Verein für Naturkunde' (a Natural History Society based in Wiesbaden) since 1996. He fulfilled all these tasks successfully and with much effort until his untimely death.

The community of German geologists lost one of its most widely educated and interested members; and we lost a warm-hearted, gentle, and modest colleague and friend – Hans-Jürgen ANDERLE will be missed!

especially of the Dill syncline. The German SDS has lost a modest and warm hearted colleague. His comprehensive knowledge of Devonian and Early Carboniferous stratigraphy of the Rhenish Schiefergebirge and the unselfish help with informations will be missed.



Arnold RABIEN together with Helga GROOS-UFFENORDE at the Donsbach section in the Eastern Rhenish Slate Mountains in 1984.

## OBITUARY

Karl ZAGORA

02.04.1938 – 16.10.2011

Helga GROOS-UFFENORDE

The community of the Palaeozoic biostratigraphers and the Devonian ostracode workers have lost a warm-hearted and open minded colleague in October 2011.

Karl ZAGORA began his studies on Devonian Tentaculites of the Thuringian Mountains in eastern Germany. His results stimulated the further investigations by G.K.B. ALBERTI. The detailed studies of Karl ZAGORA on latest Early Devonian ostracodes (see ZAGORA 1968 in *Geologie, Beiheft 62*) is still a tool for international correlation.

After their theses at the University of Jena, Karl and Ingrid ZAGORA worked for the DDR Oil and Gas Company in Grimmen. Karl mainly studied Palaeozoic (Devonian to Permian of the Middle European Basin) sequences of deep drill holes in Vorpommern (Northeastern Germany) with a focus on sedimentology and stratigraphy. A short summary of this work is given in the 'Schriftenreihe für Geowissenschaften 2, 1993'.

## OBITUARY

**Arnold RABIEN**

26.10.1918 – 13.08.2011

Helga GROOS-UFFENORDE

Arnold RABIEN began his studies after World War 2 on the stratigraphy and sedimentology of the Eastern Rheinische Schiefergebirge with Hermann Schmidt at Göttingen University, but later he concentrated on Late Devonian ostracodes. His thesis 1954 still is (and I think will stay in the future) the international standard for detailed Late Devonian stratigraphy with entomozoacean ostracodes. For many years he worked with great enthusiasm on Devonian ostracodes in particular to help the colleagues of the Geological Survey of Hessen mapping in the Rhenish Schiefergebirge to understand the complicated geology and tectonics

Karl could not enjoy his retirement very much because of a severe but slowly growing illness. Therefore Karl and Ingrid ZAGORA could neither attend the Meetings of the German Subcommission on Devonian Stratigraphy nor the Meetings of the

German speaking Ostracodologists after the Meeting in Albrechtsberg 1991. But both were still interested in the discussion of the SDS, but they only could follow it in reading the reports and newsletters.



Karl ZAGORA (together with his wife Ingrid) explaining the Devonian succession of the Thuringian Mountains on the occasion of the first united German excursion in 1991. Sheet held by Dieter WEYER (Berlin).

## SDS REPORTS

### INTERNATIONAL COMMISSION ON STRATIGRAPHY SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

#### ANNUAL REPORT 2011

##### **1. TITLE OF CONSTITUENT BODY**

Subcommission on Devonian Stratigraphy

*Submitted by:*

R. Thomas BECKER, *Chair of SDS*  
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##### **2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY**

SDS has continued in 2011 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 in Novosibirsk, in summer 2011. Other continued activities include multidisciplinary international correlation, the Devonian chapter to GTS 2012, the organisation of Devonian stratigraphic symposia, the publication of its SDS Newsletter and of monographic books/journal volumes, and improvements of the SDS Homepage. SDS objectives for 2011 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 the new 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 26.
- Annual Business Meeting in conjunction with the “International Conference on Biostratigraphy, Paleogeography and Events in Devonian and Lower Carboniferous”, Novosibirsk, 20<sup>th</sup> July to 10<sup>th</sup> August 2011.

- Field trips to the Devonian of the southern Urals and Kuznetsk Basin in conjunction with the Novosibirsk conference.
- Support for additional international Devonian symposia (at GSA, Northeastern 46<sup>th</sup> Annual and North-Central 45<sup>th</sup> Annual Joint Meeting, 20-22<sup>nd</sup> March 2011, Pittsburgh; 2011 Annual GSA Meeting, Post Meeting Field Trip on “Event history and sequence architecture of the Middle-Upper Devonian epeiric carbonate platform of the Iowa Basin”, led by TM J. DAY).
- Finalization of Devonian chapter for the GTS 2012 volume.
- New GSSP presentation and other updates on the SDS Homepage.

All listed objectives fit the directions of IUGS and ICS:

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

##### **3. ORGANIZATION**

###### **Officers for 2008-2012**

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

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

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

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

The SDS Membership includes representatives of Australia, Austria, Belarus, Belgium, Bolivia, Bulgaria, Canada, China, Czechia, Estonia, France, Germany, Great Britain, Iran, Italy, Latvia, Lithuania, Morocco, Myanmar, New Zealand, Pakistan, Poland, Portugal, South Africa, Spain, Switzerland, USA, Uzbekistan, Tadzhikistan, Turkey, and Vietnam. At national level Devonian Subcommissions exist in various countries.

**Website:** <http://www.unica.it/sds/>

#### 4. 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. The mentioned Novosibirsk symposium and excursions were the first joint SDS/IGCP 595 conference. In autumn 2011, the first circular for a joint meeting in Morocco in spring 2013 has been finalized. SDS also cooperates with IGCP 591 on "The Early to Middle Paleozoic Revolution: Bridging the Gap between the Great Ordovician Biodiversification Event and the Devonian Terrestrial Revolution", led by B.D. CRAMER, T.R.A. VANDENBROUKE, and others. Several SDS members contribute actively to IGCP 580 on "Application of magnetic susceptibility as a palaeoclimate proxy on Palaeozoic sedimentary rocks and characterization of the magnetic signal".

#### 5. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2011

##### Chronostratigraphic definitions

The continuing struggle for formal substage recognition resulted in the acceptance of this topic for the future work plan of ICS and for raising the issue within IUGS. SDS will present its substage work at the forthcoming Brisbane IGC. There are also plans to provide reviews of decided boundaries in manuscripts for *Lethaia*.

##### Pragian substages

The use of the current basal Emsian GSSP for the definition of a future Upper Pragian substage has been given some support by the Czech Devonian workers (SLAVIK et al. 2011, HLADIL et al. 2011) but the absence of the defining species, *Eocostapolygnathus kitabicus*, in the Pragian type region is a small obstacle. VALENZUELA-RIOS & MARTÍNEZ-PÉREZ (2011) showed the potential of Spanish Pyrenees sections to correlate the polygnathid succession with the more shallow-water icriodid sequence. Specialists from Russia and Uzbekistan still prefer to maintain the Zinzelban GSSP. Any formal decision on Pragian substages has to await the Emsian revision.

##### Revision of basal Emsian GSSP

An extensive revision of lithostratigraphy and faunal ranges in the current Zinzelban GSSP section has been compiled in a special supplement (No. 15) to the *Geologiya I Geofizika* series published by the Siberian Branch of the Russian Academy of Sciences in Novosibirsk. It documents the significant progress concerning conodonts, dacryoconarids, brachiopods, corals, and Bryozoa.

The problematical results from the first re-sampling campaign at the assumed critical interval

for a future Zinzelban GSSP, possibly to be defined by *Eoc. excavatus* "Morphotype 114", has been summarized by IZOKH et al. (2011) in SDS Newsletter 26. At the Novosibirsk meeting it was agreed that a second re-sampling campaign will take place in the Kitab Reserve in summer 2012.

BECKER & ABOUSSALAM (2011) published on a southern Moroccan lower Emsian section and found that the region, despite its generally outer shelf setting, is too poor in polygnathids to trace both the entry of *Eoc. kitabicus* or of *Eoc. excavatus*. However, "Morphotyp 114" was found and there is some evidence that at least parts of the regional "Pragian Limestone" in fact already falls in the lower Emsian, using either the current or envisaged future definition.

##### Emsian substages

The long awaited revision of Emsian dacryoconarids from Bohemia still has not been published but CM FRYDA announced that important new results will soon become available. BECKER & ABOUSSALAM (2011) further emphasized the distinction between the global Upper Zlichov and Daleje Events in SE Morocco. The latter is very sharply developed but attempts to recover any conodonts from rare interbedded calcareous beds have failed so far. Cyclic basal upper Emsian strata of SW Morocco were studied by BRETT et al. (2011 in press).

##### Givetian substages

General papers on Givetian magneto- and sequence stratigraphy by VER STRAETEN et al. (2011) and ELLWOOD et al. (2011) include important data for the international correlation of the Lower/Middle stage boundary. Several new publications deal with the global Taghanic Crises, which marks the Middle/Upper Givetian boundary: BRETT et al. (2011), ABOUSSALAM & BECKER (2011), MARSHALL et al. (2011), BRETT & ZAMBITO (2012 in press). These cover different regions and terrestrial to outer shelf settings. The available data are extensive and allow a reliable chronostratigraphic definition.

##### Frasnian substages

The significant isotopic spike near the Lower/Middle Frasnian boundary led to a continuing interest in the global Middlesex or *punctata* Event. There are new papers on the Ardennes (DA SILVA et al. 2010) and Western Canada (SLIWINSKI et al. 2010). The substage transition, therefore, can be traced with the help of conodonts, ammonoids, sea-level change, magnetic susceptibility signals, and carbon isotopes.

There are not so many new data on the Middle/Upper Frasnian substage boundary. DENAYER & POTY (2010) showed the significance of the *semichatovae* Transgression as extinction and eustatic event on the Ardennes shelf. In summer

2011, a small re-sampling campaign started at the German Martenberg section, where the so-called standard conodont zonation of the critical interval was established.

#### *Famennian substages*

There are no new reports on the base of the Middle Famennian. A voluminous monograph by HARTENFELS (2011) partly concentrated on the global, transgressive *Annulata* Events, as one candidate interval for the definition of the Upper Famennian. Further information comes from the Holy Cross Mts. of Poland (RACKA et al. 2010) and from Bulgaria (BONCHEVA et al. 2011). The placing of the base of the Uppermost Famennian at the base of the Upper *expansa* or *ultima* Zone is strengthened by new data from Morocco.

#### *Revision of the D/C Boundary*

SDS Newsletter 26 includes the report on the activities of the D/C Boundary Task Group by M. ARETZ until early 2011. Subsequently the group held a meeting in conjunction with the International Carboniferous/Permian congress, which took place in July in Australia. The nature of this meeting, logically, did not attract many of the Devonian workers.

Considerable progress was made by the publication of revisions of the critical *Siphonodella* (KAISER & CORRADINI 2011) and *Protognathodus* lineages (CORRADINI et al. 2011). An extensive manuscript by H. TRAGELEHN on Uppermost Famennian siphonodelloids from Franconia/Thuringia is practically complete, but has not yet been submitted for publication. The same, so far hardly known conodont group also occurs in Morocco, as shown in a preliminary report on the Lalla Mimouna North section (northern margin of the Maider, eastern Anti-Atlas) by BECKER et al. (2011). This section seems to have the globally richest conodont faunas from the interval right after the Hangenberg Regression, into the *kockeli* (= Upper *praesulcata*) Zone. Work on that section will continue in spring 2012. Uppermost Famennian "siphonodelloids" also occur in the Tafilalt (HARTENFELS & BECKER, in prep.). A detailed summary of the D/C boundary sections of the eastern Anti-Atlas was published by KAISER et al. (2011) and these will be shown during the planned Field Symposium in spring 2013.

BAHRAMI et al. (2011) provided new conodont data for the D/C boundary of the eastern Iran but the sections are not suitable for the current GSSP search. Active research is also taking place in Moravia, the Moroccan Meseta, and Russia. Unfortunately, specialists of neritic faunal groups have been less active in 2011.

#### **Publications:**

- BECKER, R. T. (Ed.) 2011. SDS Newsletter **26**. - 113 pp., Westfälische Wilhelms-Universität Münster. [ISSN No. 2074-7268]
- BRETT, C.E., SCHINDLER, E. & KÖNIGSHOF, P. (Eds., 2011). Sea-level cyclicity, climate change, and bioevents in Middle Devonian marine and terrestrial environments. –Palaeogeography, Palaeoclimatology, Palaeoecology, **304** (1-2): 1-193.
- SENNIKOV, N. V. & IZOKH, N. G. (Eds.). News on Palaeontology and Stratigraphy. – Geologiya I Geofizika, **15**, Supplement: 1-246 [special issue on the Zinzilban Emsian GSSP/Kitab Reserve Devonian]
- OBUT, O. A. & KIPRIANOVA, T. P. (Eds.). Biostratigraphy, Paleogeography and Events in Devonian and Lower Carboniferous (SDS / IGCP 596 joint field meeting). – Contributions to International Conference in memory of Evgeny A. YOLKIN, July 20 – August 10, 2011, Ufa, Novosibirsk, 191 pp (Novosibirsk Publishing House SB RAS, ISBN 978-5-7692-1187-4).
- ARTYUSCHKOVA, O. V., MASLOV, V. A., PAZUKHIN, V. N., KULAGINA, E. I., TAGARIEVA, R. C., MIZENZ, L. I. & MIZENZ, A. G. (2011). Devonian and Lower Carboniferous Type Sections of the Western South Urals. – Pre-Conference Field Excursion Guidebook, Ufa, Sterlitamak, Russia, July 20-25, 2011, 91 pp. (Ufa, ISBN 978-5-901900-54-3).
- BAKHAREV, N. K., IZOKH, N. G., OBUT, O. T. & TALENT, J. A. (Eds.). Middle-Upper Devonian and Lower Carboniferous Biostratigraphy of Kuznetsk Basin. – Field Excursion Guidebook, 96 pp. (Novosibirsk Publishing House SB RAS, ISBN 978-5-7692-1190-4).
- HARTENFELS, S. (2011). Die globalen *Annulata*-Events und die Dasberg-Krise (Famennium, Oberdevon) in Europa und Nord-Afrika – hochauflösende Conodonten-Stratigraphie, Karbonat-Mikrofazies, Paläökologie und Paläodiversität. – Münstersche Forschungen zur Geologie und Paläontologie, **105**, 527 pp.

Additional SDS / IGCP 596 volumes are in preparation for the journals "Bulletin of Geosciences" and "Palaeobiodiversity and Palaeoenvironments".

#### **Meetings:**

SDS Annual Business Meeting at International Conference in memory of Evgeny A. YOLKIN on "Biostratigraphy, Paleogeography and Events in Devonian and Lower Carboniferous (SDS / IGCP 596 joint field meeting)", Novosibirsk, 27<sup>th</sup> to 28<sup>th</sup> July 2011. Field trips to the southern Urals (20<sup>th</sup> to 25<sup>th</sup> July) and Kuznetsk Basin (29<sup>th</sup> July to 10<sup>th</sup> August).

SDS Members also took an active role in the Opening Meeting of IGCP 569, at Graz, Austria (19<sup>th</sup> – 24<sup>th</sup> September 2011).

#### **Membership:**

New Corresponding Members elected at the Business Meeting include young representatives from Switzerland, Portugal, China, and Russia.

One of the outstanding, long-term SDS Members from Germany, Prof. O. H. WALLISER from Göttingen, died unexpectedly just after Christmas 2010. His immense, to a large extent unpublished knowledge is lost this way.

The following new officers have been proposed for the period 2012-2016 (unanimous voting completed in December):

**Chairman:** Dr. John E. MARSHALL, Southampton, U.K. (currently SDS Secretary)

**Vice-Chairman:** Prof. Dr. Carl E. BRETT, Cincinnati, Ohio, USA

#### **6. CHIEF PROBLEMS ENCOUNTERED IN 2011**

- The still unresolved procedure for the ratification of formal Devonian substages.
- The rarity of polygnathids at Zinzelban 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.

#### **7. SUMMARY OF EXPENDITURES IN 2011**

##### **INCOME**

Carried over from 2010	456 \$
IUGS subvention 2011	2000 \$
<b>Sum</b>	<b>2456 \$</b>

##### **EXPENSES**

Support for two members from Uzbekistan to attend the Novosibirsk Meeting	1950 \$
SDS Newsletter 27, printing/mailing (due in February 2012)	500 \$
Support for three members to attend IPC3	
<b>Sum</b>	<b>2450 \$</b>
Balance early 2011	6 \$

#### **8. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR (2012)**

- Annual Business Meeting and symposium on “The Devonian of Asia and Australia” in conjunction with the 34<sup>th</sup> IGC, Brisbane, Australia.
- Manuscript on Givetian and Frasnian substages for Lethaia.
- Editorial work for of a Proceedings Volume of the Novosibirsk Meeting in “Palaeobiodiversity and Palaeoenvironments”.
- New sample campaign for the revised Emsian base in the Kitab Reserve, Uzbekistan (summer 2012).
- Publication of SDS Newsletter 27 in February 2012.
- Update of SDS homepage (pdf files of former SDS Newsletters and new GSSP illustrations).
- Active participation in joint Devonian/Carboniferous Boundary Task Group with a focus on conodont revisions and pelagic-neritic correlations.
- Progress on Famennian substage definitions.
- Preparations for International Field Meeting, jointly with IGCP 596 and D/C Boundary Task Group, in the Tafilalt/Maider region of Morocco (spring 2013).

#### **9. BUDGET AND ICS COMPONENT FOR 2012**

##### **INCOME**

Balance from 2011	6 \$
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##### **EXPENSES 2012**

SDS Newsletter 28	500 \$
Support for SDS Chairman to attend the 34 <sup>th</sup> IGC in Brisbane, Australia	2500 \$
Support for 2 <sup>nd</sup> SDS Member to attend the 34 <sup>th</sup> IGC	1500 \$

**Request for support/subvention from IUGS/ICS**  
**4500 \$**

#### **APPENDIX A**

##### **Subcommission officers**

*Chairman + SDS Newsletter Editor*

R. Thomas BECKER  
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*Vice-Chairman*

Ahmed EL HASSANI, Département de Géologie, Institut Scientifique, B.P. 703-Rabat-Agdal, Marokko; [elhassani@israbat.ac.ma](mailto:elhassani@israbat.ac.ma)

*Secretary*

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

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Carlo CORRADINI, Dipartimento di Scienze della Terra, Università di Cagliari, Via Trentino 51, I-09127 Cagliari, Italy; [corradin@unica.it](mailto:corradin@unica.it)

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

1. A. BLIECK: France, micro- and macrovertebrates; [alain.blieck@univ-lille1.fr](mailto:alain.blieck@univ-lille1.fr)
2. C.E. BRETT: Eastern U.S., sequence and cyclostratigraphy; [carlton.brett@uc.edu](mailto:carlton.brett@uc.edu)
3. J.-G. CASIER: Belgium, ostracods; [casier@naturalsciences.be](mailto:casier@naturalsciences.be)
4. CHEN Xiuqin: Nanjing, brachiopods; [xqchen@nigpas.ac.cn](mailto:xqchen@nigpas.ac.cn)
5. J. HLADIL: Czechia, stromatoporoids, tabulate corals, various modern stratigraphic methods; [hladil@gli.cas.cz](mailto:hladil@gli.cas.cz) [asked to be replaced at Brisbane IGC]
6. N. IZOKH: Siberia, Asian Russia, conodonts; [izokh@uiggm.nsc.ru](mailto:izokh@uiggm.nsc.ru)
7. MA Xueping: Beijing, brachiopods; [maxp@pku.edu.cn](mailto:maxp@pku.edu.cn)

8. R. MAWSON: Australia, conodonts; [rmawson@laurel.ocs.mq.edu.au](mailto:rmawson@laurel.ocs.mq.edu.au)
9. J. OVER: U.S., conodonts; [over@geneseo.edu](mailto:over@geneseo.edu)
10. M.C. PERRI: Italy, conodonts; [perri@geomin.unibo.it](mailto:perri@geomin.unibo.it)
11. G. RACKI: Poland, brachiopods, event and sequence stratigraphy; [racki@uranos.cto.us.edu.pl](mailto:racki@uranos.cto.us.edu.pl)
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15. J.I. VALENZUELA-RIOS: Spain, conodonts; [jose.i.valenzuela@uv.es](mailto:jose.i.valenzuela@uv.es)
16. U. JANSEN: Germany, brachiopods; [ulrich.jansen@senckenberg.de](mailto:ulrich.jansen@senckenberg.de)
17. G. YOUNG: Australia, micro- and macrovertebrates, general stratigraphy; [gyoung@geology.anu.edu.au](mailto:gyoung@geology.anu.edu.au) [term ends at Brisbane IGC]
18. ZHU Min: Beijing, vertebrates; [zhumin@ht.rol.cn.net](mailto:zhumin@ht.rol.cn.net) [term ends at Brisbane IGC]

## MINUTES OF THE SDS BUSINESS MEETING

**Conference Hall, Institute of Petroleum Geology and Geophysics, Siberian Branch of the Russian Academy of Science, Novosibirsk**  
**Sunday 29<sup>th</sup> July 2011**

The SDS business meeting for 2011 took place during the *International Conference on Biostratigraphy, Paleogeography and Events in the Devonian and Lower Carboniferous* organized by the Siberian Branch of the Russian Academy of Science.

**Attendance** The Chair (R.T. BECKER), & SECRETARY (J. MARSHALL), TM'S CHEN XIUQING and IZOKH, N., CM'S ARTYUSHKOVA, O., BAKHAREV, N., KIM, A., OBUT, O., RAKHMONOV, U.D., SLAVÍK, L., SNIGIREVA, M., GUESTS ANTFIMOV, A., BIKBAEV, A., CRÔNIER, C.,

DEREUIL, A., KIM, I., KIRILENKO, A., KIRILISHINA, E., KLUG, C., KRASNOV, V., MANTSUROVA, V., MESENTSEVA, O., NIKOLAEVA, S., RODINA, O., RODYGIN, S., SAVINA, N., SCHEMM-GREGORY, M., SENNIKOV, N., SHAROVK, A. SHCHERBANENKO, T., D., SOBOLOV, E., TAGARIEVA, R., TEL'NOVA, O., VILESOV, A., WATERS, J.

### 1. Introduction and apologies for absence

The meeting started at 9:32. The Chairman welcomed the participants with thanks to the organizers of the conference for supporting the SDS Devonian Session and the Business Meeting. We were delighted to again be in Novosibirsk and the wonderful Akadem Gorodok after a gap of 6 years. Thanks were given to the six organizing institutions: Siberian Branch of Russian Academy of Sciences, Trofimuk Institute of Petroleum Geology and Geophysics, Ufa Scientific Center of Russian Academy of Sciences, Institute of Geology, Ufa SC RAS, Siberian Research Institute of Geology, Geophysics and Mineral Resources,

International Subcommission on Devonian Stratigraphy, Russian Interdepartmental Stratigraphic Committee (RISC), Devonian and Carboniferous commissions.

Special thanks were given to K. BAKHAREV, N. SENNIKOV, V.N. PUCHKOV, A.V. KANYGIN, N. IZOKH, O. OBUT, O.V. ARTYUSHKOVA, E.I. KULAGINA and R.R. YAKUPOV, not to forget the many other helpers.

The agenda was distributed and it was noted that we only had about 2 hours.

The list of apologies was reported:

Vice-Chairman EL HASSANI, A., TMs BRETT, C.E., HLADIL, J., JANSEN, U., MA XUEPING, MAWSON, R., OVER, J., PERRI, M.C., SCHINDLER, E., VALENZUELA-RÍOS, J.I., CMs BRICE, D., BROCKE, R., BUDIL, P., BURROW, C., CORRADINI, C., DOJEN, C., KAISER, S.I., LUKŠEVIČS, E., MARK-KURIK, E., MISTIAEN, B., NARKIEWICZ, M., SANDBERG, C.A., SUTTNER, T., TALENT, J., TURNER, S., VER STRAETEN, C., UYENO, T.

Two documents were circulated:

1. A letter from TM Nacho VALENZUELA-RÍOS about the sub-division of the Pragian and Emsian
2. BECKER, R.T., ABOUSSALAM, Z. S., & HARTENFELS, S. *Lalla Mimouna North, an important Devonian/Carboniferous boundary section at the northern margin of the Maider, Anti-Atlas, SE Morocco.*

## 2. Approval of 2010 Minutes

The CHAIRMAN reported that SDS Newsletter 26 had been circulated. There were all available on the Caligiari SDS website with access as far back as 2002. The web address is [www.unica.it/sds](http://www.unica.it/sds)

The CHAIRMAN then asked for any corrections to these minutes. There were none and the Minutes were approved unanimously.

## 3. Chairman's Business

The CHAIRMAN started his report with the sad duty of listing those members and friends of the SDS who we had lost since the last meeting. These included Tatiana KOREN', the brachiopod worker O. GRATSIANOVA, Otto H. WALLISER, who was commemorated in summer 2011 by a special meeting of the German SDS, and honoured by the Pander Society Medal, Jared MORROW from the USA, who co-organized the wonderful Nevada Meeting, and Volker EBBINGHAUSEN who had done significant work for SDS in Morocco.

The positive achievements are included in the ICS report in the Newsletter. The ICS worked to a standard procedure with a series of official tasks. This can be especially recognized with the problems of the Emsian and base Carboniferous GSSP's. Our highest priority is the recognition of the Givetian, Frasnian and Famennian sub-stages. In the past, there had been a lack of support for

formal recognition from the ICS. The CHAIR had now negotiated a formal procedure with the ICS and this will be presented at the IGC in Brisbane.

The formal substages eventually will need GSSP's that will have to be reported in *Episodes*. There have been problems and confusion concerning some stages that have been published in *Episodes* before any formal decision by ICS. There will now be a new rule. Stage and substage proposals will not be allowed in *Episodes* but subcommissions are asked to use *Lethaia* for initial publications. We now need to prepare some of these. The Middle Givetian substage publications should be coordinated by Pierre BULTYNCK, the Upper Givetian by BECKER & ABOUSSALAM. JEFF OVER has the leading responsibility for the Frasnian substages. There needs to be further clarity concerning the ratification procedure. The initial papers won't have stratotypes but we can propose GSSP candidates. But the key process is that we need to document the substages and this will require more work in the next 8-10 years. The Pragian and Lochkovian, perhaps also the Eifelian, will require similar procedures.

CM SLAVÍK noted the similarities with the Silurian where the duration of the period was short with both series and poorly defined stages. Could there be similar series and shorter stages in the Devonian. The CHAIRMAN noted that the ICS meeting in Prague had discussed the short duration of the Silurian stages. It had been noted that the Viséan and some Devonian stages were very long in comparison. In the end there was no conclusion to the discussion, we should do as we had done before and keep to traditional practices. For the Emsian there was a two stage option that was also available for the Viséan. The ICS had accepted formal substages and there would be more work on it for the SDS in future. However, the Emsian and D-C boundary remain our highest priorities.

The highlight of last year was the IPC3 in London. There had been two very good symposia organized by the SDS on both the Devonian and the D-C boundary. There were 37 contributions on Devonian Events and it was the biggest symposium with a full day of activity. We have not yet organized a publication from the IPC3 symposia. We have considered a publication with Palaeo<sup>3</sup>; there is a new administrator now running the journal but available for discussion. The new Palaeo<sup>3</sup> Middle Devonian volume was also exhibited by the CHAIRMAN.

The SECRETARY had run an excellent fieldtrip to the Old Red Sandstone of Scotland for the IPC3 including a wonderful fieldtrip report in the Newsletter. This included a picture on page 27 of Alex BARTHOLOMEW playing the bagpipes on the famous HUTTON'S Unconformity. It was noted that a Novosibirsk fieldtrip report was needed for the Newsletter. Field photos were important and CM

CORRADINI had agreed to put photos on the SDS website

But note that an excellent selection of images from the Novosibirsk fieldtrips is available at  
<https://picasaweb.google.com/113938362168471636479/KuzbassFieldtrip>  
<https://picasaweb.google.com/113938362168471636479/UralFieldtrip>

The SDS was co-operating with IGCP Project 499 that finished at the end of 2010. It was also involved with the new IGCP 596 that opens in Graz, Austria, this September. The SDS was happy to formally support and co-operate in joint meetings. The IGCP 596 proposal is in the SDS Newsletter 26. The new IGCP is on *Climate and Biodiversity Patterns in the Mid Palaeozoic* and is organised by Peter KOENIGSHOF, CM Iliana BONCHEVA, TM Nadia IZOKH, CM Ta Hoa PHUONG, Charoentitirat THASINEE, Johnny WALTERS, and Wolfgang KISSLING. The first IGCP 596 meeting is in Graz Austria and the IGCP has also supported members to come to Novosibirsk.

The SDS has continuing challenges, such as the boundaries. Unfortunately, there are not enough members and CM's from South America. We need (more) representation from Brazil, Paraguay, Argentina, Chile, Peru, Venezuela and Columbia.

Our goals and plans for 2011/2012 are

1. The Novosibirsk meeting and fieldtrip
2. Getting the Givetian and Frasnian substages proposals into *Lethaia*
3. Publishing the Palaeo<sup>3</sup> volume (achieved in 2011)
4. Continuing the progress on the Emsian revision
5. Update the SDS home page
6. Continue the D-C boundary activity started in London
7. Discuss the D-C boundary at the forthcoming Carboniferous-Permian meeting in Australia
8. Make progress on the Famennian substages. We still have had no formal vote, all the information is available for the Uppermost Famennian but we need more discussion on the Upper Famennian.
9. Complete the GTS 2012 (GRADSTEIN et al., eds.). The CHAIRMAN has updated the bio- and chronostratigraphy of the Devonian chapter and takes responsibility for it. The big problem is the absolute timescale with little new Devonian data in the last few years apart from a single data point in the *Journal of the Geological Society*, **168**: 863-872. The new absolute scaling will remain controversial.

CM SLAVÍK noted results from Lochkovian/Pragian zircons. There was also a new date from U. LINNEMANN (Dresden). The Givetian is still a big problem as there are no zircon ages at all. TM IZOKH hoped that Givetian samples could be provided from Russia. There were possibilities from Salair and the Southern Altai.

The CHAIRMAN then reviewed the progress made with GTS 2012. All Devonian ages have been and rated on a scale of 1 to 6. GTS 2012 will not consider badly rated dates. The revision means that some dates have changed by 1-2 ma together with revised error bars. This has changed the timescale particularly in the Emsian and Eifelian. The Wetteldorf date is at the base Eifelian and the early Emsian date is from the Hunsrück Slate. This has made the Emsian very long and, in fact, much greater than the Famennian. The Wetteldorf bentonite is not so reliable. We need to involve the Senckenberg SDS members in finding new zircons. In addition, Frasnian dates are only available at the F/F boundary together with one in the mid-Frasnian. We require a programme of acquiring bentonites WITH good biostratigraphic control. Basalts are no good, it has to be acidic volcanics as these have the required zircons.

#### Membership News

Thomas BECKER needs to retire from Chair of the SDS. He has served the full term of 8 years. We need a new Chairman, Vice-Chairman and Secretary. The new Secretary is not elected but appointed by the future Chairman.

#### 4. ICS News

Much of this is contained in the ICS report. The focus is now getting all the GSSP's completed. The chairs are now voting on the Cambrian and Cretaceous GSSP's. The T/J boundary has been approved and will be formalized by a ceremony within 2 weeks. The base Santonian has not been voted on as the ICS is very unhappy about the proposal, for instance not figuring the index fossils.

The ICS is now more rigorous about GSSP submissions. It must be noted that some of the Devonian GSSP's lack published images of the defining fossils which are also not curated. This applies, for example, to the oldest *Ancyrodella* from the basal Upper Devonian GSSP (but CM KLAPPER has provided new photos that will go into GTS 2012).

There is a new GSSP (Fortunian stage of the Terraneuvian Series) at the base of the Cambrian and a GSSP for the Jiangshanian (second stage within the fourth series = Furongian) was approved, too. There is still no clear direction concerning a revised subdivision for the Silurian.

We now need to justify our budget to the ICS. We have been supported for the Novosibirsk meeting and the revisions of the base Emsian and

D-C boundary. This was \$2000 to support members to come to the meeting. In comparison the SSS had requested \$10,000 but been given \$3,500. We had requested \$2,000 and been given \$2,000. The ICS will give more if you have more GSSP's to define. The total budget is \$50,000. There are plans to give all the subcommissions more money to allow officers to attend the Brisbane IGC.

The election of new subcommission officers needs to be done well before Brisbane. They have to be voted on by the end of September of this year. We will then submit a list of the new officers and new and continuing voting members.

There are plans for a new *Encyclopaedia of Stratigraphy* being produced by Springer. It may become similar to the Encyclopaedia of Earth Science and will be available via the internet and as a book. The Chairman agreed to write the chapter on the Devonian (5-9 thousand words). Other SDS members will be asked to write sections, for example on palynostratigraphy and land plants by the SECRETARY. Apart from the main Devonian chapter there will be shorter chapters of 1-3 pages and half page summaries. The Chairman may be asking individual members for short articles. These will be internationally reviewed and as a publication they will have a life of over 10 years. Stan FINNEY, the ICS Chairman, is the main editor.

The CHAIRMAN then asked the meeting for comments about the future of SDS. There was a view that it would be good if the present CHAIR of SDS could remain.

It was noted that the practice in the subdivision of the Silurian was possibly incorrect and a poor example. But what is being done in the Devonian as regards subdivision is really good. We should not have new stages, but use old stages. It is good to follow the approach of very detailed subdivision. We should not follow current practice in the recent subdivision of the Cambrian and Ordovician.

General acclaim for the efforts of Thomas BECKER on behalf of the SDS

## 6. GSSP's

The CHAIRMAN stated that we would first discuss the base of the Emsian. There were oral contributions from CMs KIM and SLAVÍK with a written paper and powerpoint presentation from TM VALENZUELA-RÍOS.

CM KIM then noted that we should modify our opinion to get the most acceptable boundary between the lower and upper Emsian. For the Pragian and Emsian all data and analysis are from Zinzilban and that the earlier decision was not a mistake. Special attention was paid to the range of *Nowakia praesulcata*. The views of TM VALENZUELA-RÍOS and CM CARLS are accepted as to the base *Po. excavatus*. The Czech colleagues

will perhaps not agree. We need to examine the existing records to resolve the problem.

CM SLAVÍK thanked CM KIM for his review. We can correlate the biostratigraphic data in the different groups to align the stratigraphy between different regions. We should also consider global events. The global Silurian and Devonian conodont faunas do repeat morphologies - so we should rely on species that are easily recognized. There have been some incorrect determinations with morphologies appearing and disappearing. We can combine many different sets of data. The dacryoconarid data are very important and we should follow the new data by CM KIM which have not yet been tested in the Barrandian.

The Secretary then read Document 1 from TM VALENZUELA-RÍOS.

TM IZOKH then commented... *many of us have seen Zinzilban and the Spanish Pyrenees. Spain is very similar to the Zinzilban sections but more condensed. In Spain there is Polygnathus kitabicus and then the same change to stratified limestones. So the group had now looked at Zinzilban and the Spanish sections and hope to go to the Czech Republic later in 2011. After this we hope to make the final decision on the lower boundary of the Emsian. In the Pyrenees there are sharp changes observed in all conodont groups at the base of Po. kitabicus. Work continues.*

In response the CHAIRMAN repeated that Zinzilban is an outstanding section but that the Emsian, as currently defined there, is much lower than in German tradition. This places much of the Pragian/Siegenian into the Emsian so a revision is inevitable. The problem is not of Zinzilban but in the definition and classical meaning of the Emsian.

The CHAIRMAN then showed a powerpoint presentation concerning the Jebel Ihrs section in southern Morocco, which was first studied for dacryoconarids by CM ALBERTI. Conodonts were abundant in specific beds of the section. The Basal Zlíchov Event can be recognized together with a Daleje Shale equivalent in thick greenish shales. The so-called Pragian Limestone at the base only includes belodellids. It is overlain by the *Devonobactrites* Shale. Yet higher, the *Deiroceras* Limestone contains three different lower Emsian taxa of *Polygnathus*, including *Eocostapolygnathus excavatus* ssp. 114, *Eoc. gronbergi*, and a new species with affinities to *Eoc. pannonicus*. The shale unit above yields in other sections of the region the oldest known ammonoids. The local *Anetoceras* Limestone has no polygnathids despite its pelagic setting, only distinctive icriodids and *Criteriognathus steinhornensis*. It is followed by the blue coloured *Mimagoniatites*, which has *Po. laticostatus* and *Po. cf. vigierei* at the top. The dacryoconarid succession of CM ALBERTI is important but should be updated. It suggests that the Pragian Limestone is already Emsian in age, which is disturbing for the regional terminology.

Icriodids from the Pragian Limestone are needed. There is no hope of finding *Eoc. kitabicus* in the region.

There was a comment from CM SLAVIK that *Belodella* did not necessarily indicate shallow water. The other results were certainly interesting and there was no *Icriodus gracilis*, which is important in the Barrandian.

Guest N. SENNIKOV also expressed a view on the Emsian. There was no unanimous solution in Uzbekistan and not at 114m in the GSSP section. We should look at Belgium in comparison to Morocco. The Emsian sequence is not well established in Belgium. On the basis of brachiopods and correlation through the Pyrenees to Zinzilban, we think that the traditional base of the Emsian is at the *Po. excavatus* level. But the SDS, when defining the lower boundary of the Emsian, took account of the faunal development. There were problems with the Pragian Stage and with the Praha Formation being more extensive than the stage. This became apparent when the SDS took the decision on *Po. kitabicus*. With the revised data of TM IZOKH we can look again at the problem. In Western Europe the Emsian is poorly preserved in terrigenous rocks which make studies difficult. But in Salair the section is much better.

Guest A.L. ANFIMOV provided additional information. The western slope of the Urals was reefal and there was a detailed brachiopod zonation. The Pragian/Emsian boundary is well defined by brachiopods. The Pragian Limestone had a feature of many gaps and inverted sections between black pyritic *Belodella* beds. Data had been prepared to present but this was put aside as the focus had changed. They can now be published. There was also Givetian and Frasnian on the eastern slope of the Urals. We now know the regional distribution of *Sk. norrisi*; it is rare in the stratified clastics with ammonoids but is well represented in reefal limestones. *Ancyrodella* is rare. There is an evident change from the Givetian to Frasnian facies.

The CHAIRMAN then summarized. It was not intended to repeat the discussion of the Uzbekistan meeting. He had asked TM JANSEN to provide a review of the type Emsian brachiopod succession and its international correlation, which has not yet appeared. He will try and get him to provide these data soon.

The CHAIRMAN also acknowledged the new record of *Now. praesulcata* from Zinzilban but noted that it overlapped with *Now. (Turkestanella) acuaria*. This appeared to represent a range extension. We need to check these occurrences in the Barrandian area. The Emsian problem has to be sorted. How should we proceed? To allow progress TM VALENZUELA-RÍOS and others will return to Zinzilban for further sampling.

TM IZOKH provided more information from Zinzilban including more conodont data. *Po.*

*excavatus* ssp. 114 had not been found in bed 40 but in bed 42. We need to sample more rock and get a better collection. The CHAIRMAN commented that this should be a high priority.

## 5.2 Devonian-Carboniferous Boundary

The CHAIRMAN made a powerpoint presentation to introduce this item. Carbonate sedimentation is mostly not continuous across the D-C boundary. If the section lies within apparently continuous carbonates then it contains unconformities. The stratotype at La Serre C is oolitic including the GSSP in bed 89 which also contains many reworked conodonts. The original definition was based on the supposed *Siphonodella prasulcata* to *sulcata* lineage. CM KAISER has investigated, originally for stable isotopes from the Hangenberg Event Interval, the stratotype and confirmed previous claims by (then) TMs SANDBERG & ZIEGLER that *Si. sulcata* (the same morphotype as in the GSSP bed) is already present in Bed 84. So, the stratotype has no *Siphonodella* lineage (chronomorphoclone). There is no other lineage at an appropriate level in La Serre C that can be used for correlation - so it can't remain the GSSP.

The presentation continued with sections from the southern Tafilalt and Maider of SE Morocco. There is normally a very thick clastic section in the event interval, with up to 350m of shale and siltstones but almost no post-Hangenberg Event conodonts. In addition there is a new locality at Lalla Mimouna North, at the northern margin of the Maider. It yields many conodonts, including early *Siphonodella* relatives, from the immediate pre-event interval and the topmost Devonian transgression. The peak of the Hangenberg Regression is represented by brachiopod-rich clastics. *Gattendorfia* and other ammonoids occur in overlying basal Tournaisian shales. This new section has significant potential for regional correlation. It has potentially the best preserved conodont record from the higher event interval into the *kockeli* (Upper *praesulcata*) Zone.

TM IZOKH reported results from the Altai-Sayan folded area. The conodonts recovered were very poor although there might be siphonellids. But only the lower Famennian and lower Carboniferous intervals were present, with no boundary faunas found.

Other results from the Urals have shown that there are good sections with the Devonian-Carboniferous boundary, including diagnostic conodonts,  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  data, and brachiopod faunas. The CHAIRMAN noted the significance of these data and hoped they would soon be published.

One of the Russian guests then commented on two talks from the afternoon of the day before. On the eastern slope of the Mid-Urals there was a terrigenous sequence of mudstones and sandstones with black limestone that contain *Si. presulcata* as

confirmed by specialist. They believe that they have a boundary section. The CHAIRMAN suggested that these results should be made available to M. ARETZ, Chair of the D-C boundary task group.

Guest A.R. ANFIMOV noted that some beds on the western slope of the Urals that were assigned to the Upper Devonian are, in fact, Tournaisian, as there is reworking. But last year we found a complex with *Siphodella* and *Protognathodus* at the base of the Tournaisian. This had great promise. The CHAIRMAN emphasized again that this information should be sent to M. ARETZ. He reported that a significant new contribution to the Devonian glacial debate, including the SECRETARY as co-author, has been published by WICANDER et al in *Palaeo*<sup>3</sup>, **305**: 75-83.

### 5.3 Pragian

The SECRETARY read the document provided by TM VALENZUELA-RÍOS.

CM SLAVÍK made a number of comments. There were problems in Nevada and in the Pyrenees as there was only conodont data. But we can use the new results in the Barrandian although the Nevada data are more difficult to follow. The conodonts are satisfactory but there are problems with accumulation rates and correlation to other regions. So, we do need to consider other groups as well as conodonts. We should also see the contribution of TM HLADIL in the recent SDS *Newsletter* on Dynamic Time Warping (DTW), a method for correlating magnetic-susceptibility data. This indicates that there is between 29 to 40m of Pragian and that at least two thirds of the classic Pragian is now Emsian (if DTW works). Importantly there was a poster at this conference which detailed this information. But we did need more data for areas other than Zinzilban for comparison.

There was then another discussion about the Emsian and its substages. A level is needed close to the base of the (true) Dajele Event, approximately near the *Now. cancellata* zone. Unfortunately, *Po. serotinus* is too high. So, we need some conodont datum close to *Nowakia cancellata*. The entry of classic *Icriodus* s.str. is distinctive and easy to find in Europe and Morocco but is not seen in the Kitab Reserve.

The SECRETARY then read the paper by TM VALENZUELA-RÍOS on the Emsian. The CHAIRMAN reported on new *cancellata* zone goniatites from Morocco. It had been hoped that the late CM Otto WALLISER might have done more work on the *Now. elegans* to *cancellata* interval in Morocco. There was a new Bohemia monograph that needed completing and it was hoped that TM SCHINDLER provides long-promised new dacryconarid data. It was recognized that we needed more time to discuss the intra-Emsian boundary levels.

So, in summary we needed to:

- Write an account of the Givetian and Frasnian substages for *Lethaia*
- Formally vote on the Uppermost Famennian
- Have a straw vote on the upper Famennian
- Re-sample Emsian sections

### 7. SDS Membership

Both CM BULTYNCK and TM BRETT had been asked to form an election committee but did not respond. So, the CHAIRMAN will accept the formal proposals. All TM's and CM's can submit nominations for Vice-Chair and Chair (but not the Secretary who is nominated by the new Chair). Nominations need to be submitted in four weeks, before the end of August. The new SDS officers need to be able to attend most/all meetings, be able to travel and have support to attend. It is not necessary to have been a TM before. The vote will be by email with only the current TM's being able to vote.

TM's can normally serve for a maximum of 8 years (exceptions are possible under specific circumstances) and are replaced or re-nominated at each IGC. Some new TM's have been nominated. ZHU Huai-cheng has been nominated by the Director of the Nanjing Institute. He is a vice-director of NIGPAS in Nanjing, a palynologist and chairman of the Devonian working group in China. Most TM's are continuing, but, after serving their maximum time, Gavin YOUNG and ZHU Min will be asked to continue as CM. We might have to look for a new TM that is specialized in Devonian fish. After consulting ICS, the CHAIRMAN will continue as TM; being a sub-commission chair does not count against TM time. Similarly Ahmed EL HASSANI will continue (for Morocco). Importantly Thomas will continue with the SDS *Newsletter* after completing his two terms as Chair.

The nominations for new CM's were

Elena KIRILISHINA, conodonts, Moscow, Russia, nominated by the CHAIRMAN, seconded by TM IZOKH

Mena SCHEMM-GREGORY, Portugal, brachiopods, nominated by the Chairman, seconded by the SECRETARY

Christian KLUG, Switzerland, ammonoids, nominated by the Chairman, seconded by the SECRETARY

LUO, Hui, radiolarian, Nanjing, nominated by the Nanjing Institute and the Chairman, seconded by CM OBUT

### 8. Publications

The new *Palaeo*<sup>3</sup> volume was out. This was edited by TMs BRETT and SCHINDLER. Possibly there will be a second volume of *Palaeo*<sup>3</sup> that includes papers from the London IPC3 Symposium. We now have to decide what to do

with the papers from the Evgeny YOLKIN Symposium here in Novosibirsk. There are three possibilities:

1. merge with a *Palaeo*<sup>3</sup> volume
2. use *Bulletin of Geosciences* although this might conflict with the IGCP 596 Symposium and also the Prague M-S volume.
3. *Neues Jahrbuch für Geologie und Paläontologie* which is now online.

The CHAIRMAN addressed this question to our Russian hosts. TM IZOKH replied that it was very important to publish in high ranking journals and looked for suggestions for international journals. We could ask Peter KOENIGSHOF about a thematic *Palaeo*<sup>2</sup>. The CHAIRMAN would request contributions so we could send a list and agree on a deadline. CM SLAVÍK suggested that we should consider *Newsletters on Stratigraphy* which had a turnaround time of 1.5 years. CM KLUG also suggested *Fossils & Strata*.

For the forthcoming SDS Symposium at the Brisbane IGC it was suggested that we had a *Geological Society of London Special Publication*. These are now published online ahead of print, have free colour figures and a pdf plus are listed with an ISSN and on the SCI if originating from a meeting.

There was a new Zinzelban publication in the Novosibirsk journal (supplement) that we can buy. More information will be available in the *SDS Newsletter*.

The SDS Newsletter 27 will be available in February/March 2012. The deadline for submissions will be in January. All SDS members were reminded that they need to submit short reports.

## 9. Future Meetings

Our next meeting is the IGCP 596 Meeting in Graz, Austria in September.

9.1 Following that we have the 2012 IGC in Brisbane, Australia. We do understand that many SDS members will find it difficult to get to Brisbane but the ICS compel us to meet at every IGC. At the IGC there will be a Devonian Symposium with a focus on Asia and Australasia. In addition there will be a meeting of IGCP 596 together with the John TALENT Symposium that will focus on the Ordovician to Carboniferous interval. Our Australian colleagues have been asked to run a Devonian focused trip out of Brisbane but there is no response yet.

9.2 In the spring of 2013 we will again visit Morocco for a field meeting on the Devonian and early Carboniferous. This will visit the new Lalla Mimouna section and many others that have not been shown to SDS before. The first circular will

be included in the next *SDS Newsletter*. It is anticipated that Dieter KORN and CM Klug will also contribute. There will be one or two days of talks, five days Anti-Atlas and three days Meseta field trips. The D-C boundary task group would probably meet in Morocco. We would also focus on the Emsian.

9.3. In 2014 we have agreed to meet at the 4<sup>th</sup> IPC in Mendoza, Argentina. The first circular had already been sent out. We would have a Devonian Symposium at the meeting.

9.4. The SECRETARY reported a suggestion he had that the SDS should meet in Bulgaria. There would be a report on the Bulgarian Devonian in the next SDS newsletter. The CHAIRMAN suggested that this could be combined with IGCP 596. The SECRETARY would keep in contact with the Bulgarians and Iliana BONCHEVA, the CM for Bulgaria.

## 10. Finances

We will have only \$6 left early in 2012:

Balance from 2010	456 \$
Allocation for 2011	2000 \$
Support for Uzbek SDS members to attend	
Novosibirsk	1950 \$
SDS Newsletter 27	500 \$

We need to ask for more money. One suggestion is to get sponsorship for a revised Devonian sea level curve. A similar meeting had revised the Jurassic curve.

There are costs in printing and mailing the SDS Newsletter, which is not completely covered by the allocation given above. We have considered producing a digital only SDS Newsletter but that would lose us our current ISSN and publication status.

## 11. Any Other Business

Guest Nikolay SENNIKOV commented on a presentation from the previous day that had examined ammonoids from the Salair. It was agreed that this collection was late Eifelian and that this was important for a revision of the regional stratigraphy.

There was then a vote of thanks to the CHAIRMAN of the SDS for meeting in Siberia and thanks for the organizing committee for their considerable efforts with the fieldtrips to Ufa, Salair and Kuznetsk as well as the conference. This was met with general applause.

Then there was a contribution from Guest Viktor KRASNOV (SNIIGIMS, Novosibirsk) who noted that there were two options for subdividing the

Emsian. The first was to use the Zinzilban GSSP. The second was a Czech option with a new stratigraphic scale for the Lower Devonian. It was stated that the Emsian/Pragian is an artificial grouping. The Emsian has new boundaries that were awkward and we may not agree with them.

A. KURILENKO ([Alena\\_kurilenko@mail.ru](mailto:Alena_kurilenko@mail.ru)) then announced that in 2012 it would be the anniversary of 100 years of Devonian studies in St. Petersburg, following the arrival of ARKHANGELSKAYA. This would include a conference and public meeting on Life in the Devonian.

There was a brief written report from CM VER STRAETEN about the recent changes in the New York State Museum in Albany.

An announcement was made from CM LUKSEVICS about the 8th Baltic Stratigraphical Conference which was to be held in Riga at the end of August-beginning of September (28 Aug.-1 Sept.) in Riga (please visit <http://www.geo.lu.lv/8bsc>). The meeting will be devoted not only to regional aspects of stratigraphy in Baltics, but also to the new IGCP projects 591 and 596, and Dr. Peter KÖNIGSHOF is planning to provide a talk on the new IGCP 596 project.

The meeting closed at 12:29 with lunch. A group then went on the post-conference fieldtrip to the Salair and Kuznetsk Basin in excellent weather.

John E. MARSHALL  
SDS Secretary  
(with minor additions by R.T. BECKER)  
January 3<sup>rd</sup> 2012

## **IGCP 596: CLIMATE CHANGE AND BIODIVERSITY PATTERNS IN MID-PALAEozoic (2011 – 2015)**

Peter KÖNIGSHOF

### **Summary of major achievements of the project**

In the frame of the forerunner project (IGCP 499) one more special volume has been published: BRETT, C.E., SCHINDLER, E., KÖNIGSHOF, P., [Eds.] 2011. Sea-level cyclicity, climate change, and bioevents in Middle Devonian marine and terrestrial environments. - Palaeogeography, Palaeoclimatology, Palaeoecology **304**, 1-194.

### **Achievements of the project in the first year**

It was the first year of the project and therefore it was necessary to establish a website and project secretariat. The official IGCP 596 webpage is updated regularly with project news. A working plan for the next year with a number of workshops have been established, each year will have a special scientific theme (see

website:<http://www.senckenberg.de/IGCP-596>) in order to consistant structure during the entire duration of the project. Networks in different areas (such as Southeast Asia, which is important in terms of new sections and education – compare the number of the fourth meeting this year) have been established. It is important to note that we received additional funding of more than 300.000,- Euro for various projects in the frame of the IGCP. Additionally, there are a number of travel grants provided by National Funding Agencies (e.g., Austria, Germany, Thailand).

A main focus of the first year was to strengthen cooperation with scientists from Mongolia, Russia, Vietnam and Thailand and joint field work is scheduled for 2012 and the following years. In recent years, the close cooperation of the International Subcommission on Devonian Stratigraphy (SDS) with IGCP projects with a strong Devonian focus has been a large success. Consequently, it was decided that the long planned field symposium for 2011 in Russia, with technical sessions in Novosibirsk and separate excursions to the South Urals and Kuznetsk Basins, should become the first joint meeting of SDS and the new IGCP 596. We have a reasonable number of colleagues from many countries which have been active in the first year of the project (see below). Several working groups (for different fossil groups such as brachiopods, corals, as well as regional working groups such as Spain, Czech Republic and beginning co-operation with countries from Southeast Asia) will contribute to the project. Project participants, and their number is increasing, frequently consult us for including further updates. This shows us that the scientific communication within the community is on the way to refresh since the projects IGCP 497 and 499 finished. In general, field workshops and excursions in the first year provided an overview of the faunal and facies development in specific time slices, with the discovery of new faunas and fascinating insights into the regional patterns of facies and sea level changes, especially around global event levels. The results from sampling during the field meetings will contribute to further refinements.

Additionally, the project has been elected for the Project of the Month (<http://www.increase.eu/en/1238.php>). In terms of social benefits and public outreach we have had a number of contributions in the German and Austrian Press including a contribution in the German TV (15 minutes) on September 09.-2011. For the near future it is plannend to publish a book on outstanding geological sites of the world (with a special focus on Devonian and Carboniferous sections) in contries contributing to this project.

For more information please visit our website: <http://www.senckenberg.de/IGCP-596>

## List of meetings and number of countries active in 2011

In the frame of the new IGCP we are very proud to announce that it was possible to organize four international meetings (in conjunction with other meetings and working groups), particularly based on the fact that we received the official confirmation of the project very late in April 2011:

- International Subcommission on Devonian Stratigraphy/IGCP 596 meeting "Middle-Upper Devonian and Lower Carboniferous Biostratigraphy of south Urals and Kuznetsk Basin", Ufa, Novosibirsk, Russia (July 20 – August 10, 2011); approx. attendance: 62; number of countries: 11
- 8<sup>th</sup> Baltic Stratigraphic Conference/IGCP596, Riga, Latvia (August 28 - 30, 2011); approx. attendance: 73; number of countries: 10
- IGCP 596 Opening meeting, Graz, Austria (September 19 - 24, 2011); approx. attendance: 36; number of countries: 13
- WCPS/IGCP 596, Nakhon Ratchasima, Thailand, (November 28 – December 2, 2011); approx. attendance: 270; 24 countries

### Other Meetings/Workshops

- Carnic Alps Workshop IV, Udine, Italy (April 15 – 16, 2011); approx. attendance: 15; number of countries: 4
- Carnic Alps Workshop V, (Field-Workshop), Carinthia, Austria & Italy (August 03 – 12, 2011); approx. attendance: 8; number of countries: 3
- XXVII Jornadas de la Sociedad Española de Paleontología Simposios de los proyectos PICG 587 y 596, Sabadell, Spain (October 05 – 08, 2011); approx. attendance: 8;

During the first project year 130 scientists of 24 countries agreed to join the project and more than one-third are female scientists. In this year, we could encourage scientists mainly from Mongolia, Russia and Spain to participate at meetings and workshops. 15 female scientists and 5 students participated at the IGCP 596 Opening Meeting in Austria. Larger groups of young scientists attended the meetings in Russia (21 delegates) and Thailand (56 delegates). A major part of female scientists participating in this project come from Spain (10 persons) and Russia (8 persons). Also the number of participants from developing countries is high.

### List of countries involved in the project (\*countries active in 2011)

Australia (2 participants), Austria (3)\*, Belgium (10)\*, Bulgaria (2)\*, Canada (1), China (1), Czech Republic (12)\*, Estonia (1)\*, France (13)\*, Germany (11)\*, Iran (1), Italy (5)\*, Japan (7)\*, Malaysia (1)\*, Mongolia (4)\*, Morocco (1), Poland (8)\*, Portugal (2)\*, Russia (10)\*, Spain

(19)\*, Thailand (4)\*, Turkey (3)\*, United Kingdom (3), U.S.A. (9)\*, Vietnam (1)\*.

## Activities planned

Joint fieldwork and workshops together with leaders and participants of IGCP 580 and the Subcommission on Devonian Stratigraphy (SDS) took place in 2011 and a number of joint publications are planned. Additionally, several projects related to IGCP 596 started (or continued), such as:

SUTTNER, T.J. (Austria): FWF P23775-B17 - Late Eifelian climate perturbations: Effects on tropical coral communities: 2011-2014, Austrian Science Fund.

VALENZUELA-RÍOS, J.I. (Spain) Lower Devonian Global Events of Spain and its worldwide correlation: 3 years, Spanish Ministry of Science and Innovation.

VODRÁŽKOVÁ, S. (Czech Republic): Multidisciplinary approach in mid-Paleozoic biotic crisis assessment- Devonian Daleje and Kačák events (Prague Basin, Czech Republic): 2012-2016, Czech Science Foundation.

VODRÁŽKOVÁ, S. (Czech Republic): Biostratigraphy, stable isotope analysis and microfacies analysis of the „Upper dark interval“ of the *Acanthopyge* Limestone of the Koněprusy area (Middle Devonian, Eifelian): 2011-2012, Project of the Czech Geological Survey.

The scientific focus of the year 2012 is dedicated to "Biodiversity patterns in the Mid-Palaeozoic". The main goal will be the evaluation of biodiversity patterns of "climate sensitive" organisms in the Mid-Palaeozoic. In the frame of this topic we will organize a meeting Workshop on *Paleobiology Database* and utilization of compiled data will be held in Berlin in conjunction with the Annual Meeting of the German Palaeontological Society (September 24<sup>th</sup> – 28<sup>th</sup>, 2012). For 2012 more exchange with young scientists especially from Asia (e.g. in the frame of the YES initiative) is planned.

## Several symposia and joint meetings are scheduled for 2012

- GSA 34 in Brisbane (Australia, August 5<sup>th</sup> to 15<sup>th</sup>) – Special Symposium
- Workshop on *Paleobiology Database* (September 24<sup>th</sup> – 28<sup>th</sup>) and utilization of compiled data will be held in Berlin in conjunction with the Annual Meeting of the German Palaeontological Society
- Joint meeting with IGCP 591 and the Conodont Symposium, both in U.S.A.
- Beside that field trips to Mongolia (Austria, Germany, Mongolia, USA) and Vietnam are planned in order to prepare workshops in this countries one year later.
- Field workshops and field work in conjunction with IGCP 580 on magnetic susceptibility (June 24 – 30, 2012 in Austria).

## SDS DOCUMENTS

### ON THE TRADITIONAL SIEGENIAN- LOWER EMSIAN SUCCESSIONS IN THE RHENISH SLATE MOUNTAINS, IN SPECIAL CONSIDERATION OF THE BASAL EMSIAN BOUNDARY AND ITS SUPRAREGIONAL CORRELATION

Ulrich JANSEN

#### Introduction and motivation

The Siegenian and Emsian stages in traditional German sense have their type regions in the Rhenish Slate Mountains (Germany), where they are represented by successions in rhenotypic ("Rhenish"), siliciclastic facies reflecting shallow-marine to intertidal palaeoenvironments. Fossils of neritic-benthic animals dominate the fossil content, whereas pelagic elements are rare. Regional Siegenian-Emsian biostratigraphy is chiefly based on rhenotypic brachiopods (e.g. SOLLE 1953, 1963, 1971, 1972; MITTMAYER 1974, 1982, 2008; JANSEN 2001 & in prep.) and trilobites (e.g. WENNDORF 1990; STRUVE 1996), in the last three decades also supplemented by data from the palynomorphs (e.g. RIEGEL & KARATHANASOPOULUS 1982, STREEL et al. 1987; STEEMANS et al. 2000). The basal Emsian boundary has largely been defined by the disappearance of Siegenian and the onset of Emsian brachiopod taxa. Although the traditional type region is not suitable for the definition of a GSSP, international attention is presently being paid to it, because the traditional boundary shall be reconsidered in the works for the new Emsian GSSP. In the following discussion, the term "Emsian" is meant in the traditional German sense, if not indicated differently.

The present, still valid GSSP for the lower boundary of the Emsian Stage in the Zinzilban gorge (Uzbekistan) is defined in a hercynotypic succession yielding mainly conodonts and dacryconarid tentaculitoids (YOLKIN et al. 1997). The boundary is biostratigraphically linked to the entry of the conodont taxon *Eocostapolygnathus kitabicus* (YOLKIN, WEDDIGE, IZOKH & ERINA, 1994).

After the definition of this boundary, it has turned out to be difficult to recognise the present GSSP level outside Uzbekistan, even in pelagic sequences. During recent years, however, conodont specialists (SLAVÍK 1994; CARLS et al. 2009), geochemists/geophysicists (KOPIKOVA et al. 2010) and palaeontologists comparing neritic and pelagic faunas in West European and North African sections (e.g., JANSEN et al. 2007; CARLS et al. 2009) could show that the present GSSP-boundary represents a very low level with respect to previous concepts of the Pragian/Zlichovian boundary in the Barrandian area and the Siegenian/Emsian boundary in the

Rhenish Slate Mountains. It is a general postulate that international boundary stratotypes for stages should at least approximately be consistent with traditional and widely accepted, previous concepts of the same. The present GSSP for the Emsian base does not only violate traditional concepts, but the level is even very difficult to be correlated with the traditional successions. At present, it can be stated, that the GSSP-Pragian is much too short (it lost probably about the upper two thirds of its original length in the Barrandian), and the GSSP-Emsian was extended by at least 4.5 Ma (it is now about one third longer below in comparison to the Rhenish Emsian) (cf. CARLS et al. 2009).

With intent to change this undesirable situation, the Subcommission on Devonian Stratigraphy decided on its Uzbekistan meeting in 2008 to redefine the basal Emsian boundary in the Zinzilban section near the entry of *Eocostapolygnathus excavatus*. It is one of the objectives of the new initiative to define the new boundary close to the level of the traditional Emsian base. Therefore, it is necessary to review the stratigraphical content and international correlation of the traditional Upper Siegenian-Lower Emsian boundary interval in the Rhenish Massif. As a brachiopod worker, I concentrate on this faunal group, but this does not mean that other groups (trilobites, bivalves, palynomorphs etc.) could not contribute to the topic, as well. Typical brachiopods and their recorded ranges are shown in Fig. 1.

#### The Rhenish Siegenian and its brachiopod faunas

When KAYSER (1885) introduced the term "Siegener Grauwacke" [today = "Siegen-Schichten"] for the thick sequences of middle Early Devonian siliciclastics in the Siegerland mining area, he characterized the unit biostratigraphically with the brachiopod taxa *Crassirensellaeria crassicosta* (KOCH, 1881) and *Acospirifer primaevus* (STEININGER, 1853). Later, DORLODOT (1900) deduced the "Siegenien" from this lithostratigraphical unit. ZIEGLER (1979) summarized the history of the Siegenian and its lithostratigraphy, CARLS et al. (1982) described the Siegenian stratigraphy in its type region and GODEFROID & STAINIER (1982) in the Ardennes. The type stratum, the Siegen-Schichten or Siegen Beds (which should better be termed Siegen Group) consist of sandstones, sandy shales and argillaceous shales with a cumulative thickness of 3,700 to 5,000 m. Due to frequent lateral facies changes and the lack of well recognizable and widely distributed guide horizons, lithostratigraphical subdivision has always been problematic, but the only way to bring a satisfying order in the monotonous sequences. A considerable number of formations can be distinguished (THÜNKER 2008), whereas fossils primarily allow a distinction of Lower, Middle and Upper Siegenian substages (CARLS et al. 1982;

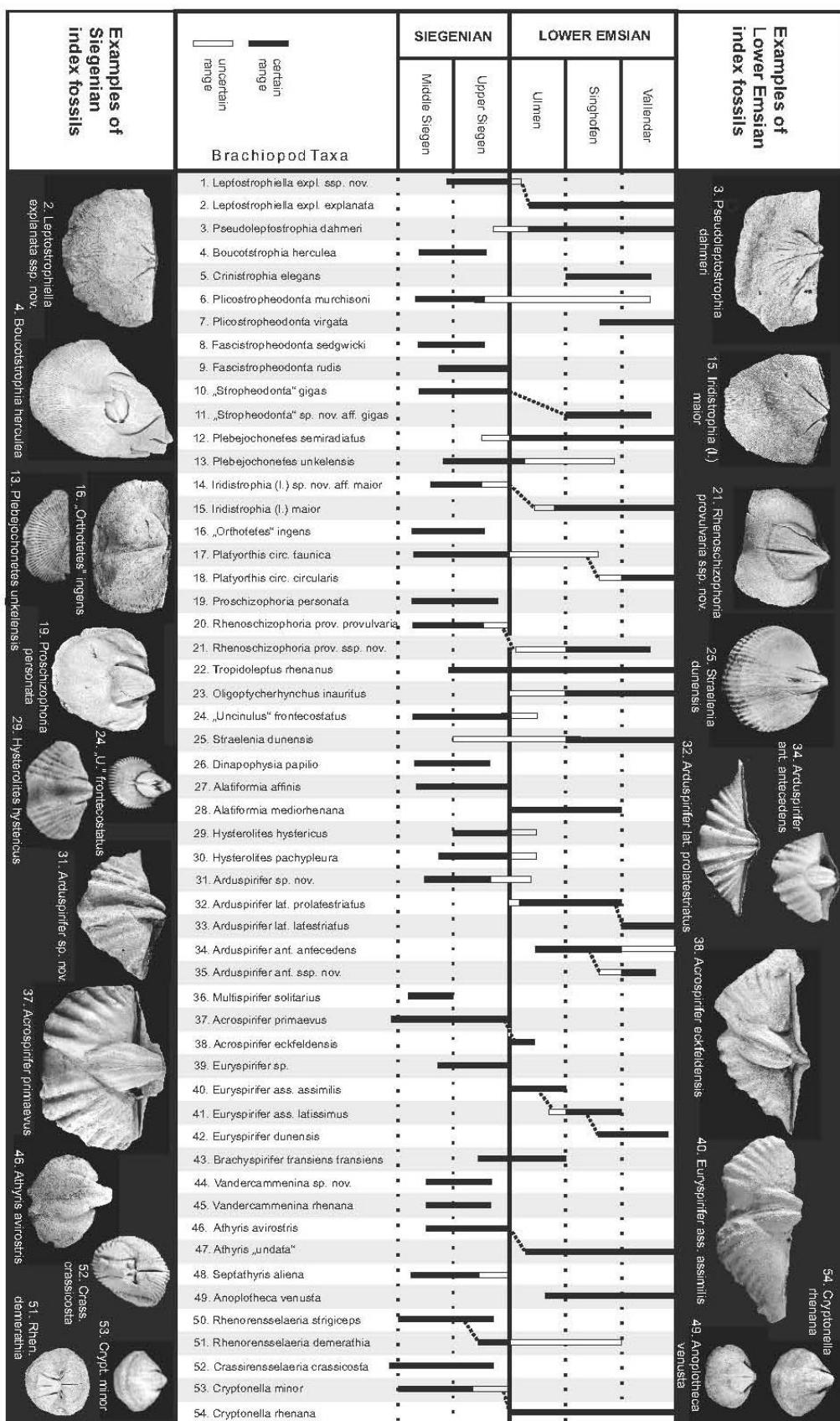


Fig. 1. Ranges of brachiopod taxa in the Siegenian – Lower Emsian interval of the Rhenish Massif.

MITTMEYER 1982, 2008). Beds of Siegenian age are also represented by the Hermeskeil Formation and the “Taunus Quartzite” of the Taunus and Hunsrück areas (southern Rhenish Slate Mountains), and by different formations in the South and East Eifel, for example the Ramersbach, Nitztal and Saxler formations (MITTMEYER 2008).

The Lower Siegenian in the Rhenish Slate Mountains is developed in deltaic facies and faunistically characterized by agnathan fishes, gigantostracans, ostracodes, bivalves, “rensselaeriids” and lingulids. A small, but poorly preserved marine fauna has been described by PILGER & WO. SCHMIDT (1959) and another fauna from the approximately coeval Hermeskeil Formation by D.E. MEYER (1970). Both faunas have recently been restudied by the present author, but their preservation has not allowed any definite determination or even decisive biostratigraphical conclusion. Among the articulate brachiopods from the Lower Siegen Beds, only the presence of *Crassirensellaeria crassicosta* (KOCH, 1881) could be verified.

The beginning of the Middle Siegenian coincides with the onset of marine conditions and rich marine faunas (POSCHMANN & JANSEN 2003). The Seifen fauna of the Westerwald (DREVERMANN 1904; DAHMER 1934) and the Gensberg fauna of the Siegerland (PAPROTH 1960) display the highest diversity.

Only *Multispirifer solitarius* (KRANTZ, 1857) and early morphs of *Acrospirifer primaevus* (STEININGER, 1853) are restricted to the Middle Siegenian; *Boucotstrophia herculea* (DREVERMANN, 1904) and *Fascistropheodonta sedgwicki* (D'ARCIAC & DE VERNEUIL, 1842) are probably restricted to the unit, but questionably range into the Upper Siegenian. Because most of the Middle Siegenian taxa survive the upper boundary of the unit, Late Siegenian brachiopod faunas are essentially similar to the Middle Siegenian ones, but generally showing lower diversity. The faunal turnover around the boundary can largely be explained by a facies change reflecting a change of palaeoenvironments. As one possible aspect, abundant clear water conditions were apparently replaced by increasing turbid water conditions (POSCHMANN & JANSEN 2003). Strong regressive tendencies can be seen in the Late Siegenian deltaic Wahnbach facies. The whole Middle-Late Siegenian time interval was probably too short as to document significant phylogenetic changes. *Hysteroites hystericus* VON SCHLOTHEIM, 1820 (sensu stricto), *Rhenorensellaeria demerathia* SIMPSON, 1940 and *Plebejochonetes unkelensis* (DAHMER, 1936) first appear with the Upper Siegenian, and first occurring specimens of *Tropidoleptus rhenanus* FRECH, 1897 are another good argument for the beginning of the Upper Siegenian, although this taxon has rarely been found in upper parts of the Middle Siegenian, too. In

addition, late morphs of *Acrospirifer primaevus* (STEININGER, 1853) support a Late Siegenian age. *Crassirensellaeria crassicosta* (KOCH, 1881) disappears prior to the upper boundary of the Upper Siegenian. Typical Late Siegenian faunas include the faunas from Unkel/Rhine river, Aegidienberg in the Siebengebirge and a number of classical faunas in the Siegerland, for example Käuser Steimel, Herdorf, Häusling, Anzhausen, Rudersdorf etc.

### **The Rhenish Lower Emsian and its brachiopod faunas**

The Belgian geologist DORLODOT (1900) introduced the term “Emsien” for the upper part of the Lower Devonian, which he named after the richly fossiliferous successions around Bad Ems and Koblenz in the central Rhenish Slate Mountains. His work was a reaction on the general confusion in the stratigraphical terminology of the Lower Devonian during the second half of the nineteenth century, caused by different stratigraphical nomenclatures in the Ardennes and the Rhenish Slate Mountains, for example very different meanings of the term “Koblenzian” (in different spellings). Rhenish workers first continued to use the term “Koblenz(ium)” for rocks of today Rhenish Emsian age in the first half of the twentieth century and replaced the term by “Ems(ium)” later – following the recommendation by RICHTER & RICHTER (1950). The Emsian in its traditional Rhenish type region is subdivided into Lower and Upper Emsian; the subdivision is biostratigraphically well-defined (SOLLE 1972). Fossiliferous marine Lower Emsian is exposed especially in the South Eifel (around Manderscheid, Eckfeld, Stadtfeld, St. Johann etc.), the southwestern Westerwald (Brexbach Valley, Nellenköpfchen, Feisternacht Valley etc., Kretzers Mühle), in the Taunus (Usingen, Oppershofen, Bornich, Bornhofen, Lorelei, Katzenelnbogen etc.) and the Hunsrück regions (Walderbach, Bundenbach etc.).

The scope of the Rhenish Lower Emsian changed in history mainly due to varying definitions of its lower boundary (see next chapter). Following the subdivisions by SOLLE (1950), MITTMEYER & GEIB (1967) and MITTMEYER (1973), the Lower Emsian succession is subdivided today into Ulmen (in revised sense), Singhofen and Vallendar groups; these became even biostratigraphically defined regional substages (MITTMEYER 1974, 1982, 2008). The Lower Emsian shows a phylogenetic development within the genera *Arduspirifer* and *Euryspirifer*. *Arduspirifer “arduennensis”* initiator MITTMEYER, 2008 from the lowermost part of the Lower Emsian (lower Ulmen Group in actual sense) is still poorly known. The species probably represents the ancestor of *Ard. latestriatus prolatestriatus* MITTMEYER, 1973 from the lower and middle parts of the Lower Emsian (Ulmen to Singhofen groups); this subspecies gives rise to late

Early Emsian *Ard. latestriatus latestriatus* (MAURER, 1886), the index fossil of the Vallendar Group. In a separate lineage, *Ard. antecedens antecedens* (FRANK, 1898) appears within the lower part of the Lower Emsian and ranges up into its middle and probably upper parts, regionally giving rise to a still undescribed new subspecies (JANSEN, in prep.). *Euryspirifer* exhibits a progressive evolution from *Eur. assimilis* (FUCHS, 1915) to *Eur. dunensis* (KAYSER, 1889) during the Early Emsian. The beginning of the Singhofen Group is biostratigraphically recognized by the onset of *Eur. assimilis latissimus* MITTMEYER, 2008. Strong variation within the subspecies of *Eur. assimilis*, however, makes it rather difficult to separate its subspecies. A revision of the whole species is in progress (JANSEN, in prep.). Another good indication of the beginning of the Singhofen Group is the first occurrence of typical and numerous specimens of *Pseudoleptostrphia dahmeri* (RÖSLER, 1954).

### The Rhenish Siegenian/Emsian boundary

Continuous transitions from the Upper Siegenian to the Lower Emsian are documented most complete and fossiliferous in the Manderscheid-Stadtfeld region of the South Eifel (RÖDER 1957; FUCHS 1982; MITTMEYER 2008), where rich brachiopod faunas occur in the boundary beds. The exact delimitation between the stages was questionable for a long time.

An important step forward was the work by SOLLE (1950) who recognized the distinctness of a unit which he called the “Ulmen-Gruppe” [= “Ulmen Group”] representing a transitional stage in the Siegenian/Lower Emsian boundary interval. He distinguished a rhenotypic, sandy “normal facies” in the type area of Ulmen (South Eifel region) and the Hunsrück Slate facies of the same age. SOLLE (ibid.: 307) emphasized the absence of *Crassirensellaeria crassicosta* (KOCH, 1881) from the Ulmen Group and the presence of *Acrospirifer primaevus* (STEININGER, 1853) in its lower parts. He regarded *Euryspirifer assimilis* (FUCHS, 1915), a very common fossil in the Ulmen Group, as a genuine guide fossil of the Siegenian (ibid. 338) and accordingly placed the unit as a fourth Siegenian unit above the Upper Siegen Beds. After his revision of *Eur. assimilis* sensu stricto, MITTMEYER (1973) shifted the Ulmen Group to the basal Lower Emsian, because he could recognize exclusively Early Emsian fossils associated with this species – and in the Hunsrück Slate in general. He defined the basal Lower Emsian boundary with the disappearance of *Acrospirifer primaevus* (STEININGER, 1853) and alternatively with the transition from *Alatiformia affinis* (FUCHS, 1909) to *Al. mediorhenana* (FUCHS, 1909). As a result, only a small interval of the former Ulmen Group, the interval between the levels of the disappearance of *Crass. crassicosta* and *Acr. primaevus*, remained in the uppermost Siegenian. After all, just a few previously Late Siegenian strata

can be added to the Emsian now, because specimens of “*Acr. primaevus*” must be determined as *Acr. eckfeldensis*, for example the Bornhofen Formation (MITTMEYER 1973) or parts of the Saxler Formation. All these changes were of relatively minor significance (in comparison to the new definition of the Emsian base), because the age assignments of most of the classical Siegenian and Emsian faunas remained unchanged.

The basal boundary of the Lower Emsian in the current sense can be recognized by the extinction of typical Siegenian brachiopod taxa, mainly *Acrospirifer primaevus* (STEININGER, 1853), *Proschizophoria personata* (ZEILER, 1857), *Rhenorensellaeria strigiceps* (C.F. ROEMER, 1844) and *Cryptonella minor* DAHMER, 1931. The entry of *Acrospirifer eckfeldensis* MITTMEYER, 2008 [formerly “*Acrospirifer fallax*” by different authors], *Arduspirifer “arduennensis” initiator* MITTMEYER, 2008, *Arduspirifer latestriatus prolatestriatus* MITTMEYER, 1973 and *Euryspirifer assimilis assimilis* (FUCHS, 1915) prove the beginning of the Lower Emsian (Fig. 1). The exact levels of first appearance are still not totally clear. *Alatiformia mediorhenana* (FUCHS, 1909) and *Anoplotheca venusta* (SCHNUR, 1853) appear near the base of the traditional Emsian, as well.

The faunal turnover from the Siegenian to the Emsian coincides with a general transgressive tendency (Saxler Event: MITTMEYER 2008). It is documented by a diversification of marine biota in the latest Siegenian Saxler Formation (SIMPSON 1940). The basal Emsian boundary apparently lies within that formation, because typical specimens of *Acr. eckfeldensis* first occur there. The overlying Eckfeld Formation contains the typical lowermost Emsian fauna. A restudy of the latest Siegenian-earliest Emsian faunas of the Dhrontal and Zerf formations (western Hunsrück), the latest Siegenian Darustwald Formation (eastern Hunsrück), the earliest Emsian Bornhofen and Bornich formations (Taunus and Hunsrück near the Rhine) and the earliest Emsian Holzhausen Formation (western Taunus) may provide additional data on the faunal change, as well (JANSEN, in prep.). In the southern Rhenish Slate Mountains, the basal Emsian transgression is reflected by the change from shallow-water deposits of the Taunus Quartzite to deeper water deposits of the Hunsrück Slate facies.

### Correlations

Siegenian and Early Emsian brachiopod faunas with Rhenish affinities occur in successions of West/Southwest Europe and North Africa. In the same sections or as lateral substitutes, hercynotypic intercalations are yielding pelagic guide fossils with supraregional or even cosmopolitan distribution. The Middle or Upper Siegenian (difficult to distinguish there) is documented with faunas, for example, by the upper sandstone units of the Merzâ-Akhsâi

Formation (“Rich 2”) in the Moroccan Dra Plains (JANSEN 2001; JANSEN et al. 2007) and by the upper Santa Cruz Formation (d3c) in the Eastern Iberian Chains (northeastern Spain; CARLS 1987). These units hardly yield any conodonts, although some limestone lenses or beds are intercalated. In contrast, directly overlying hemipelagic limestones of the Mdâuoer-el-Kbir and Mariposas formations contain advanced specimens of *Eocostapolygnathus excavatus* (CARLS & GANDL, 1969) in both regions, the nominative index taxon of the second standard conodont zone of the Emsian. The accompanying brachiopod fauna of the lowermost Mariposas Formation (d4a alpha) is still devoid of any forms pointing to the classic Lower Emsian and is therefore still assigned to the Siegenian. Close relatives of *Arduspirifer latestriatus prolatestriatus* appear above, within unit d4a beta 1 (e.g. CARLS et al. 2009 and own observ.). The traditional base of the Emsian must be located close to this level. The transgression which is documented by the onset of hemipelagic limestones mentioned above may correlate with the transgression in the Rhenish Siegenian-Emsian boundary interval (MITTMAYER 2008: “Saxler Event”). All data confirm the suggestion, that the traditional Siegenian/Emsian boundary is situated well above the base of the present GSSP-Emsian and even above the lower boundary of the *Eocost. excavatus* Zone. As a consequence, the entire *Eocost. kitabicus* Zone falls in the Siegenian.

Regarding the succession in Uzbekistan, the rapid change from the shallow water carbonate complex of the Madmon Formation to the well-bedded, fine-grained, dark limestones of the Zinzelban Member of the lower Khodhza-Khurgan Formation has been termed Zinzelban (*kitabicus*) Event (WALLISER 1996). The basal Emsian GSSP is fixed at 35 cms above that lithostratigraphic boundary. Considering the enormous thickness of the Zinzelban section, a set of 35 cms thickness presumably corresponds to a very short time. If this transgressive event should really turn out to be significant on a global scale, one can hypothesize that the transgressive limestone at the base of the Merzâ-Akhsaï Formation in the Dra Plains or the beginning of the Rhenish Middle Siegen Beds correspond to it. Further studies in the Moroccan Anti-Atlas may help to clarify this question of relative age relationships. The basal Emsian boundary level in traditional German sense is supposed to be in the Zinzelban section about 114 m above the present boundary (CARLS et al. 2009).

In middle (to upper?) parts of the Lower Emsian in the Eifel region (Gefell Formation of the lower Singhofen Group, Vallendar Group?), *Euryspirifer dunensis* and subspecies of *Arduspirifer antecedens* (material studied by the author in 2008, Museum für Naturkunde, Berlin) occur in association (in one and the same bed) with *Anetoceras arduennense* (STEININGER, 1853) pleading for a late Zlichovian

age in terms of the Bohemian subdivision. Brachiopods from the famous Hunsrück Slate sensu stricto have consistently been assigned to the Ulmen Substage by MITTMAYER (1973, 1974, 1982, 2008). In my opinion, *Euryspirifer assimilis* ssp. restricts the possible range from early to middle Early Emsian (Ulmen to Singhofen), whereas palaeoammonoids from the same beds, such as *Ivoites* and the advanced genus *Mimagoniatites* clearly point to a late Zlichovian age (DE BAETS et al. 2009). These data point to a younger age than Ulmen and at least early Singhofen, because *Mimagoniatites* appears in the fossil documentation later than *Anetoceras*. Besides, Zlichovian dacryoconarid taxa *Nowakia praecursor* BOUČEK, 1964, *Now. cf. zlichovensis* BOUČEK, 1964, and *Now. barrandei* BOUČEK & PRANTL, 1959 are associated (ALBERTI 1982, 1983). There seems to be a mixture of older and younger faunal elements in the Hunsrück Slate sensu stricto. From my point of view, the rare brachiopod finds still need revision and presently do not exclude a post-Ulmen age. Although the Hunsrück Slate follows above the Siegenian Taunus Quartzite and doubtlessly represents the Ulmen Group in parts, it probably ranges through the Singhofen Group and may even reach the Vallendar Group. If this turns out true, this would mean, however, that the sandy facies of the Spitznack Formation (Singhofen age), for example, would not overly the Ulmen age Hunsrück Slate – what has been regarded as proved by the very experienced field geologists SOLLE (1950) and MITTMAYER (2008) – but would represent an lateral substitute of the latter. The old problem of the age of the Hunsrück Slate remains still unsolved to some degree and concerns the actual discussion, as well.

### Concluding remarks

If the present definition of the basal Emsian (GSSP-) boundary would be applied to the Rhenish sections, probably all classical Siegenian strata/faunas were of Emsian age. Fortunately, nobody has assigned any Rhenish Siegenian stratum or fauna to the Emsian yet, as this procedure would endanger the stability of Rhenish stratigraphical nomenclature, which has reached – apart from some smaller discrepancies – a common acceptance for many decades not only in Germany but in other countries of Europe and North Africa, as well (cf. CARLS 1987; JANSEN 2001). Since 1996, when the basal Emsian GSSP was ratified by the IUGS, many regional workers have continued to use the traditional concept as though nothing happened, and they were well advised to do so. It is unfortunate enough that a few workers in the Rhenish Massif have just replaced the term “Siegenian” by “Pragian” in publications and so introduced a “third Pragian”. After the trouble of inconsistent stratigraphical nomenclature in Europe before 1950, one should by all means avoid to destabilize it again. In my

opinion, it must therefore be the maxim to define the new base of the Emsian as close as possible to the classic Rhenish boundary. I totally agree with CARLS et al. (2009) who propose a new, much higher level. However, a new GSSP should be installed after a re-evaluation of pelagic taxa from the *Eocostapolygnathus excavatus* Zone and accompanying phenotypic Siegenian to Early Emsian brachiopods from sections in Southwest Europe and North Africa in order to obtain a more precise neritic-pelagic correlation within the interval under consideration. Finally, there is still a need for a better documentation of taxon ranges in the traditional Siegenian/Lower Emsian boundary beds of the Rhenish type region.

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## FRASNIAN TRANSGRESSION OF LATE DEVONIAN SEA AND ITS BIOTA IN THE SOUTHERN PART OF THE OCH'PARMA SWELL (SOUTH TIMAN)

V. S. TSYGANKO

The onset of one of the most important stages in the Paleozoic history of the Earth was connected with the Middle/Upper Devonian boundary near the global eustatic Frasnes Event. Due to the transgressive character of this event, this level matches at the western slope of the Uralian and on the Eastern Russian platform the basement of the Sargaj horizon in the majority of sections. In sections composed of shallow marine sediments, where conodonts are not present or represented by stratigraphically indifferent assemblages, the age of enclosing strata is determined by macrofauna remains. An example is represented by the unique Upper Devonian section cropping out at the Vol River in the south of the Timan Ridge, near the southern termination of the Och'parma Swell (Figs. 1-2).

The section was studied over various years by many scientists, from A. KEYSERLING and P. KRUSENSTERN P. (1846), E. VERNEUIL (1845), R.I. MURCHISON (1849), F.N. CHERNYSHEV (1887), V. RJABININ (1932) to the author of this report (TSYGANKO et al. 1997, TSYGANKO 2009). The local stratigraphic divisions of this article correspond to formations of International stratigraphic use.

In the middle course of the Vol' River Upper Proterozoic outcrops, below the transgressive Upper Devonian, sediments are represented by dark grey and black shales with interbedding grey and light-grey quartz aleurolites.

Below, a short description of the southern termination of the Och'parma Swell is given.

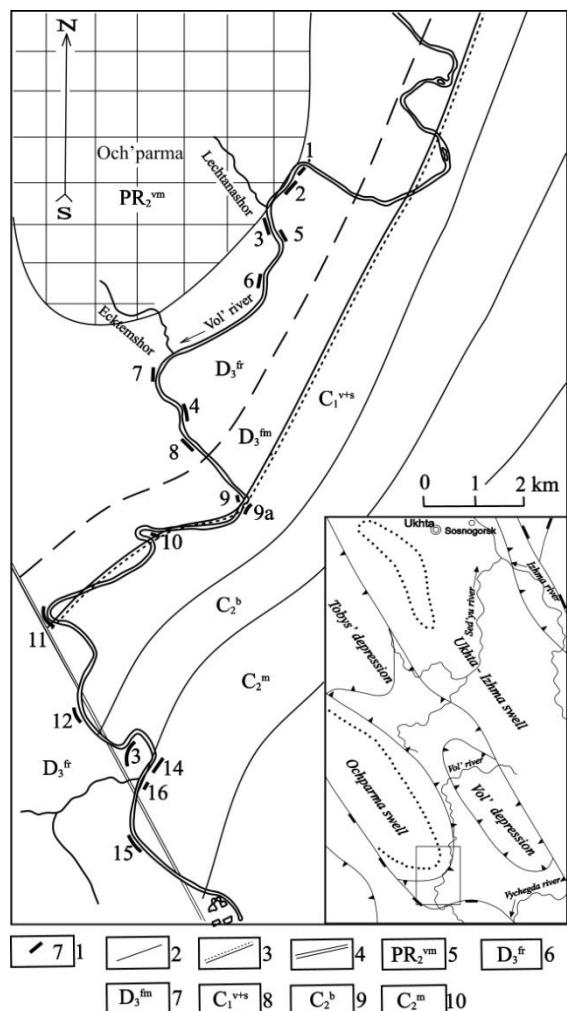


Fig. 1. A schematic geological map of the territory at the southern end of the Och'parma swell (South Timan). 1-outcrops; 2, 3-stratigraphic borders line: 2-concordant, 3-discordant; 4-tectonic contact; 5-Vym'a series of the Upper Proterozoic; 6-Frasnian stage; 7-Famennian stage; 8-Visean and Serpukhovian stage; 9-Bashkirian stage; 10-Moscowian stage.

### Frasnian stage

The above-mentioned shales and aleurolites of the Upper Proterozoic Vym' series are overlain by a thin (up to 1.8 m) member of clay and clay-carbonate sandstones, gravelites and dirty green clays of the *Ust'Yarega Suite* (Formation). Concretions are formed by algae and stromatoporid colonies. The latter settled also on outcrops of Precambrian rocks, which testifies to the rapid movement of sea level in the area of the Och'parma Swell. Fig. 3 shows a colony of the stromatoporid *Trupetostroma cf. microlaminatum* (RIAB.) growing on the top of steeply dipping shales and aleurolites of the Upper Precambrian Vym series and on their erosion products – aleurites and sandstones with carbonate-clay cement. The colony contains at least three levels of thickening due to changing life conditions. An upper lens-like member of sandy organogenic-detrital limestones with clay fragments formed in the

sublittoral zone. Its maximal thickness is 1.3 m. Among shell fragments, remains of the brachiopod *Ladogia* predominate.

The main interval of the *Ust'yarega Suite* is represented by interbedded limestones, marls and clays formed in sublittoral conditions. The dominant sedimentation mode caused a considerable reduction of sediment thickness and also assisted the diagenetic thickening of sediments (Figs. 4a, b) and the formation of hard grounds at some levels. The latter were colonized by the serpulid worm *Spirorbis* (Fig. 4c).

On the whole, the formations contains a rich complex of invertebrates: the stromatoporids *Trupetostroma microlaminatum* (RIAB.) and *T. perschini* BOGOYAVL., the tabulate corals *Alveolites suborbicularis* LAM., *Crassialveolites multiperforatus* SALEE, and *Thecostegites cf. rossicus* SOK., the rugose corals *Temnophyllum modicum* (SMITH) and *Macgeea ex gr. solitaria* (HALL & WHITFIELD), the brachiopods *Striatoprodus gracilis* LJASCH., *Cupularostrum timanicus* LJASCH., *Uctella praesemilukiana* LJASCH., *Ladogia meyendorfii* VERN., *Pseudoatrypa velikaja* (NAL.), *Iowatrypa timanica* (LJASCH.), *Spinatrypa tubae-costata* PAEK., *Eleuterocoma novosibirica* (TOLL.), *Dmitrispirifer ex gr. nalivkini* LJASCH., and *Nordella orbiculata* LJASCH., undeterminable bivalves, and also rare conodonts *Polygnathus dubius* HINDE, *P. normalis* MILL. & YOUNG. The total thickness of the *Ustyarega Formation*, transgressively overlying Precambrian rocks, is about 30 m. Paleontological data allow a reliable correlation with the Sargaj horizon of the Frasnian stage. Upwards follow sediments of the Ektemshor Suite (Formation).

### *Ektemshor Suite (Formation)*

It is named by the author after the Ektemshor stream flowing into the Vol' River near its outcrops. It contains predominantly grey and light grey detrital-mud, argillaceous and biothermal limestones interbedded with black, bituminous marls and black calcareous clays. The character of the sediments testifies the deepening of the marine basin in comparison with the preceding *Ustyarega* time. This was accompanied by a considerable renewal of bottom dwellers. The formation contains a rich fauna of coelenterates and brachiopods, the majority of which characterize regionally only the given interval: *Actinostroma timanicum* RIAB., *Crassialveolites multiperforatus* (SALEE), *Disphyllum kostetskae* (SOSHK.), *Thamnophyllum ex gr. virgatum* Soshk., *Temnophyllum cf. modicum* (SMITH), *Macgeea multizonata* (REED), *M. rozkowskae* COEN-AUBERT, *Chonetipustula petini* NAL., *Nervostrophia asella* (VERN.), *Spinatrypa morsovensis* LJASCH., *Sp. semilukiana* LJASCH., *Cyrtospirifer schelonicus* NAL., *Anathyris helmerseni* (v. BUCH.), and others. The thickness is

about 40 m. The Ektemshor Formation seems to have an age analog to the Domanik formation.

#### *Vil' Suite (Formation)*

It was first found on the Zhezhimparma Swell, where its stratotype is located (KIRILLIN 1991). At the Vol' River its sections are composed of interbedded limestones including bioherms and dolomite, and also of dolomites characterized by remains of the stromatoporid *Tienodictyon katavense* (YAV.), the tabulate corals *Alveolites suborbicularis* LAM. and *Thecostegites cf. rossicus* SOK., the rugose corals *Disphyllum kostetskiae* (SOSHK.), *Peneckiella fascicularis* (SOSHK.), and *Phillipsastraea ananas* (GOLDF.), the brachiopods *Productella ex gr. subaculeata* MURCH., *Atrypa uralica* (NAL.), *Hypothyridina cuboides* SOW., *Theodossia aff. tanaica* NAL., and the conodonts *Polygnathus politus* OVN. and *P. praepolitus* KONOVOVA et al. The thickness is at least 60 m. It is supposed that the Vil' Suite (Formation) correlates with the Vtlaysyan and Syrachoy Suites (Formations) of the Ukhta region.

#### *Ukhta Suite (Formation)*

It is represented by a regressive series of sediments, which are characteristic for sublagoonal and lagoonal formations of stratotypical sections of the formation: clays, aleurolites, limestones, marls and also rare interbeds of fibrous gypsum. The characteristic fossil association of the formation at the Vol' River consists of rare remains of the brachiopod *Theodossia livensis* NAL. The thickness is about 70 m.

#### **Famennian stage**

In outcrops, the Famennian is represented by the *Izhma Suite* (Formation): limestones with subordinate clay interbeds are assigned to the Lower Famennian substage. The lower part of the section and its contact with underlying Frasnian sediments result from diagenetic thickening, which is typical for the formation. Limestones and clays contain remains of the brachiopods *Productella koscharica* SOK., *Cupularostrum cf. brodica* (NAL.)

*Cyrtospirifer archiaci* MURCH., and *Athyris concentrica* v. BUCH., which is typical for the Lower Famenian. The assumed thickness is about 70 m.

Upperwards there is a 10 m thick stratum, composed of mottled clays and light grey clays of predominantly kaolinite composition, which represents a weathering crust on underlying Lower Famenian sediments. The contact of this stratum with the latter was not determined, because it is located in the Vol' River bed. The kaolinite stratum represents the basement for terrigenous-carbonate and carbonate-terrigenous Visean stage sediments (Lower Carboniferous).

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Fig. 2. Columnar section of the Upper Devonian at the Och'parma Swell. 1-sandstone, aleurolitic and metamorphic shale; 2-5-limestone: 2-detrital, 3-clay, 4-sandy, 5-dolomitic; 6-dolomite; 7-mergel'; 8,9-sandstone (8) and conglomerates (9) from carbonate cement; 10-clay; 11-kaolinites; 12-gypsum.

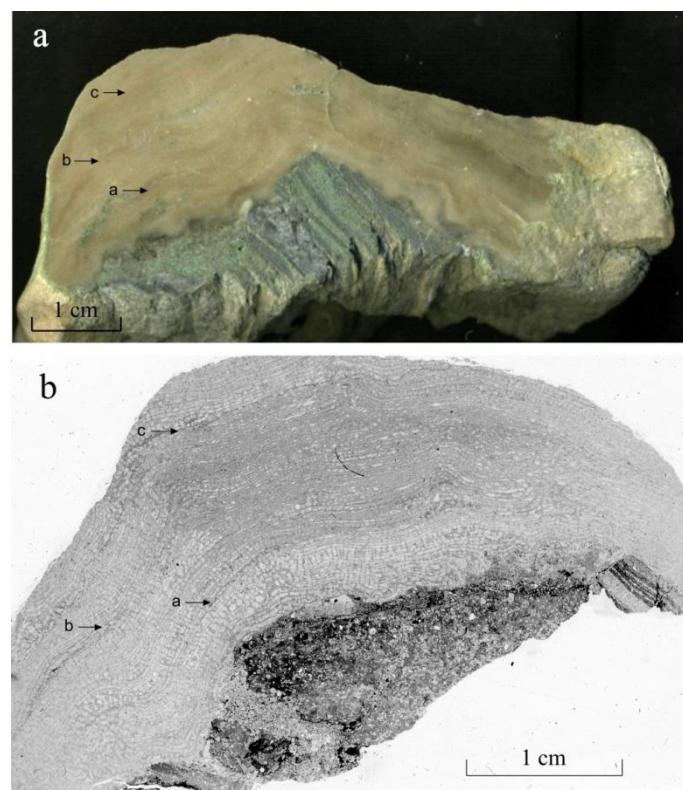
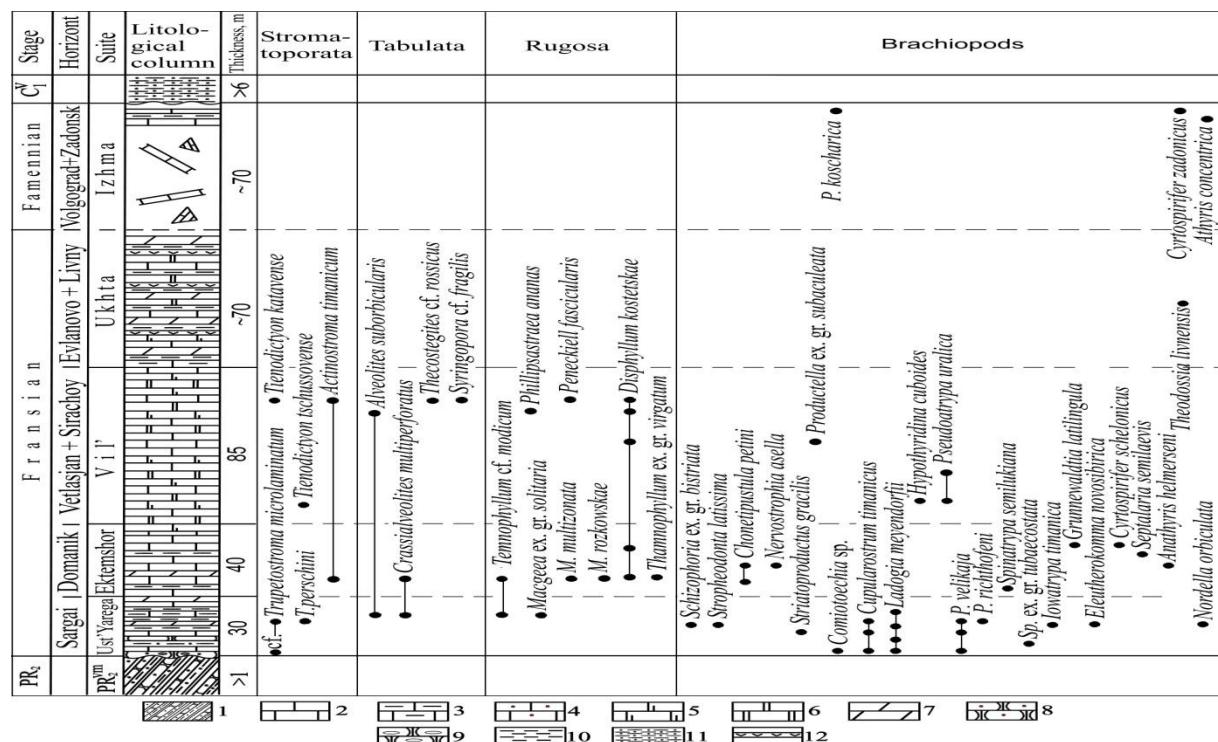


Fig. 3. Hemispherical coenosteum of the stromatoporid *Trupetostroma* cf. *microlaminatum* (RIABININ), attached to a radical outcrop of rocks of the Vym' series and their erosional products. (a) growth setting of the coenosteum, (b) internal structures in longitudinal section.



Fig. 4. Result of diagenetic consolidations of deposits (a, b) hard ground with numerous bioclasts, (c) *Spirorbis*, Vol' river; Frasnian stage, Ust'Yarega suite (formation).

## THE DEVONIAN-CARBONIFEROUS BOUNDARY AT LALLA MIMOUNA (NORTHERN MAIDER, ANTI-ATLAS, SE MOROCCO) – PRELIMINARY NEW DATA

R. Thomas BECKER, Z. Sarah ABOUSSALAM & Sven HARTENFELS

### Introduction

The Task Group for the revision of the Devonian-Carboniferous boundary is currently seeking new data concerning the taxonomy and ranges of critical conodont groups, of other fossil groups and new sections. The SE Anti-Atlas, especially the southern Maider, southern and eastern Tafilalt include a range of important D/C boundary sections with different facies and faunas that were deposited in the Maider Basin, on the Tafilalt Platform, and in the Tafilalt Basin. These have recently been described and correlated with the German (Rhenish) succession by KAISER et al. (2011). Ammonoids, event and sequence stratigraphy provide the main regional time framework. Conodonts are sparse in the pre-Hangenberg Event nodular limestones and only few Lower Tournaisian specimens could be obtained since limestone deposition almost ceased with the main Hangenberg Event until late in the Upper Tournaisian. In addition, the upper part of the pre-event beds (at least the *Wocklumeria* Zone, UD VI-D) is missing in an unconformity just below the Hangenberg Black Shale equivalents all over the Tafilalt. Few brachiopod taxa occur in the latest Devonian Hangenberg Shale and Sandstone equivalents (BRICE et al. 2005, 2007). Rich goniatite faunas re-appear in some sections rather late in the Lower Tournaisian (last summary in KORN et al. 2007).

### Lalla Mimouna South

Based on a detailed survey of the Jebel Rheris area at the northern margin of the Maider (FRÖHLICH 2004), KORN et al. (2004) described an important locality (their Section A) from the northern slope of the Lalla Mimouna Mountain N of Msissi. It represents one of the two small most northerly Devonian outcrops of the Maider region. Vertically-bedded, dark, bioclastic limestones of the *kockeli* Zone yielded an association of *Postclymenia evoluta* and *Acutimitoceras (Stockumites) hilarum*, accompanied by abundant gastropods and small, ribbed brachiopods. This mixed neritic-pelagic assemblage confirmed the short-term survival of last cymaclymeniids into the terminal Devonian (of current definition), into the initial post-event recovery interval (Ac. (*Stockumites*) Zone, UD VI-F). New conodont samples from the adjacent crinoidal limestones yielded *Palmatolepis gracilis gracilis*, *Bispaphodus costatus* Morphotype 2, *Bi. ultimus*, *Bi. spinulicostatus* (two morphotypes), and others. This fauna clearly falls in the pre-Hangenberg *ultimus* (Upper *expansa*) to (Lower) *praesulcata* Zones. It confirms the section log in KORN et al. (2004), which placed the crinoidal packstones below the ammonoid level. The latter is vertically overlain by ca. 2 m of unfossiliferous, orange-grey, fine siltstones and subsequent white/orange-weathering shales. The Hangenberg Event Interval is either represented by a thin unit (25 cm) of weathered marls between the crinoidal limestone and ammonoid bed or it is missing at an unconformity. There is no continuous section through the current D/C boundary interval at Section A.

First stable isotope data record a very large negative spike ( $\delta^{13}\text{C} = -17\text{ ‰}$ ) in the goniatite bed. It can only be explained by very extensive, possibly early diagenetic recycling of organic matter. Thin sections confirm a strong recrystallization of the limestone, which contains elevated C<sub>org</sub> levels.

### Lalla Mimouna North

Our field work concentrated in 2009 to spring 2011 on the larger outcrop on the lower slope of Lalla Mimouna, which we discovered independently from the Tübingen group. It is identical with Section B of KORN et al. (2004) since our GPS coordinates ( $N 31^{\circ} 16,502' W 4^{\circ} 49,092'$ ) are almost identical with those given in FRÖHLICH (2004). Fig. 3 gives a photographic illustration of the flat exposure with two separate limestone units that overlie unconformably (to the E) fine Ordovician siliciclastics. The local (new) Lower Crinoidal Limestone (Beds 1-6, Fig. 1) fines upwards and contains common conodonts but only sparse macrofauna apart from crinoid fragments. During the Uppermost Famennian eustatic transgression, crinoid forests began to settle the northern slope of Lalla Mimouna, which formed a small island N of the Maider Basin. The shallow-water crinoidal banks are followed in the main section by ca. 4.5 m of deeply weathered greenish marls/shales with lenses of marly, partly brachiopod-rich siltstones. Unfortunately, these are difficult to process for conodonts or proved to be barren. They represent a thin development of the topmost Devonian part of the Fezzou Formation of the southern Maider. Dominant brachiopod groups (Fig. 4) are rhynchonellids and orthids that are currently under study by D. BRICE. The subsequent (new) Upper Crinoidal Limestone (Beds 10-13) records high energy shedding of crinoidal debris, which resulted in lateral thickness variations. Some beds may wedge out laterally, especially in the upper part. Therefore, we measured a lateral section just 30 m to the S (Fig. 2), which includes solid, marly brachiopod siltstones (again without conodonts) and a peculiar, coarse encrinite marl (Bed 7f) below the Upper Crinoidal Limestone. Iron encrustations within the latter testify occasional periods of starved sedimentation. The last crinoidal packstone (Bed 13b) is sharply overlain by thick greenish silty shales with rare, small goniatites (Fig. 5) in its lower part. There are two new species of *Gattendorfia*, the first Moroccan *Eocanites* of the *supradevonius* Group, *Acutimitoceras* (*Stockumites*) n. sp., *Imitoceras* n. sp., and rare gastropods. Even higher, to the S on the slope, and separated by a long outcrop gap, there are deeply weathered shales with few brownish sideritic nodules (Rharriz Formation). These contain the Middle Tournaisian index goniatite *Protocanites* sp. and orthocones.

### Main advantages of Lalla Mimouna North

- Currently it is the only known North African section with conodont-rich limestones from just below and above the Hangenberg Event Interval. To the East, in the Algerian Bechar Basin (WEYANT 1988), both levels have been recognized in adjacent, separate sections.

- The Lower Crinoidal Limestone includes rare *Pa. gracilis gracilis* and *Bi. ultimus* as well as *Bi. costatus* (Fig. 6) and, therefore, is of pre-Hangenberg age, correlating with the *praesulcata* Zone. There are also longer ranging taxa, such as *Bi. spinulicostatus*, *Bi. aculeatus aculeatus*, *Neopolygnathus communis*, *Branmehla suprema*, and *Mehlina strigosa*.
- Bed 6 yielded a few siphonodellids, including curved forms (“*sulcata* s.l.”) in direct association with the last *Pa. gracilis gracilis* and *Bi. ultimus*. They require further study.
- Beds 1-6 are additionally characterized by “siphonodelloids” (Fig. 6) that combine polygnathid platform shapes and ornament with *Siphonodella* (*Eosiphonodella*)-type large, shallow basal cavities. There are specimens with narrow or wide platform and with regular transverse or more irregular ornament. Several species seem to be present. Marked anterior platform shoulders are typical. The basal cavities differ much from the smaller pits in the types of *Po. inornatus* or *Po. symmetricus*. A closely related form was illustrated from the upper Wocklum Limestone of Brewer (Rhenish Massif) by KORN et al. (1994) as *Po. cf. longiposticus*. The Lalla Mimouna specimens belong to a group of *Siphonodella*-relatives or ancestors that will be published by H. TRAGELEHN, based on extensive collections from Franconia and Thuringia. They prove that these phylogenetically significant taxa are not restricted to Germany. In addition there are specimens (e.g., Figs. 6.7-8) with a morphological trend towards the *Ps. primus* Group. The definitions and relationships of pre-Hangenberg polygnathids, pseudopolygnathids, and eosiphonodelids have to be re-considered (compare discussion in SPALLETTA et al. 2011).
- The siliciclastic, brachiopod-rich Fezzou Formation (Bed 7) represents the glacially induced, eustatic Hangenberg Regression. The Hangenberg Black Shale was not developed locally or it was cut out subsequently by submarine erosion during the main sea-level fall. The contact between Beds 6 and 7 can be interpreted as a sequence boundary and the Fezzou Formation as a lowstand deposit. The brachiopods (Fig. 4) should allow a correlation with the much thicker contemporaneous clastics of the southern Maider and southern Tafilelt, as well as with more distant clastic basins of the Dra Valley (BRICE et al. 2007) and Algeria.
- The gradual transition between the marly and crinoidal siltstones of the top Fezzou Formation and the subsequent crinoidal limestones, especially in the lateral section, records a very gradual deepening (transgression during early post-glacial re-warming), without any gaps.
- The main part of the Upper Crinoidal Limestone represents on a global scale one of very few

- sections where the *costatus-kockeli*-Interregnum (upper part of “Middle *praesulcata* Zone”) contains abundant conodonts in a sequence of beds and without any evidence of reworking. Apart from long-ranging bispathodids, *Neo. communis*, and *Mehlina*, various “siphonodelloids” continue. There are no *Palmatolepis*, as in southern Europe (KAISER et al. 2009). Unfortunately, there are also very few *Protognathodus* in the upper event interval.
- The *kockeli* (Upper *praesulcata*) Zone commences with Bed 13, based on the index taxon. There are no clymeniids or goniatites at this level, only few poorly preserved terebratulids. Section A of KORN et al. (2004), therefore, provides significant additional information from the same area.
  - The *Gattendorfia* Shale clearly falls in the Lower Tournaisian but its fauna (Fig. 5) is very different and possibly older than the *Gattendorfia* faunas of the Maider (EBBIGHAUSEN & BOCKWINKEL 2007) and SE Tafilelt (BOCKWINKEL & EBBIGHAUSEN 2007).

## Outlook

The Lalla Mimouna North succession and faunas fill gaps of the conodont and ammonoid succession of the eastern Anti-Atlas. Since the Hangenberg Black Shale is not developed and since the *Gattendorfia* faunas come from shale without conodonts, the section is not suitable as stratotype if the “*sulcata*”, *Pr. kuehnei* or extinction event levels are chosen for future GSSP definition. First carbon isotope measurements did not produce any significant positive excursion, unlike as in many other sections (e.g., KAISER et al. 2006, CRAMER et al. 2008). Most values are negative (up to  $-4.7\text{ ‰}$ ), probably because of diagenetic overprinting. If, however, the base of the *kockeli* Zone is taken into consideration (compare CORRADINI et al. 2011), there is currently no section on a global scale with a more continuous conodont record from below and into the *kockeli* Zone. However, the origination of *Pr. kockeli* is not preserved locally. Current investigations at Lalla Mimouna North include additional conodont faunas, the taxonomy of ammonoids and brachiopods, microfacies analysis, and more stable isotope data. The identification of the “siphonodelloids”, which also occur in the southern Tafilelt (HARTENFELS & BECKER in prep.), has to await the revision of contemporaneous siphonodelloids by H. TRAGELEHN (2010).

## Acknowledgements

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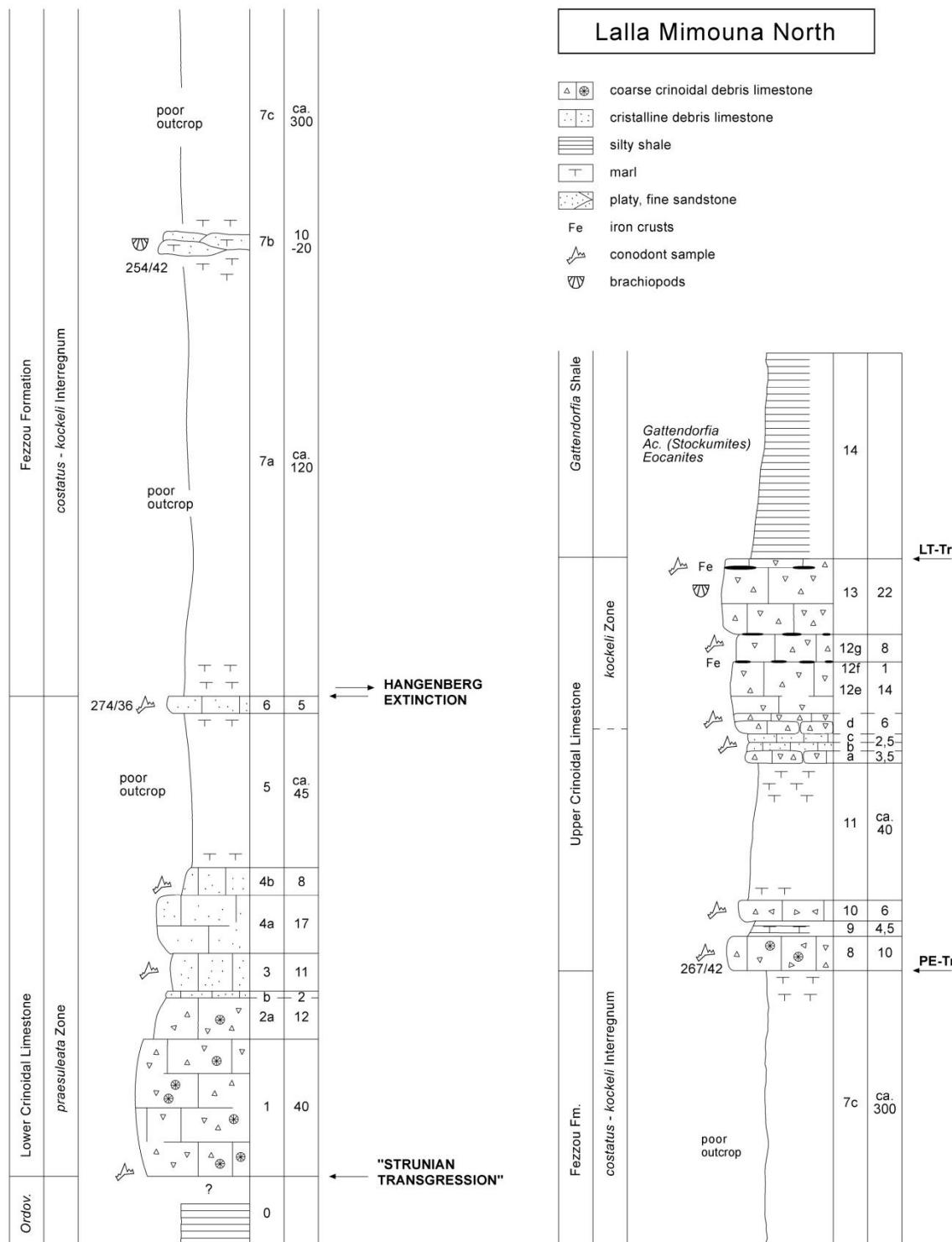


Fig. 1. Litho-, conodont, sequence and event stratigraphy at Lalla Mimouna North, with the position of conodont samples. PE-Tr = initial post-glacial transgression of the Hangenberg Crisis, LT-Tr = Lower Tournaisian transgression.

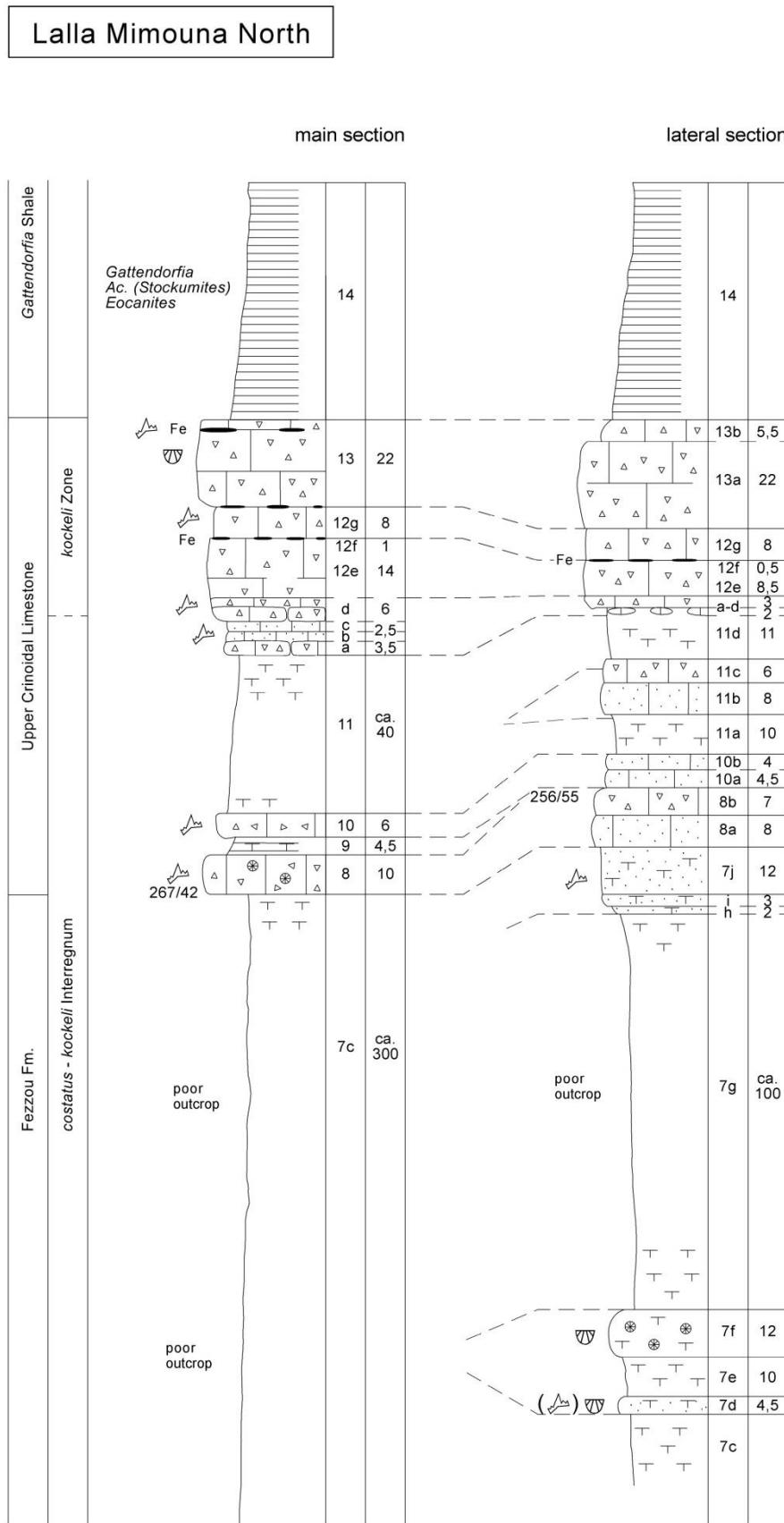


Fig. 2. Correlation of the upper part of the main section at Lalla Mimouna North with the lateral section, ca. 30 m to the South, showing the wedging out of some crinoidal debris beds, and the gradual transition from the Fezzou Formation to the Upper Crinoid Limestone. Legend as for Fig. 1.

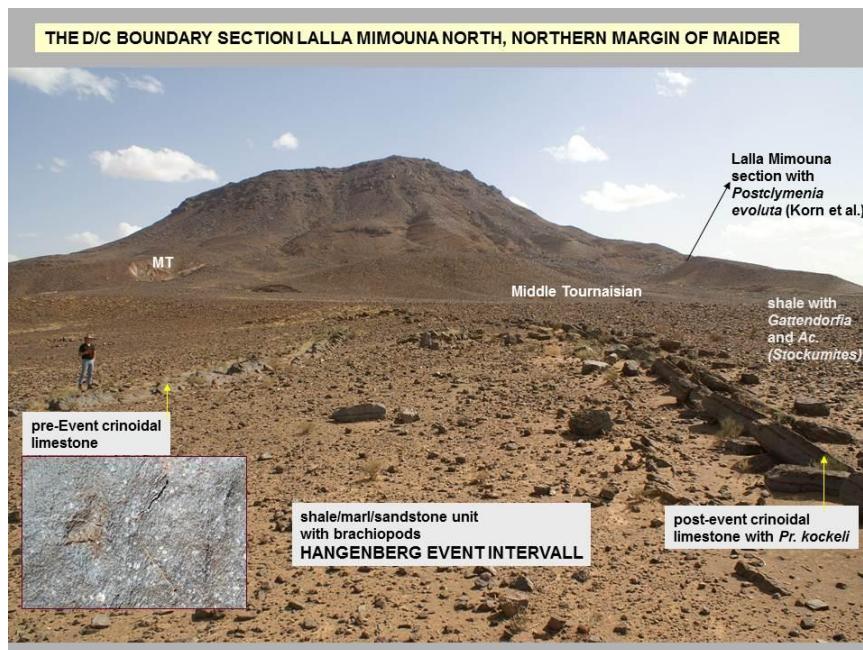


Fig. 3 (left = East)

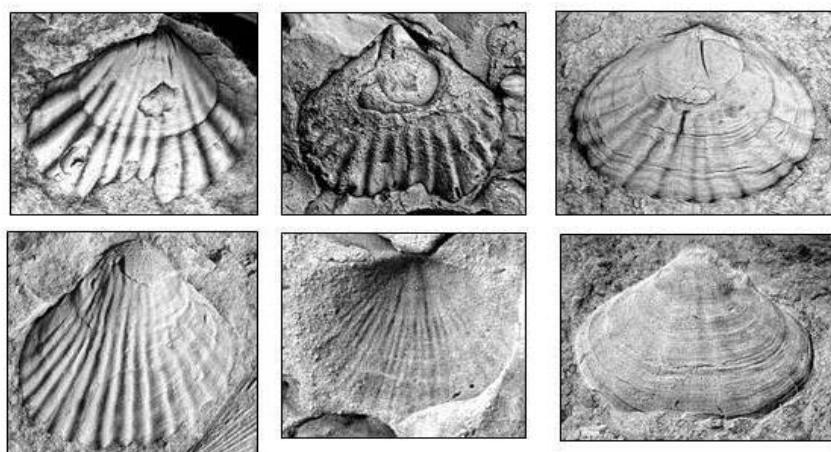


Fig. 4. Rhynchonellids, orthids, and other brachiopods from Bed 7 (Fezzou Formation).

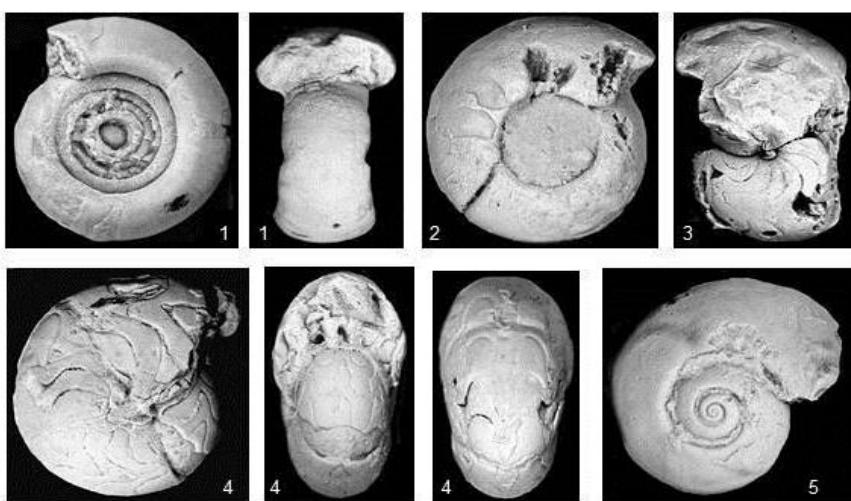
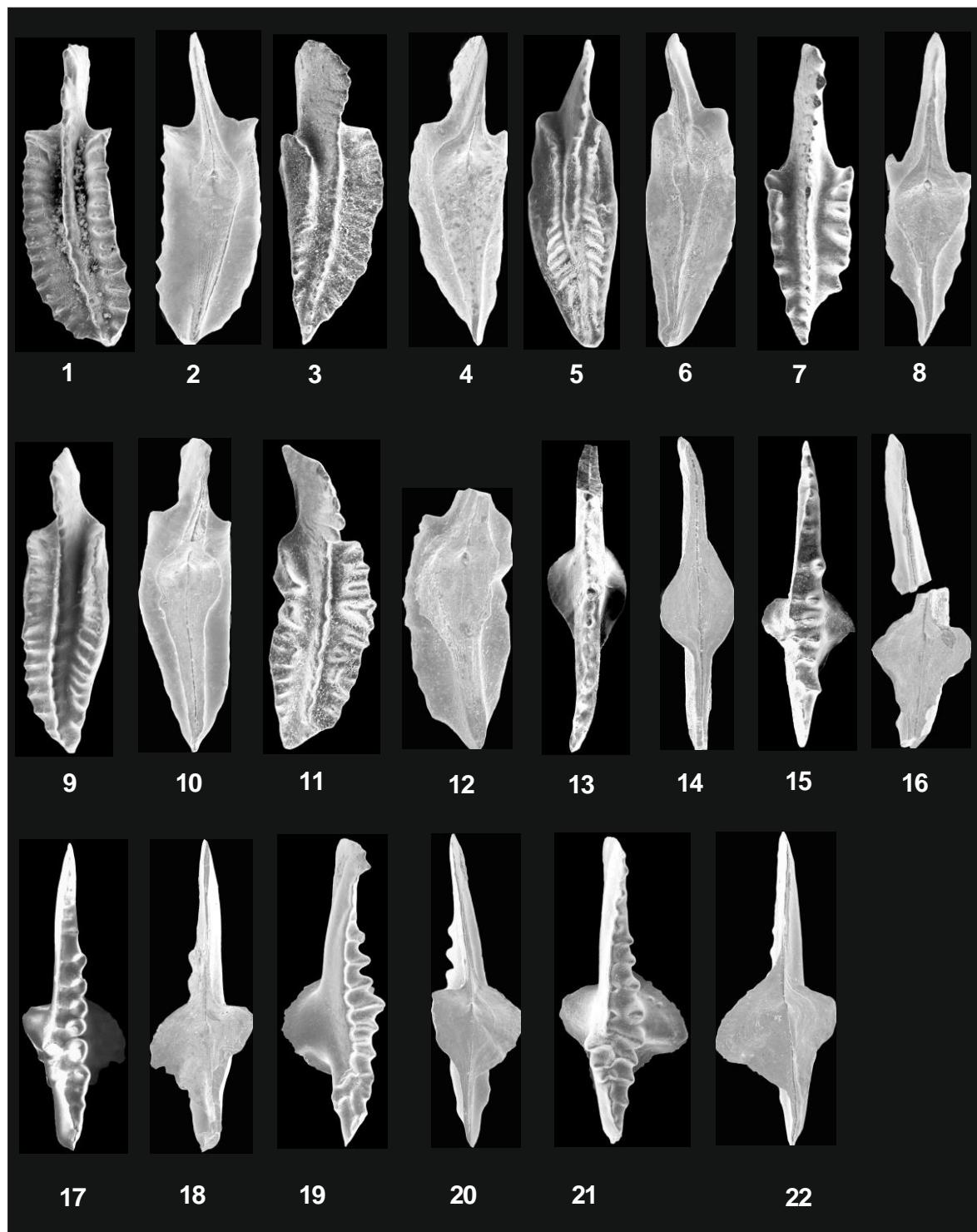
Fig. 5. Goniatites and gastropod from the  Shale. 1. *Gatt. aff. jacquelinae*, lateral and adoral views. 2. *Gattendorfia* n. sp., 3. *Imitoceras* n. sp., 4. *Acutimitoceras* (*Stockumites*) n. sp., lateral adoral, and ventral views, 5. almost planispiral gastropod.

Fig. 6. Conodonts from the base (Bed 1) of the Lower Crinoid Limestone. 1-6 and 9-12. various "siphonodelloids", 7-8. specimen with trend to the *Ps. primus* Gp., but with pronounced anterior platform shoulders and deep adcarinal troughs delimiting the transverse nodes and costae, 13-14. *Bi. stabilis vulgaris*, 15-16. *Bi. aculeatus aculeatus*, 17-18. *Bi. costatus* Morphotype 2, 19-22. *Bi. spinulicostatus*.



## THE PRAGIAN-EMSIAN EVENT AND SUBDIVISION OF THE EMSIAN IN THE ZINZILBAN AND KHODZHA-KURGAN SECTIONS

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### 1. Base of the Emsian

In the context of the debate on the Pragian-Emsian boundary in the Zinzilban Section, it is important that, in contrast to the base of the Zlichovian in the Barrandian (CHLUPAČ & LUKEŠ 1999), the Pragian-Zlichovian boundary in Zinzilban represents a prominent change in the pelagic and benthic fossil communities (KIM et al., 1978, 1984, 1985; SAPELNICKOV et al. 2004, YOLKIN et al. 2008, KIM I. 2008). This stratigraphic interval shows the most significant renewal in the assemblages at generic and species levels, allowing convincing correlations of the existing Pragian-Emsian boundary, which is accepted as a GSSP of the base of the Emsian in the Zinzilban section. Dacryoconarids show a significant change in generic and specific composition. The beginning of the Pragian (Khukarian Horizon) has the last occurrences of *Paranowakia* and *Homoctenowakia*, while *Nowakia (Turkestanella) acuaria* (RICHTER) appears in the Upper Pragian. This species continues up to the Norbonak Beds (Lower Emsian). *Guerichina strangulata* has not been found in the Zinzilban Section, but is present in the Pragian-Emsian boundary beds of the adjacent Sangi-Tovar section (KIM 2007, pl. 69, fig. 9). In the Turkestan-Alai sections (the Kyk and Igaroldi sections) *Guerichina* species first appear in the *Eognathodus sulcatus* Zone and continue to the *gronbergi* Zone (KIM et al. 1988). Therefore this genus and species, like *Nowakia (Turkestanella) acuaria*, can only indicate the Pragian when the host beds are overlain by the *Nowakia (Dmitriella) praesulcata* Zone. The latter species enters in the lower part of the Zinzilban Beds (4 m above the GSSP boundary).

*Nowakia (Dmitriella) praesulcata* is distinguished from *Nowakia (Turkestanella) acuaria* in that the drop-like embryonic chamber of its shell is followed by the initial cone with no annulations, and the shell itself is very narrow, mainly cylindrical-conical. Such morphology is not found among the Lochkovian-Pragian dacryoconarids, but is common in the Emsian-Eifelian species and

characterizes a distinct period in the evolution of these organisms. At this stage *Nowakia (Dmitriella) praesulcata* is abundant this interval and is present at many levels of the Zinzilban and Norbonak beds as a rock-forming element. According to ALBERTI (1993, Table 1), in the Barrandian, Kellerwald, and southeastern Morocco, the species *Nowakia (Dmitriella) praesulcata* is present in the Lower Zlichovian and found in the lower part of the *zlichovensis* Zone. In the Zinzilban Section, this species is found in the interval from the Zinzilban Beds to the first half of the Norbonak Beds and completely embraces the *kitabicus* Zone. Consequently, the distribution of *Nowakia (Dmitriella) praesulcata* completely corresponds to the lower part of the Zlichovian of the Barrandian. The Pragian/Zlichovian boundary in the type area (Praha-Barrandov and Chynice) is mainly determined by a change in lithology, while its paleontological substantiation by zonal index species of conodonts and dacryoconarids is not convincing (CLUPAČ 1998; CHLUPAČ & LUKEŠ 1999). *Nowakia zlichovensis*, a zonal index species of the basal Zlichovian in the Zbuzanska Quarry first appears more than 15 meters above the boundary. It appears that the biostratigraphic boundary between the Pragian and Zlichovian in Barrandian is conventional, and can be at any level within the interval of 15-20 m. This means that the entity of the Pragian is not affected by dacryoconarid zonations, although this has been repeatedly stated in publications (CARLS 2008, CARLS et al., 2007; al., 2008; VALENZUELA-RÍOS et CARLS 2010). The problem apparently lies in an incorrect correlation of sections, often produced when data obtained at a single level are extrapolated to the whole interval of a section, as in the study by CHLUPAČ & LUKEŠ (1999, Fig. 5). Therefore, there is a reason to believe that there might be a gap in the section corresponding to the beds with *Nowakia (Dmitriella) praesulcata*, whereas the beginning of the Zlichovian was drawn in an interval with no evidence of *Nowakia zlichovensis* (CHLUPAČ & LUKEŠ, 1999, Fig. 5), and no evidence of *Nowakia (Dmitriella) praesulcata* (Text-Fig.1).

It is noteworthy that the accepted level of the base of the Emsian (GSSP) is characterized by the mass occurrence in the Early Emsian of conodonts of the family Polygnathidae, while the Emsian begins with the entry of the polygnathid *Polygnathus kitabicus*. In this paper we will not discuss the morphology of the early polygnathids and their taxonomy, which is not agreed between taxonomists. Conodont workers should analyze all the published material on *pireneae*, *dehiscens*, and *kitabicus*, to eliminate the existing taxonomic problems.

On the composition of benthic associations (corals, brachiopods, crinoids, trilobites, etc.),

despite some continuity with the Khukarian (= Late Pragian), which has been repeatedly noted by a number of workers (RZHONSNITSKAYA 1974, SAPELNIKOV et al. 2004, KIM I. 2008) the Lower Emsian Zinzilban assemblage represents a large stage in the development of the Devonian biota, dominated by new elements, which became widespread in the Middle Devonian.

We consider that the above described gap in the Barrandian succession corresponds to the lowermost zone in the Zlichovian *praesulcata* Zone in Zinzilban. Thus, the doubts of some authors regarding the incorrect choice of GSSP for the base of the Emsian in the basal part of the *kitabicus* Zone are poorly based.

Therefore the proposal by CARLS et al. to move the GSSP of the base of the Emsian in the Zinzilban section to the level of 114 m, to the base of the *excavatus* conodont zone (CARLS & VALENZUELA-RÍOS, 2008) will not solve the problem. In this case, the Zlichovian tentaculites would be in the Upper Pragian. This would necessitate the placement of some of the Zlichovian beds in the Czech sections into the Upper Pragian to increase its reduced range. This was voiced by VALENZUELA-RÍOS & CARLS (2010) in their "Brief comments" on the future of the Pragian.

The base of the Emsian remains a subject of discussion, in our opinion, because regional and local correlations of the Devonian have not been sufficiently refined in the Barrandian, the Ardenno-Rhine region, Spain (Celtiberia), or other regions. This is especially true with regard to correlations based on benthic fossils, especially if they are primarily based on long-term traditions. To demonstrate convincingly that these sections are sufficiently based paleontologically with no gaps in the succession, new series of detailed studies need to be conducted in the Barrandian, Ardenno-Rhine region and Zeravshan region, to solve existing problems on the correspondence of the Siegenian and Pragian with the Emsian under the supervision of the Subcommission of Devonian Stratigraphy (SDS).

## 2. The Base of the Upper Emsian

The base of the Upper Emsian is represented in the Khodzha-Kurgan Section as excellently and fully as the base of the Emsian in the Zinzilban section.

The Emsian in the Zinzilban and Khodzha-Kurgan sections is represented by carbonates and carbonate-cherty deposits of the Khodzha-Kurgan Formation. Based on lithology and fossils they are subdivided into the Zinzilban, Norbonak, Dzhaus, and Obisafit Beds of the Kitab Horizon (Lower Devonian) and Novikhush Beds (Middle Devonian, Eifelian) (KIM et al. 1978, KIM et al. 1984; SAPELNIKOV et al. 2004), characterized both by benthic (stromatoporoids, tabulatomorph corals,

rugose corals, brachiopods, bivalves, crinoids, ostracodes, trilobites, and bryozoans), and pelagic fossils (graptolites, ammonoids, tentaculites, conodonts, fishes, and others). Dacyroconarids and ammonoids form mass accumulations in the Dzhaus Beds and are represented by *Nowakia barrandei*, *Nowakia elegans*, *Nowakia cancellata*, and ammonoids *Anetoceras*, *Gyroceratites*, *Erbenoceras*, *Mimosphinctes*, *Mimagoniatites*, and *Convoluticeras*. Conodonts include *Polygnathus inversus*, *Po. catharinae*, *Po. gilberti*, and *Po. serotinus*. They represent assemblages typical of the Zlichovian and Dalejan of the Barrandian and characterize beds synchronous to the Emsian. It is noteworthy that the fossil fauna of beds can be reliably subdivided into large assemblages based on benthic fossils (stromatoporoids, tabulatomorph corals, rugose corals, brachiopods, crinoids, and others). These assemblages include those of the Zinzilban and Norbonak beds, which were in the past recognized as *regularissimus* and Obisafit with *Conchidiella* fauna and with the boundary at the base of the *P. serotinus* Zone. This level is a distinct event boundary in the evolution of the benthic fauna and is clearly recognized in the Khodzha-Kurgan section, across the South Tien-Shan, in the Urals, Altai-Sayan region, in the Barrandian (Czech Republic), and in Western Europe. Therefore, this stratigraphic boundary could be selected as the base of the Upper Emsian and be placed at the base of the *Polygnathus serotinus* conodont zone. The first appearance of the latter species in the Khodzha-Kurgan section is established at the level of 72 m within the Dzhaus Beds.

The brachiopod species *Megastrophia uralensis*, characteristic of the *Conchidiella* Zone was found at approximately the same level. If the base of the *serotinus* Zone in Barrandian is correctly correlated with the base of the tentaculite *cancellata* Zone (CHLUPAČ 1998, Fig. 56) this stratigraphic boundary could become a global correlation level in beds with both benthic and pelagic assemblages. However, in the Khodzha-Kurgan section the base of the *serotinus* conodont zone is almost coincident with top of the *cancellata* tentaculite zone (KIM et al. 2008), i.e., in both cases there are discrepancies in the distributions of the index species. BECKER et al. (2010) noted that it would be desirable that the level of the last *Mimosphinctes* was close to the level of the first appearance of *Pol. serotinus*. We consider that such a level for the base of the Upper Emsian would be the best, taking into account that the range of *Mimosphinctes erbeni* is restricted by the appearance in the Khodzha-Kurgan Gorge *Pol. serotinus* at the level of 72 m (KIM et al. 2008, Fig. 11).

The transition between the *elegans* and *cancellata* Zones has been for many years considered by many workers (CHLUPAČ 1998) as a possible level

separating the Lower and the Upper Emsian in the Barrandian. This stratigraphic level coincides with the so-called “Dalejan Event”, a transgression followed by the deposition of the Dalejan Shale and dominance of pelagic faunas in the marine basins. However, this event, although a eustatic flooding, is not always easily recognizable globally (BECKER 2007). Especially it is necessary to note, that in South Tien Shan and in the Zeravshan-Hissar basin in particular the change of conditions of sedimentation has already taken place at that time and the latter basin was dominated by pelagic organisms, including ammonoids, dacryococonarids, and conodonts, which are abundant in the Dzhaus Beds in the Khodzha-Kurgan Gorge. It was recorded that this level in the Barrandian is also marked by a change in the ammonoid assemblage, from *Gyroceratites laevis* to *Gyroceratites gracilis*. In the Khodzha-Kurgan no such change in ammonoids has been observed. *Gyroceratites laevis* appears in the *Nowakia barrandei* Zone and continues through the whole *cancellata* Zone. This level is considered to be coincident with the Zlichovian--Dalejan boundary (CHLUPAČ & LUKEŠ, 1999).

The correlation of the Khodzha-Kurgan section with the Barrandian section shows that the Zinzelban, Norbonak and the lower half of the Dzhaus Beds in the interval of the *praesulcata* – *zlichovensis* - *barrandei* - *elegans* tentaculite zones correspond to the Zlichovian of the Barrandian, whereas the upper part of the Dzhaus Beds and the Obisafit Beds corresponding to the *cancellata* – *richteri* – *holynensis* zones correlate with the Dalejan of the Barandian. In the conodont succession, this stratigraphic boundary in the Khodzha-Kurgan section falls in the middle of the *inversus* Zone (KIM et al. 2008), whereas in the Barrandian it occurs in approximately the middle of the *laticostatus* Zone. Thus, the possible boundaries either at the base of the *serotinus* conodont zone, or at the base of the *cancellata* tentaculite zone are not completely coincident. Therefore, to understand the distributions of the zonal species of dacryococonarids, conodonts, and ammonoids in the Dzhaus Beds and the basal Obisafit Beds, and to be convinced of the validity of the boundary proposed, it is extremely important to characterize paleontologically all of the so far barren intervals in the upper part of the Dzhaus Beds and the basal Obisafit Beds with new fossil records. Only this approach will show objectively why the Emsian Stage should be subdivided into two substages at this stratigraphic level.

The third possible level for the boundary between the Lower and Upper Emsian was proposed by YOLKIN et al. (2008) at the base of the *nothoperbonus* conodont zone. This intra-Emsian boundary was thought to mark the beginning of the “Gorlisai Event” (*possible equivalent of the*

“Dalejan Event”), embracing the interval of the section including the top part of the Norbonak Beds, Dzhaus and Obisafit Beds, which YOLKIN correlated with the Shandy Horizon of Salair (YOLKIN et al. 2005). This intra-Emsian boundary is problematic in that the correlation with Salair shows that only the upper part of the Dzhaus beds and the Obisafit Beds in the Khodzha-Kurgan can be put in correspondence with the Shandy level of Salair. In addition, the base of the *nothoperbonus* Zone in the Khodzha-Kurgan section falls into the middle of the *zlichovensis* tentaculite zone (YOLKIN et al. 2008), which puts Zlichovian in correspondence with the Shandy Horizon of Salair and occurs within the *zlichovensis* Zone.

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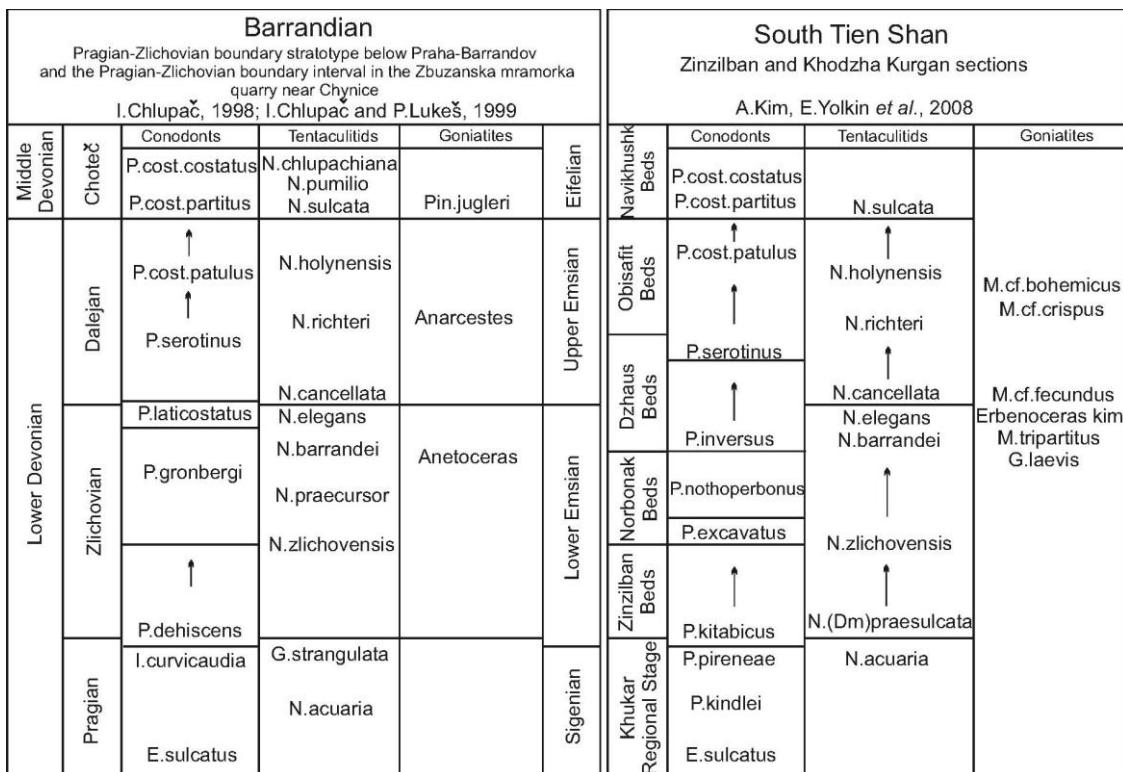


Fig.1 The correlation chart of the Barrandian and Khodzha-Kurgan/Zinzilban sections.

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## SDS FORUM

### THE UNCOUNTED SPECIES OF *POLYGNATHUS* – PLEA FOR CLEAR TRACKS THROUGH A TAXONOMIC JUNGLE

R. Th. BECKER

#### Introduction

*Polygnathus* is the most diverse and wide-spread genus of Devonian to Lower Carboniferous conodont genus, at least in its most often used, wide taxonomic concept based on its Pa element. Most species have some stratigraphic value. Our current DFG research project at Münster deals, amongst other aspects, with the timing of Eovariscan crustal movements. These led to carbonate reworking and re-sedimentation in polymict conglomerates. Conodont samples, therefore, may produce mixtures of Lower Devonian up to Tournaisian faunas. In this context it is not always an easy task to distinguish between the many homoeomorphic polygnathids of different stratigraphic levels. For example, some morphotypes of the Famennian shallow-water species *Po. semicostatus* look identical to Eifelian-Givetian *Po. linguiformis* (compare HARTENFELS 2011). The knowledge of Moroccan polygnathids is still incomplete, which leaves the possibility for new records of species that are currently only known from other regions (confirmed in recent Frasnian and Famennian samples). Reliable identifications, therefore, require a complete overview of all taxa in the genus. However, this is not available from any publication and not from the various databases that are freely available in the internet. The probably best, the Global Names Index (gni.globalnames.org, beta list), has many double listings, spelling errors, and lacks almost 150 names, especially from “exotic” papers or when they were published under different generic names. Also, many species records have no authors and anyway no information on age and current generic affinities. The Paleobiology Database is currently still useless, due to sparse input from the conodont community. The Zoological Record has no general open access and species lists.

This contribution tries to compile a complete list of species included in *Polygnathus* s.l. The attempt is bound to fail in its “first round” but I am optimistic that I found more than 95 % of all taxa. I like to ask other conodont workers/SDS Members to add to the almost 650 names found and to provide any corrections. Additions and corrections can be placed in the next Newsletter (with the names of everybody who contributed). The list below places subspecies in the strict alphabetical order. This allows easily to spot homonyms. They amount only to ca. 2 % of the names (13 names) but nine have not yet been corrected by name replacements. This is only

necessary when taxa are regarded as potentially valid. Questions of subjective synonymies cannot be raised here. The incredibly high amount of named species reflects taxonomic oversplitting in some groups, for example in the Emsian (e.g., MAWSON & TALENT 2003 in reply to BARDASHEV et al. 2002) and Lower Carboniferous (e.g., COOPER 1939).

#### List of species named in *Polygnathus*

Included are also species established in closely related genera that are not (yet) widely accepted. These are *Eoctenopolygnathus*, *Eolinguiopolygnathus*, *Eocostapolygnathus*, *Linguipolygnathus*, *Ctenopolygnathus*, *Avignathus*, *Immognathus*, *Lagovignathus*, *Polynodosus*, *Polylophodonta*, and *Neopolygnathus*. The list also includes a few non Pa element taxa that have priority in multi-element taxonomy (e.g. *Po. perbonus*).

Abbreviations of main (not necessarily complete) range: (Ord) = Ordovician, Sil = Silurian, Pr = Pragian, LEm = lower Emsian, UEm = upper Emsian, Eif = Eifelian, Giv = Givetian, MD = Middle Devonian, Fr = Frasnian, Fa = Famennian, LC = Lower Carboniferous, UC = Upper Carboniferous, Tr = Triassic. Homonyms are marked and emphasized if not yet replaced. Current assignments to widely accepted other genera are given in [ ]. I kept the original spelling of species names, without subsequent gender changes. Two Chinese species names are in conflict with the International Code of Zoological Nomenclature. In the related *Pseudopolygnathus*, including *Macropolygnathus*, there are currently ca. hundred names, with some overlap with the *Polygnathus* list. \* means that I do not know the original reference, or even the authors, and the internet provides no clarification. In these cases I am especially thankful for advice.

This Newsletter does not have the space to give the long reference list for all taxa. Ziegler (1988) published a very useful bibliography for conodont papers until the end of 1986. For subsequent publications you should search the internet or contact either the species authors (if still active) or me.

- abbessensis* Savage 2011 (Eif)
- abnepitis* Huckriede 1958 (Tr), type species of *Epigondolella*
- abnormis* Branson 1934 (LC)
- dehiscens abyssus* Mawson 1987 (LEm)
- acaulis* Ullrich & Bassler 1926 (Fa), nom. dub. [*Palmatolepis*]
- acrinodosus* Aboussalam 2003 (Giv)
- acuta* (Thomas 1949) (Fa)
- acutatus* Khalymbadzha et al. 1991 (Fa)
- admirandus* Strelchenko 2000 (Fa)
- adolata* Cooper 1939 (LC)
- adunca* Youngquist & Patterson 1949 (LC)
- aequalis* Klapper & Lane 1985 (Fr)
- aequidivisus* Aboussalam & Becker 2007 (Giv)
- alatus* Huddle 1934 (Giv-Fr)
- alexanderensis* Savage 1995 (Eif)
- linguiformis alingulatus* Sparling 1983 (Eif)
- alternans* Hadding 1913 (Ord) [*Erraticodon*]
- alvenus* Ovnatanova & Kononova 1996 (Fr)

*alveoliposticus* Orr & Klapper 1968 (Giv)  
*linguiformis alveolus* Weddige 1977 (Eif)  
*amana* Müller & Müller 1957 (Fr)  
*amphora* Walliser & Bultync 2011 (Eif)-(Giv)  
*anastasiae* (Bardashev et al. 2002) (UEm)  
*ancyrognathoidea* Ziegler 1957 (Fr) [.,*Tortodus*“/*Ancyrognathus* s.l.]  
*angulosus* Stauffer 1940 (Giv) [*Tortodus*]  
*angusta* Branson & Mehl 1934 (Fa/LC)  
*angusta* (Pazukhin in Pazukhin et al. 2009) nom. nud., no homonym, if *Polylophodonta* is kept separate  
*angusticostatus* Wittekindt 1966 (Eif), type species of *Parapolygnathus*  
*angustidiscus* Youngquist 1945 (Giv-Fr), type species of *Ctenoplygnathus*  
*angustipennata* Bischoff & Ziegler 1957 (Eif)  
*anida* Cooper 1939 (LC)  
*annamariae* Bultync 1989 (LEm)  
*anomala* Cooper 1939 (LC)  
*ansatus* Ziegler & Klapper in Ziegler et al. 1976 (Giv)  
*antecompressus* Capkinoglu & Gedik 2000 (FA)  
*costatus antiquus* Baranov 1990 (UEm)  
*apekinae* Bardashev 1986 (Em)  
*aragonensis* Martinez-Pérez 2010 nom. nud. (Pr-LEm)  
*argutus* Vorontzova & Kuzmin 1984 (Fa)  
*ashourii* Gholamalian & Kebria-ee 2008 (Fr)  
*asilbekensis* Khalymbadzha et al. 1991 (Fa)  
*aspelundi* Savage & Funai 1980 (Fr)  
*aspera* Huddle 1934 (Giv) [*Tortodus*]  
*dubia asymmetrica* Bischoff & Ziegler 1957 (Fr), type species of **Mesotaxis**  
*laciniatus asymmetricus* Rhodes et al. 1969, unreplaced **HOMONYM** (LC)  
*atasensis* Kuzmin 1992 (Fa)  
*auriformis* Drygant 1986 (Fa)  
*kockelianus australis* Jackson in Pedder et al. 1970 (Eif) [*Tortodus*]  
*australis* Druce 1976, unreplaced **HOMONYM** (Fr)  
*azygomorphus* Aristov 1988 (Fr)  
*bagialensis* Savage 2011 (Eif)  
*baicangensis* Zhao & Zhu 1983 (Fa)  
*basilicus* Stauffer 1938 (Fr)  
*bassleri* Harris & Hollisworth 1933 (UC), type species of **Neognathodus**  
*beckmanni* Bischoff & Ziegler 1957 (Giv) [*Tortodus*]  
*beckmanni* (Lys & Serre 1957) (Fr) [*Avignathus*]  
*belorussicus* Strelchenko 2000 (Fa)  
*benderi* Weddige 1977 (Eif)  
*berthogurensis* Gatovsky 2010 (Fa)  
*beshanikensis* Khalymbadzha et al. 1991 (Fa)  
*bicavata* Ziegler 1962 (Fa)  
*biclavula* Youngquist & Patterson 1949 (LC)  
*biconstrictus* Gedik 1969 (LC)  
*communis* var. *bifurcata* Hass 1959 (LC)  
*bifurcatus* (Dzik 2002) [no homonym if excluded from *Polygnathus*] [*Avignathus*]  
*glabra bilobata* Ziegler 1962 (Fa)  
*bischoffi* Rhodes et al. 1969 (LC)  
*bilineatus* Roundy 1926 (LC), type species of *Gnathodus*  
*boersmai* (Bardashev et al. 2002) (Pr)  
*borealis* Savage 1995, HOMONYM (Eif), = *abbessensis* nom. nov.  
*borealis* Nasedkina & Plotnikova 1979 (Fr)  
*bouckaerti* Dreesen & Dusar 1974 (Fa)  
*boucoti* Savage 1977 (LEm)  
*brevicarina* Klapper & Lane 1985 (Fr)  
*brevicornis* Youngquist & Peterson 1947 (Fa)  
*brevilamiformis* Ovnatanova 1976 (Fr)  
*brevilamina* Branson & Mehl 1934 (Fa)  
*brevimarginata* Branson 1934 (LC)  
*brevis* Miller & Youngquist 1947 (Fr)  
*bryanti* Huddle 1934 (Giv)  
*bucareliensis* Savage & Funai 1980 (Fr)  
*bucerus* (Aristov 1983) (Fa)  
*buddingtoni* Savage 1987 (Fr)  
*bullata* Branson 1934 (LC)

*linguiformis bultynci* Weddige 1977 (Eif)  
*burtensis* (Druce 1969) (LC)  
*buzmakovi* Kuzmin 1990 (Fa)  
*caelatus* Bryant 1921 (Giv) [*Tortodus*]  
*capollocki* Yazdi 1999 (Fr)  
*claviger* Roundy 1926 (LC), type species of *Geniculatus*  
*communis* var. *carina* Hass 1959 (Fa-LC)  
*carinata* Miller & Youngquist 1947 (Fr) [*?Ancyrodella*]  
*carinata* Bender & Kockel 1963 (TR) nom. nud.  
**[Gladigondrella]**  
*carinifera* Youngquist & Peterson 1947 (Fa)  
*carlisi* Martinez-Pérez 2010 nom. nud. (Pr-LEm)  
*communis carmanae* Xia & Chen 2004 (LC)  
*catharinae* Bultync 1989 (LEm)  
*changtanziensis* Ji in Hou 1988 (Fa)  
*churkini* Savage & Funai 1980 (Fr)  
*lacinatus circaperipherus* Rhodes et al. 1969 (LC)  
*colliculosus* Aristov 1985 (Fr)  
*collieri* Huddle 1981 (Giv-Fr)  
*collinsoni* Druce 1969 (Fa)  
*comis* Stauffer 1938 (Fr)  
*communis* Branson & Mehl 1934 (Fa), type species of **Neopolygnathus**  
*concava* Thomas 1949 (Fa)  
*concentricus* Ulrich & Bassler 1926 (Fa)  
*confluens* Ulrich & Bassler 1926 (Fa)  
*conradi* Chatterton 1978 (Eif-Giv)  
*linguiformis cooperi* Klapper 1971 (Eif)  
*cordiformis* Leuteritz & Ziegler in Koch et al. 1970 (Fa)  
*corpulentus* Gagiev & Kononova in Barskov et al. 1987 (Fa)  
*corrugata* Branson 1934 (LC)  
*asymmetricus costalliformis* Ji 1986 (Fr) [*Mesotaxis*]  
*costatus* Klapper 1971 (Eif), type species of *Eucostapolygnathus*  
*costulatus* Aristov 1985 (Fr)  
*costulifera* Mawson & Talent 1997 (Fa)  
*cracens* Klapper et al. 1978 (UEm-Eif)  
*crasculus* Ulrich & Bassler 1926 (Fa)  
*crassus* Hinde 1879 (Giv)  
*cristatus* Hinde 1879 (Giv)  
*crownsnestpassensis* Johnston & Chatterton 2001 (Fa)  
*crucifera* Branson 1934 (LC)  
*cryptocavicus* Apekina 1984 (LEm)  
*cuneatus* Baranov 1990 (UEm)  
*cunulæ* Youngquist & Patterson 1949 (LC)  
*curta* Cooper 1939 (LC)  
*curtigladius* Uyeno 1978 (Eif)  
*curvatus* Hinde 1879 (Fr) nom. dub.  
*cymachila* Cooper 1939 (LC) [*Pseudopolygnathus*]  
*cymbiformis* Youngquist & Patterson 1949 (LC)  
*damelei* Vodrázková et al. 2011 (Eif)  
*dapingensis* Qin et al. 1988 (Fa)  
*dapoushangensis* Ji 1989 (LC)  
*davidi* Bai in Bai et al. 1994 (LC)  
*debaokensis* Xiong in Xian et al. 1980 (Em)  
*declinatus* Wang 1979 (UEm)  
*declinatus* Aristov 1988, unreplaced **HOMONYM** (Fr)  
*decorosus* Stauffer 1938 (Fr)  
*deformis* Anderson 1966 (Fr) [*Tortodus/Ancyrognathus*]  
*linguiformis dehiscens* Philip & Jackson 1967 (LEm), type species of *Eolinguipolygnathus*  
*delenitor* Drygant 1986 (Fa)  
*delicatulus* Ulrich & Bassler 1926 (Fa)  
*dengleri* Bischoff & Ziegler 1957 (Giv-Fr)  
*denisbriceae* Bultync in Brice et al. 1979 (Giv-Fr)  
*communis dentatus* Druce 1969 (LC)  
*dentimarginatus* Kuzmin 1992 (Fr)  
*deplanatus* Khalymbadzha et al. 1999 (Fa)  
*depressus* Metzger 1989 (Fa)  
*devexus* Melnikova & Kuzmin 1994 (Fa)  
*dilatatus* Zhang 1996  
*dissimilis* Helms & Wolska 1967 (Fa)  
*distorta* Branson & Mehl 1934 (LC)  
*diversa* Helms 1959 (Fa)  
*dobrogensis* Mirauta 1971 (Em)  
*drucei* Bai in Bai et al. 1994 (Fr)

*drucei* Zhuravlev 1999, HOMONYM (Fr), = *ilmenensis* nom. nov.  
*dubius* Hinde, 1879 (Giv-Fr), type species both of ***Polygnathus*** and ***Costapolygnathus***  
*duolingshanensis* Ji & Ziegler 1993 (Fa)  
*duplicatus* Hinde 1879 (Fr)  
*dushanensis* Xiong in Xiong & Chen 1983 (LC)  
*decorosus dutroi* Savage 1992 (Fa)  
*dystacta* Cooper 1939 (LC) [***Pseudopolygnathus***]  
*eberleini* (LEM)\*  
*ectypus* Huddle 1934 (Giv)  
*efimovae* Kononova et al. 1996 (Fr)  
*eiflia* Bischoff & Ziegler 1957 (Eif)  
*elegantulus* Klapper & Lane 1985 (Fr)  
*elongata* (Druce 1969) (Fa)  
*elongonodosus* Druce 1969 (LC)  
*xylus ensensis* Klapper et al. 1987 (Eif-Giv)  
*eoglaber* Ji & Ziegler 1993 (Fa)  
*eriensis* Hinde 1879 (Giv/Fr), different genus  
*yolkini erinae* (Bardashev et al. 2002) (Pr)  
*nodocostatus etremae* Pickett 1972 (Fr)  
*evidens* Klapper & Lane 1985 (Fr)  
*webbi excavata* Carls & Gndl 1969 (LEM)  
*exelsacarinata* Wang 1989 (Fa)  
*exodus* Cooper 1939 (LC) [***Pseudopolygnathus***]  
*explexus* Sandberg & Ziegler 1979 (Fa)  
*extralobatus* Schäfer 1976 (Fa)  
*falcatus* Boncheva 1992 (OEm-Eif)  
*fallax* Helms & Wolska 1967 (Fa)  
*flabella* Branson & Mehl 1938 (LC)  
*flaccidus* Helms 1961 (Fa)  
*flexomarginatus* Olivieri 1970 (Fa)  
*flexus* Nasedkina & Plotnikova 1979 (Fr)  
*foliatus* Bryant 1921 (Giv-Fr)  
*foliformis* Snigrieva 1975 (Eif)  
*folium* Ulrich & Bassler 1926 (Fa)  
*fornicatus* Ji & Xiong 1985 (LC)  
*fossilatum* Erina in Kim et al. 2008 (LEM), nom. nud.  
*linguiformis foveolatus* Phillip & Jackson 1967 (LEM)  
*dubius frons* Huddle 1981 (Fr)  
*furtivus* Xiong in Xian et al. 1980 (Giv)  
*gagievi* (Bardashev et al. 2002) (LEM)  
*communis gancaohuensis* Xia & Chen 2004 (LC)  
*gardenae* Staesche 1964 (Tr), type species of ***Foliella***  
*gediki* Luppold in Luppold et al. 1994 (LC)  
*geniculatus* Uyeno 1978 (Giv)  
*germanus* Ulrich & Bassler 1926 (Fa)  
*gigantea* Thomas 1949 (LC)  
*gilberti* Bardashev 1986 (Em)  
*gilklapperi* Mawson & Talent 1994 (UEm)  
*glaber* Ulrich & Bassler 1926 (Fa), = *glabra* nom. van.  
*gracilis* Klapper & Lane 1985 (Fr)  
*grandidentatus* Aristov 1988 (Fr)  
*granulosa* Branson & Mehl 1934 (Fa)  
*gravis* Erina in Kim et al. 2008 (Pr), nom. nud.  
*gronbergi* Klapper & Johnson 1985 (LEM)  
*guangxiensis* Wang & Ziegler 1983 (Eif)  
*guanwushanensis* Tian in Hou 1988 (Fr) [***Mesotaxis***]  
*guttiformis* Khalybadzha et al. 1991 (Fa)  
*gyratilineata* (Branson & Mehl 1934) (Fa)  
*hannibalensis* Youngquist & Patterson 1949 (LC)  
*hanshanensis* Xiong in Xian et al. 1980 (Eif/Giv)  
*hassi* Helms 1961 (Fa)  
*helmsi* Kuzmin 1992 (Fa)  
*hemiansatus* Bulyntck 1987 (Giv)  
*hemipennatus* Aboussalam 2003 (Giv)  
*hieroglyphica* Mawson & Talent 1997 (Fa)  
*hindai* Mashkova & Apekina 1980 (Pr)  
*holynensis* Vodrážková et al. 2011 (Eif)  
*homoirregularis* Ziegler 1971 (Fa)  
*housei* Aboussalam 2003 (Fr)  
*hulkus* Stauffer 1940 (Giv)  
*illistris* Kuzmin 2001 (Fr)  
*ilmensis* Zhuravlev 2003 (Fr)  
*impar* Luppold in Korn & Luppold 1987 (Fa)  
*imparilis* Klapper & Lane 1985 (Fr)

*inaequilateralis* Youngquist & Patterson 1949 (LC)  
*includens* Erina in Kim et al. 2008 (LEM), nom. nud.  
*incompleta* Uyeno 1967 (Fr)  
*incomptus* Vorontsova 1993 (Fa)  
*inconcinus* Kuzmin & Melnikova 1991 (Fa)  
*nodocostata incurva* Helms 1961 (Fa)  
*independens* Müller & Müller 1957 (Fr)  
*lobatus inflexus* Rhodes et al. 1969 (LC)  
*inflexus* Baranov 1990, unplaced **HOMONYM** (UEm)  
*inopinata* Youngquist & Patterson 1949 (LC)  
*inornata* Branson & Mehl 1934 (Fa?LC)  
*instabilis* (Kuzmin & Melnikova 1991) (Fa)  
*inversus* Klapper & Johnson 1975 (UEm)  
*iowaensis* Youngquist & Peterson 1947 (Fa)  
*irregularis* Cooper 1939 (LC)  
*irregularis* (Thomas 1949) secondary HOMONYM (Fa), = *homoirregularis*  
*itha* Cooper 1939 (LC) [***Pseudopolygnathus***]  
*izhmensis* Kuzmin 1998 (Fa)  
*jacksoni* (Bardashev et al. 2002) (LEM)  
*jalilovi* (Bardashev et al. 2004) (LC)  
*janetae* Druce 1976 (Fr)  
*japonicus* Hayashi 1968 (Tr), [***Epigondolella***]  
*jianghuaensis* (Ji 1987) (Fa)  
*johnsoni* (Bardashev et al. 2002) (LEM)  
*jorfensis* Aboussalam & Becker 2007 (Giv)  
*juverevi* Aksanova 1987 (LEM)  
*juvenis* Stauffer 1940 (Giv)  
*kadzielniae* Dzik 2006 (Fa)  
*karadjalis* Vorontsova & Kurmin 1984 (Fa)  
*costatus karapetovi* Bardashev 1990 (Eif)  
*kedensis* Rao & Yu 1985 (Fa)  
*kendalli* Johnson & Klapper 1981 (UEm)  
*kennettensis* Savage 1976 (Eif)  
*keregetasicus* Kuzmin 1992 (Fa)  
*khalybadzhai* (Bardashev et al. 2002) (LEM)  
*kimi* Mashkova & Apekina 1981 (UEm)  
*kirchgasseri* Klapper 2007 (Fr)  
*kitabicus* Yolkin et al. 1994 (Pr-LEM), type species of ***Ecostapolygnathus***  
*klapperianus* Ashouri 2006 (Fa)  
*kluepfeli* Wittekindt 1966 (Giv)  
*kockeliana* Bischoff & Ziegler 1957 (Eif), type species of **Tortodus**  
*linguiformis klapperi* Wittekindt 1966 (Giv)  
*klugi* Rogers 1998 (Giv)  
*komi* Kuzmin & Ovnatanova 1989 (Fr)  
*krestovnikovi* Ovnatanova 1969 (Fr)  
*krutoensis* Kirilishina & Kononova 2010 (Fr)  
*kuleensis* Erina 2008 nom. nud. [LC]  
*labiosus* Mawson 1987 (LEM)  
*lacinata* Huddle 1934 (LC)  
*lagowiensis* Helms & Wolska 1967 (Fa), type species of ***Lagovignathus***  
*lanceolata* Branson 1934 (LC)  
*lanceolus* Vorontsova 1993 (Fa)  
*lanei* Kuzmin 1995 (Fr)  
*lata* Wittekindt 1966 (Giv)  
*laticostatus* Klapper & Johnson 1975 (LEM)  
*latifossata* Wirth 1967 (Giv) [***Schmidtognathus***]  
*latisemicostatus* Johnston & Chatterton 2001 (Fa)  
*mehli latus* Johnston & Higgins 1981, unplaced **HOMONYM** (LC)  
*lauriformis* Dreesen & Dusar 1974 (Fa)  
*communis lectus* Kononova 1981 (LC)  
*lenticularis* Gagiev 1979 (Fa-LC)  
*lenzi* Klapper 1969 (LEM)  
*lepidus* Ji 1987 (Fa)  
*lidiae* (Bardashev et al. 2004) (LC)  
*limbatus* Matyja 1993 (Fa)  
*limitaris* Ziegler et al. 1976 (Giv)  
*linguiformis* Hinde 1879 (Eif-Giv), type species of ***Linguipolygnathus***  
*linguiformis* (Branson & Mehl 1934) (Fa), no homonym if ***Polylophodonta*** is kept separate  
*lingulatus* Ovnatanova 1976 (Fr)

- lita* Cooper 1939 (LC)  
*ljashenkoi* Kuzmin 1995 (Fr)  
*lobata* Branson & Mehl 1938 (LC)  
*lodinensis* Pölsler 1969 (Fr)  
*longipostica* Branson & Mehl 1934 (LC)  
*longiusculus* Capkinoglu 1997 (Fa)  
*longulus* Corradini & Spaletta in Corradini et al. 2003 (LC)  
*luciae* Martinez-Pérez & Valenzuela-Ríos 2011 (LEm)  
*macilenta* Kuzmin 1993 (Fr)  
*macra* Cooper 1939 (LC)  
*magidisi* Melnikova (Fa)\*  
*maizurensis* Ishiga 1984\*  
*makhlinae* Kirilishina & Kononova 2010 (Fr)  
*manuripiensis* Over in Over et al. 2009 (Giv-(Fr))  
*margaritatus* Schäfer 1976 (Fa)  
*marginata* Branson & Mehl 1934 (LC) [*Pseudopolygnathus*]  
*marginolutus* Gedik 1969 (Fa)  
*mariannae* (Bardashev et al. 2002) (UEm)  
*rhenanus marijae* Huddle 1981 (Giv)-(Fr)  
*martyanova* Vorontzova 1993 (Fa)  
*mashkovae* Bardashev 1986 (LEm)  
*labiosus mawsonae* Long & Burrett 1989 (LEm)  
*mawsonae* (Bardashev et al. 2002) secondary **HOMONYM** if  
*Ecostapolygnathus* is not accepted (LEm)  
*maximovae* Ovnatanova & Kononova 1996 (Fr)  
*glabra media* Helms & Wolska 1967 (Fa)  
*medicinelakensis* (Johnston & Chatterton 2001) (Fa)  
*mehli* Thompson 1967 (LC)  
*meijerdreesi* Johnston & Chatterton 2001 (Fa)  
*menneri* Kirilishina & JK Kononova 2010 (Fr)  
*mesacostalis* Youngquist et al. 1948 (Fr) [probably *Tortodus*]  
*mirabilis* Xiong in Xian et al. 1980 (Fr) [*Tortodus*]  
*mirificus* Ji & Ziegler 1993 (Fr)  
*millensis* Thomas 1949 (Fa)  
*monohumerus* Ji 1987 (LC)  
*morgani* Klapper & Lane 1985 (Fr)  
*mosquensis* Litvinova in Ovnatanova & Kononova 1996 (Fr)  
*linguiformis mucronata* Wittekindt 1966 (Giv)  
*mugodzaricus* Gagiev et al. in Barskov et al. 1987 (Fa-LC)  
*multilirata* Youngquist & Patterson 1949 (LC)  
*multinodosus* Youngquist & Miller 1948 (Fr)  
*mungoensis* Diebel 1956 (Tr), type species of *Sephardiella*  
*mutabilis* Khalymbadzha et al. 1991 (Fa)  
*najiaoensis* Xiong in Xian et al. 1980 (Eif)  
*aspelundi nanus* Savage 1992 (Fa)  
*nasutus* Hinde 1879 (Giv-Fr)  
*navicula* Hinde 1900 (LC) [*Cavusgnathus*]  
*neoserotinus* Bai in Bai et al. 1994 (Eif)  
*newalbanyensis* Huddle 1934 (LC) [*Siphonodella*  
*(Siphonodella)*]  
*nodocostatoides* Qin et al. 1988 (Fa)  
*nodocostata* Branson & Mehl 1934 (Fa), type species of  
**Polynodosus**  
*nodosa* Thomas 1949 (LC)  
*nodosarius* Ji & Xiong 1985 (LC)  
*nodomarginata* Branson 1934 (LC) [*Pseudopolygnathus*]  
*nodosiphonellus* Wang & Yin 1985  
*nodoundatus* Helms 1961 (Fa)  
*inornatus nodulatus* Druce 1969 (LC)  
*nodulifera* Branson 1934 (LC)  
*normalis* Miller & Youngquist 1947 (Fr)  
*norrisi* Uyeno 1967 (Giv-Fr), type-species of *Skeletognathus*  
*nothoperonus* Mawson 1987 (LEm)  
*obliquicostatus* Ziegler 1962 (Fa)  
*costatus oblongus* Weddige 1977 (Eif)  
*hanshanensis obovatus* Xiong in Xian et al. 1980 (UEm)  
*obruchevae* Kirilishina & Kononova 2010 (Fr)  
*obtecta* Branson & Mehl 1938 (LC)  
*algae* Ovnatanova & Kuzmin 1991 (Fr)  
*omala* Cooper 1939 (LC) [*Pseudopolygnathus*]  
*orbicularis* Aristov 1988 (Fr)  
*asymmetricus orchardi* Tian in Hou 1988 (Fr) [“*Klapperina*”]  
*ordinatus* Bryant 1921 (Giv-Fr)  
*orientalis* Gagiev et al. in Barskov et al. 1987 (Fa)  
*ormistoni* (Bardashev et al. 2002) (LEm)  
*ortha* Cooper 1939 (LC)  
*orthoconstricta* Thomas 1949 (LC)  
*orthoptera* (Ziegler 1958) (Fr) [*Avignathus*]  
*ousnodus* Cooper 1939 (LC) [*Pseudopolygnathus*]  
*asymmetricus ovalis* Ziegler & Klapper (Fr) [*Mesotaxis* s.l.]  
*nodocostata ovata* Helms 1961 (Fa)  
*ovatinodosus* Klapper et al. 1976 (Giv)  
*oviformis* (Kononova & Kim 2005) (Eif)  
*oxys* Cooper 1939 (LC) [*Pseudopolygnathus*]  
*communis ozbakensis* Weddige 1984 (Fa)  
*pachus* Cooper 1939 (LC)  
*xylus pacificus* Savage & Funai 1980 (Fr)  
*padovanii* Perri & Spaletta 1990 (Fa)  
*palmatus* Hinde 1879 (Fr), nom. dub.  
*pandoensis* Over in Over et al. 2009 (Giv/Fr)  
*pannonicoformis* Izokh et al. 2011 (Pr)  
*pannonicus* Mashkova & Apeksina 1980 (Pr)-(LEm)  
*papillata* Youngquist & Peterson 1947 (Fa)  
*paprothae* Bouckaert & Groessens 1976 (Fa)-(LC)  
*paradecoratus* Ji & Ziegler 1993 (Giv-Fr)  
*paraobliquicostatus* Johnston & Chatterton 2001(Fa)  
*parapetus* Druce 1969 (LC)  
*linguiformis parawebbi* Chatterton 1974 (Eif)  
*costatus partitus* Klapper 1971 (Eif)  
*costatus patulus* Klapper 1971 (UEm)  
*parvisculpis* Youngquist 1947 (Fr)  
*paucidentatus* Ji 1987 (Fa)  
*pawhuskensis* Harris & Hollingsworth 1933 (UC)  
[*Streptognathodus*]  
*pennatula* Ulrich & Bassler 1960 (Fa)  
*pennatuloidea* Holmes 1928 (Fa)  
*pennatus* Hinde 1879 (Giv-Fr)  
*peracutus* Bryant 1921 (Giv) [*Schmidtognathus*]  
*perbonus* (Phillip 1966) (LEm)  
*percarinatus* Youngquist 1947 (Fr)  
*pergyratus* Holmes 1926 (Fa), type species of *Polylophodonta*  
*permarginata* Branson 1934 (LC)  
*perplana* Branson 1934 (LC)  
*perplexa* Thomas 1949 (Fa)  
*persulcata* Youngquist et al. 1948 (Fr)  
*philipi* (Bardashev et al. 2002) (LEm)  
*pierrei* (Bardashev et al. 2002) (LEm)  
*linguiformis pinguis* Weddige 1977 (Eif)  
*pirenae* Boersma 1974 (Pr), type species of *Eoctenopolygnathus*  
*pizhensis* Kuzmin 2001 (Fr)  
*pjatakovae* Khalymbadzha et al. 1991 (Fa)  
*planarius* Klapper & Lane 1985 (Fr)  
*planirostratus* Dreesen & Dusar 1974 (Fa)  
*plana* Huddle 1934 (LC) [*Siphonodella*]  
*poleucus* Strelchenko 2000 (Fa)  
*polinae* (Bardashev et al. 2002) (LEm)  
*politus* Ovnatanova 1969 (Fr)  
*pollocki* Druce 1976 (Fr)  
*pomeranicus* Matyja 1993 (Fa)  
*communis porcatus* Ni 1984 (LC)  
*porcillus* Stauffer 1940 (Giv)  
*orrectus* Vorontzova & Kuzmin 1984 (Fa)  
*postibrevicornis* Youngquist & Peterson 1947 (Fa)  
*posterus* Kuzmin 1985 (Fr)  
*praecursor* Matyja 1993 (Fa)  
*praehassi* Schäfer 1976 (Fa)  
*praepolitus* Kononova et al. 1996 (Fr)  
*praestyriacus* Khalymbadzha et al. 1991 (Fa)  
*praetrigonicus* Bardashev 1992 (Eif)  
*praetrigonicus* Savage 1995 HOMONYM (Eif), = *bagialensis*  
nom. nov.  
*lacinatus prelobatus* Rhodes et al. 1969 (LC)  
*princeps* Hinde 1879 (Giv/(Fr), ramiform element  
*communis procerus* Sannemann 1955 (Fa)  
*proprius* Kononova & Pistshikova 1984 (LC)  
*protostyriacus* Tragelehn & Hartenfels 2011 (Fa)  
*provincialis* Melnikova & Kuzmin 1994 (Fa)  
*pseudobrevilaminus* Vorontzova 1993 (Fa)  
*pseudoefilius* Walliser & Bultynck 2011 (Eif-Giv)  
*pseudofoliatus* Wittekindt 1966 (Eif-Giv)  
*pseudoserotinus* Mawson 1987 (LEm)  
*pseudostrigatus* Dreesen & Dusar (Fa)

- pseudotenellus* Hartenfels 2011 (Fa)  
*pseudoxylus* Kononova et al. 1996 (Fr)  
*pugunculus* Mawson 1987 (UEm)  
*punctatus* Hinde 1879 (Fr) [*Palmatolepis*]  
*pupus* Wang & Wang 1978 (LC)  
*pura pura* Voges 1959 (LC)  
*pusillus* Corradini & Spaletta in Corradini et al. 2003 (LC)  
*qinjiensis* Xiong in Xian et al. 1980 (MD)  
*quadratus* Klapper et al. 1978 (Eif)  
*communis quadratus* Wang 1989, unplaced **HOMONYM** (LC)  
*radina* Cooper 1939 (LC)  
*radiotoplicata* Youngquist & Patterson 1949 (LC)  
*ramoni* Martinez-Pérez 2010 nom. nud. (Pr-LEm)  
*rarus* Balisnki 1995 (Fa)  
*ratebi* Yazdi 1999 (Fa)  
*rechitsensis* Strelchenko 2000 (Fa)  
*reimersi* Kuzmin 2001 (Fr)  
*reitlingerae* Ovnatanova & Kononova 2008 (Fr)  
*communis renatae* Corradini & Spaletta in Corradini et al. 2003 (LC)  
*restrictus* Vorontzova 1993 (Fa)  
*retroversa* Youngquist & Peterson 1947 (Fa)  
*rhabdotus* Schäfer 1976 (Fa)  
*rhenanus* Klapper et al. 1976 (Giv)  
*rhomboideus* Ulrich & Bassler 1926 (Fa)  
*richi* (Bardashev et al. 2002) (LEm)  
*rimulata* Ulrich & Bassler 1934 (Giv)  
*robertensis* Vodrážková et al. 2011 (Eif)  
*robusticostatus* Bischoff & Ziegler 1957 (Eif)  
*robustus* Klapper & Lane 1985 (Fr)  
*rosae* Martínez-Pérez et al. 2010 (LEm)  
*rossicus* Zhuravlev 2000 (Fr), type species of *Youngquistognathus*  
*rostratus* Rhodes et al. 1969 (LC)  
*rotundilobus* Bryant 1921 (Fr) [*Ancyrodella*]  
*rudkinensis* Ovnatanova & Kononova 1996 (Fr)  
*rugicosta* Miller & Youngquist 1947 (Fr) [*Tortodus*]  
*rugosus* Huddle 1934 (Giv)  
*rugosa* (Branson & Mehl 1934) (Fa), no homonym if kept in *Polylophodonta*  
*rukhenensis* Stritzke 1992 (Fr)  
*saevas* Aboussalam & Becker 2007 (Fr)  
*dengleri sagitta* Aboussalam & Becker 2007 (Giv-Fr)  
*sagittaria* Youngquist & Patterson 1949 (LC)  
*salixensis* Vodrážková et al. 2011 (Eif)  
*samueli* Klapper & Lane 1985 (Fr)  
*sanduskiensis* Stauffer 1938 (Giv)  
*sardarensis* Gholamalian et al. 2009 (Fa)  
*sariangensis* Savage et al. 2007 (Fa)  
*savagei* (Bardashev et al. 2002) (LEm)  
*scapha* Huddle 1934 (LC)  
*schinkaryovi* Gatovsky 2010 (Fa)  
*schenkiae* (Bardashev et al. 2002) (UEm)  
*schwartzii* Chatterton 1978 (Eif/Giv)  
*scitulus* Hinde 1900 (LC) [*Synclydognathus*]  
*scobiniformis* Branson 1934 (LC)  
*sculptilis* Kuzmin 2001 (Fr)  
*cooperi secus* Klapper et al. 1978 (Eif)  
*seddoni* Druce 1976 (Fr)  
*semicostata* Branson & Mehl 1934 (Fa)  
*semidictyus* Ji 1987 (LC)  
*seminudus* Kuzmin 1992 (Fa)  
*semismoothi* Zhao & Zuo 1983 (Fa), incorrect etymology (the genitive form of an adjective is grammatically wrong and in conflict with Article 11.9.1 of the Code), = *semismoothus* nom. corr. (in accord with Article 31.2); the name is in conflict with recommendation 11A (use of native languages) but probably saved by Article 11.3.  
*timorensis semitimorensis* Drygant 1986 (Giv)  
*senckenbergi* (Bardashev et al. 2002) (LEm)  
*seraphinae* Ovnatanova & Kononova 1996 (Fr)  
*foveolatus serotinus* Telford 1975 (UEm)  
*serpagliae* Corradini 1998 (Fa)  
*serratus* Hinde 1879 (Giv/Fr) [*Palmatolepis*]  
*sevai* (Bardashev et al. 2002) (UEm)  
*communis shangmiaobeiensis* Qin et al. 1988 (Fa)  
*shani* Bai in Bai et al. 1994 (LC)
- sheffieldensis* Youngquist & Peterson 1947 (Fa)  
*signata* Huddle 1934 (Giv)  
*simplex* Hinde 1879 (Giv/Fr)  
*sinelamina* Branson & Mehl 1934 (Fa) [= *Ancyrognathus*]  
*sinuosus* Sculcewski 1971 (Fr)  
*siphonellus* Druce 1969 (LC)  
*siratchoicus* Ovnatanova & Kuzmin 1992 (Fr)  
*smoothi* Zhao & Zuo 1983 (Fr), incorrect etymology (see comments on *semismoothi*), = *smoothus* nom. corr.  
*snigirevae* (Bardashev et al. 2002) (Eif)  
*sobolevi* (Bardashev et al. 2002) (Pr/LEm)  
*costatus sogdianensis* Bardashev 1990 (Eif)  
*sokolovi* Yolkin et al. 1994 (Pr)  
*solidus* Hinde 1879 (Giv/Fr), ramiform element  
*elegantulus sparus* Savage 1992 (Fa)  
*sparus* Kuzmin 2001, unplaced **HOMONYM** (Fr)  
*spatulata* Youngquist 1947 (Fr)  
*spicata* Branson 1934 (LC)  
*spiculiferus* Hartenfels 2011 (Fa)  
*spinatus* Hadding 1913 (Ord), type species of *Spinodus*  
*spinulosa* Youngquist 1947 (Fr)  
*squalidus* Drygant 1986 (Fa)  
*stadleri* Ziegler & Leuteritz in Koch et al. 1970 (Fa)  
*stainbrooki* Downs & Youngquist 1950 (Giv)  
*streeti* Dreessen et al. 1976 (Fa), type species of *Immognathus*  
*strictus* Kuzmin & Yurtchenkova 1989 (Fr)  
*strongi* Stauffer 1938 (Giv)  
*communis stylensis* Lipnyagov 1978 (LC)  
*styriaca* Ziegler in Flügel & Ziegler 1957 (Fa)  
*subapertus* Drygant 1986 (Fa)  
*subincompletus* Ovnatanova & Kononova 1996 (Fr)  
*subinornatus* Strelchenko 2000 (Fa)  
*subirregularis* Sandberg & Ziegler 1979 (Fa)  
*sublatus* Ulrich & Bassler 1926 (Fa)  
*subnormalis* Vorontzova & Kuzmin 1984 (Fa)  
*pura subplana* Voges 1959 (LC)  
*subradinus* Pazukhin in Pazukhin et al. nom. nud. (Fa)  
*subserratata* Branson & Mehl 1934 (Fa)  
*subsymmetricus* Wang & Wang 1978 (Fa)  
*subtortilis* Youngquist & Patterson 1949 (LC)  
*sudeticus* (Dzik 1997) (LC)  
*sulcata* Huddle 1934 (LC) [*Siphonodella (Eosiphonodella)*]  
*suroides* Cooper 1939 (LC) [*Pseudopolygnathus*]  
*symmetrica* Branson 1934 (LC)  
*symmetrica* Cooper 1939, unplaced **HOMONYM** (LC)  
*szulczewskii* Matyja 1974 (Fa)  
*tabasianus* Gholamalian 2007 (Fa)  
*taffi* Roundy 1926 (LC)  
*tafilensis* Aboussalam & Becker 2007 (Giv)  
*talapicus* Khalymbadzha et al. 1991 (Fa)  
*talassicus* Nigmadzhanov 1986 (LC)  
*talenti* (Bardashev et al. 2002) (LEm)  
*taljaschenkoae* (Kononova & Kim 2005) (Eif)  
*tamarae* Apekinæ 1989 (Pr)  
*tedi* Uyeno & Wendte 2005 (Fr) [= *Tortodus*]  
*telfordi* (Bardashev et al. 2002) (LEm)  
*tenellus* Ji & Ziegler 1993 (Fr-Fa)  
*tenuiserratus* Corradini & Spaletta in Corradini et al. 2003 (LC)  
*tethydis* Huckriede 1958 (Tr), type species of *Gladigondolella*  
*texanus* Roundy 1926 (LC) [*Gnathodus*]  
*thomasi* Druce 1969 (LC)  
*tichonovitchi* Kuzmin & Melnikova 1991 (Fa)  
*tigrinus* Kuzmin & Melnikova 1991 (Fa)  
*timanicus* Ovnatanova 1969 (Fr)  
*timofeevae* (Bardashev et al. 2002) (UEm)  
*timorenensis* Klapper et al. 1970 (Giv)  
*tinus* Pazukhin 1988 (Fa)  
*tomi* (Bardashev et al. 2002) (L/UEm)  
*torosus* Ovnatanova & Kononova 1996 (Fr)  
*totensis* Snigrieva 1975 (Eif)  
*toxophora* Cooper 1939 (LC)  
*asymmetricus trachytus* Tian in Hou 1988 (Fr)  
[= *Klapperina*]/*Mesotaxis*  
*transitus* (Dzik 2006) (Fa)  
*linguiformis transversa* Wittekindt 1966 (Giv)  
*triangularis* Branson & Mehl 1934 (LC)

- trigonicus* Bischoff & Ziegler 1957 (Eif)  
*trilinearis* (Cooper 1973) (Pr)  
*trilobatus* Holmes 1928 (Fa)  
*triphyllatus* (Ziegler 1960) (Fa)  
*tritus* Kumin 1998 (Fa)  
*truncata* Hinde 1879 (Fr)  
*tschatkalicus* Nigmazhanov 1986 (LC)  
*tuberculatus* Hinde 1879 (Giv-Fr)  
*uchensis* Ovanatova & Kuzmin 1991 (Fr)  
*undulosa* Youngquist & Patterson 1949 (LC)  
*unicornis* Müller & Müller 1957 (Fr)  
*asymmetricus unilabius* Huddle 1981 (Fr) [“*Mesotaxis*”]  
*uralbaiensis* Vorontzova 1993 (Fa)  
*uyenoi* Bardashev 1992 (Fr)  
*vachiki* Gholamalian 2007 (Fa)  
*vagus* Pazukhin 1988 (Fa)  
*valentinae* Kuzmin 1990 (Fa)  
*varcus* Stauffer 1940 (Giv)  
*variabilis* Bischoff & Ziegler 1957 (Giv) [*Tortodus*]  
*varinodosa* Branson & Mehl 1934 (Fa)  
*verrucosa* Youngquist & Peterson 1947 (Fa)  
*versatilis* Klyza 1995 (Eif)  
*vetus* (Vorontzova 1993) (Fa)  
*inornatus vexatus* Rhodes et al. 1969 (LC)  
*vialovi* Zvereva 1986 (Fr)  
*purus vicinus* Xiong in Xiong & Chen 1983 (LC)  
*vigierei* Bultynck 1989 (LEM)  
*villasalti* Corradini 1990 (Fa) OK  
*vogesi* Ziegler 1962 (Fa-LC)  
*volhynicus* Drygant 1986 (Fa)  
*volodymyrensis* Drygant 1986 (Fa)  
*sinuosus wadleighensis* Savage 1987 (Fr), type species of  
***Uyenognathus***  
*wangi* (Bardashev et al. 2002) (UEm)  
*wapanuckensis* Harlton 1933 (UC) [*Neognathodus*]  
*webbi* Stauffer 1928 (Fr)  
*linguiformis weddigei* Wittekindt 1966 (Giv)  
*willii* Bardashev 1990 (Eif)  
*wilsoni* James 1884 (Ord), different genus  
*wugongensis* Zuo 1982\* (Fa)  
*wyatti* Mawson & Talent 1997 (Fa)  
*wyomingensis* Klapper 1966 (Fa)  
*xianiensis* (Xiong in Xian et al. 1980) (Giv)  
*xylus* Stauffer 1940 (Giv)-(Fr)  
*xyncha* Cooper 1939 (LC) [*Pseudopolygnathus*]  
*yaranicus* Kuzmin 2011 (Fr)  
*yazdii* Gholamalian et al. 2009 (Fa)  
*yohi* Bai in Bai et al. 1994 (LC)  
*yolkini yoklini* (Bardashev et al. 2002) (LEM)  
*trilinearis zeravshanicus* (Bardashev & Ziegler 1992) (Pr)  
*zieglerianus* Weddige 1977 (Eif)  
*zikmundovae* Zhuravlev 1991 (LC)  
*zinaiidae* Kononova et al. 1996 (Fr)  
*znepolensis* Spassov 1965 (Fa)

### Taxonomic Consequences

This extensive list documents how almost impossible it has become to handle *Polygnathus* s.l. When new species are described, comparisons are just made with taxa from the same stratigraphic interval, sometimes only from the same region. Homoeomorphy with earlier and later species is hardly mentioned, especially between Devonian and Carboniferous forms. The fact that the current practice works indicates the presence of distinctive groups within specific time intervals that can be used to subdivide the “mega-genus”. In other fossil groups, especially in other “volatile clades” (e.g., ammonoids, trilobites, brachiopods), genera frequently include a few to some dozens of species. Larger genera are regularly subdivided according to

the recognition of supposedly monophyletic morphological and phylogenetic trends. Iterative evolution, the repetition of the same or very similar morphological innovations at different times, is not seen as an obstacle to use morphological features for taxon diagnosis.

After sorting out the species that clearly belong to other genera, some from the Ordovician or Triassic, there are still close to 600 names in the *Polygnathus* list. The current taxonomic status of *Polygnathus* in many publications resembles that of *Goniatites*, *Clymenia*, *Phacops* or *Spirifer* at the end of the 19<sup>th</sup> century. Even if 1/3 of the named species or subspecies are regarded as subjective synonyms, subdivision of *Polygnathus* into 20 genera, as a theoretical example, would leave an average of 20 valid taxa per genus – not a case of oversplitting in other fossil groups. The numerous additional species currently left in open nomenclature are not even considered. A still widely lacking morphometric approach to faunas from different regions and strata is also bound to further increase the species/subspecies number. In other words, many (perhaps the ones marked in the list in bold) of the genera previously proposed for some polygnathid groups have the potential to become very useful.

But what is the benefit of such a subdivision? The creation of names is not science in itself. The question comes down to the general justification for any taxa and systematics above the species level. The main reason to combine fossil species in genera, families etc. is to outline and mark (name) morphological and evolutionary units (species flocks and lineages) that have specific distributions in time and space. Taxonomy and systematics above the species-level provide the essential transparency to morphological knowledge that is inferred to reflect evolution. Sometimes this can be proven by intermediates and gradual changes with time. Genera have to be monophyletic evolutionary units and should not be agglomerates of morphologically similar but partly unrelated forms. Likely cases for the latter are *Ctenopolygnathus* sensu MÜLLER & MÜLLER (1957) and BARDASHEV et al. (2002) or, outside the polygnathids, *Pandorinellina* and *Pelekysgnathus*, in their current content.

A main objection against a *Polygnathus* subdivision comes from the argument that conodont genera should be based on their apparatus morphology, which is unknown in the majority of the listed species. JOHNSTON & CHATTERTON (2001), for example, rejected *Neopolygnathus* and *Polynodosus* because members of both share the principal apparatus characteristics with *Polygnathus*. However, there are widely accepted Devonian genera with unknown or (so far) indistinctive apparatus (e.g., *Schmidtognathus*, *Pseudopolygnathus*, *Siphonodella*, *Klapperina*) whilst some polygnathid genera with very distinctive non Pa elements (e.g., *Avignathus*, which includes *Po*,

*decorosus* s. str., and *Uyenognathus*) are not (yet) widely accepted. The current polygnathid taxonomy is strongly inconsistent. Pragian and lower Emsian forms with extensive basal cavities would not be tolerated in *Polygnathus* in the Givetian to Lower Carboniferous (see discussion in BECKER & ABOUSSALAM 2011). *Polylophodonta* is widely recognized but only distinguished from the *Po. nodocostata* Group (= *Polygnathus*) by its concentric ornament on the posterior platform of the Pa. However, a trend to similar sculpture existed independently in older forms assigned to *Po. etremae* (KLAPPER & LANE 1985) and, later, even in some *Siphonodella* (*S.* cf. *sandbergi* in BARDASHEVA et al. 2004).

Extinct genera can be based on any morphological characters, as long as their variability and ontogeny within strata are taken into account. Thousands of polygnathid-rich samples from different levels did not yield unusual or distinctive ramiform elements. This and the comments by JOHNSTON & CHATTERTON (2001) mentioned above suggests that many or even most of the hundreds of different polygnathid species share the same principal apparatus. Some groups will have small modifications of specific elements, as suggested for *Immognathus* and *Lagovignathus* by Dzik (2006). But there will be iterative evolution in all elements, not just in the Pa's, and there is little hope that statistical apparatus reconstructions of the prevailing multi-species assemblages will become unequivocal.

MAWSON & TALENT (2003) gave examples of other species-rich genera that defied subdivision. However, these are hardly positive examples. Rather they are annoying exceptions for evolutionary biologists. In the polygnathids there are sufficient, although recurrent, changes in the basal cavity/pit, shape, size and ornament of Pa elements. These can be used for the definition of genera/subgenera that are characteristic for specific time intervals. For example, there are at least six parallel species groups/genera with different morphology and palaeoecology (conodont biofacies distribution) in the Givetian: the *varcus* Group, the *linguiformis* Group (= *Linguipolygnathus*), the *pseudofoliatus-dubius* Group (*Polygnathus* s. str.), *Po. alveoliposticus*, the *cristatus-limitaris* Group, and the *angustidiscus* Group (= *Ctenopolygnathus* s. str.). The acceptance of *Linguipolygnathus* implicates to treat the homoemorphic Frasnian (*Po. brevis-brevicarina* Group) and Famennian groups (*Po. semicostatus* Group) in a similar way. Such distinctions would provide some clarity in the jungle of contemporaneous taxa. It also has the potential to improve conodont biofacies analysis. It may stop the widespread lumping of polygnathid groups that characterize very different settings in too simple generic counts.

## Summary

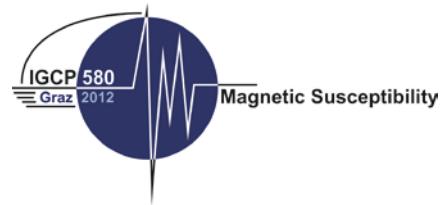
A case is made for the evolutionary and stratigraphically meaningful break-up of the “megagenus” *Polygnathus*. Its taxonomy has to become more consistent and should recognize and clearly express homoemorphic trends. The subdivision according to apparatus differences has the first priority but since this is unlikely to be helpful in many/most species, genera/subgenera can also be defined by the basal pit, shape, size and ornament of the Pa element. However, the intraspecific variability and ontogenetic change of these features have to be taken into account.

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## DEVONIAN MEETINGS

**IGCP 580: Magnetic Susceptibility and  
Gamma-Ray Spectrometry through time**  
**Graz, Austria; 24-30<sup>th</sup> June 2012**



### 4<sup>th</sup> Annual Meeting

### 1<sup>st</sup> Circular

#### Venue

Within the frame of the 4<sup>th</sup> Annual Meeting of IGCP 580, we intend to bring together scientists that apply geophysical methods working on different time slices. Knowledge of problems appearing through the entire data-gaining-procedure (from application to interpretation) of Magnetic Susceptibility (MS) & Gamma-Ray Spectrometry (GRS) signals and possible ways how to deal with them is one of the major tasks of this meeting. In addition, we also invite participants of other disciplines in natural sciences to enhance the discussion with contributions regarding progress in environmental sciences and other areas.

On behalf of the IGCP 580 leaders and the on-site organizing committee, we are looking forward to see many of you in Graz!

#### Organization

This conference is organized by Thomas Suttner, Erika Kido, Werner Piller (Institute for Earth Sciences of the University of Graz c/o CPSA, Austrian Academy of Sciences, Austria), Anne-Christine da Silva (Department of Geology, Sedimentary Petrology of Liège University, Belgium) and Carlo Corradini (Dipartimento di Scienze della Terra of Università di Cagliari, Italy). For any questions please contact us via the official email address: [igcp@uni-graz.at](mailto:igcp@uni-graz.at)

#### Deadlines

Registration (and payment): **1<sup>st</sup> March 2012**

Abstract submission: **1<sup>st</sup> March 2012**

#### General Program

Sun, 24<sup>th</sup> June: Ice breaker party (Institute for Earth Sciences, University of Graz)

Mon, 25<sup>th</sup> June: Registration; Conference Sessions 1 (Talk & Poster)

Tue, 26<sup>th</sup> June: Conference Sessions 2 (Talk & Poster)

Wed, 27<sup>th</sup> June: Social Day & Conference Dinner

Thu, 28<sup>th</sup> - Sat, 30<sup>th</sup> June: Carnic Alps Field-Workshop (departing from Graz)

Sun, 1<sup>st</sup> July: Departure day (arrival back in Graz from Field-Workshop: Saturday approx. 20-21p.m.)

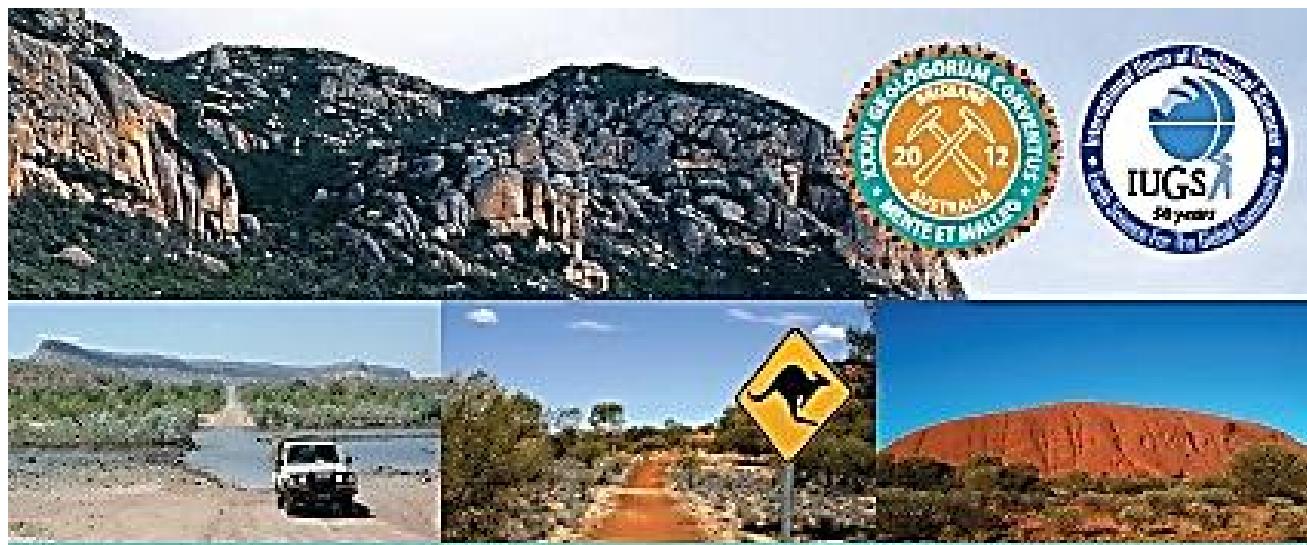
#### Carnic Alps Field-Workshop

During the second half of the meeting a field-workshop in the Carnic Alps is planned (the trip is limited to max. 25 participants). The first day of the workshop will be more a kind of geo-touristic site hopping in the area where finally we will have the true field work, while the second day is regarded as full working day, where the entire group will take samples for MS and produce GRS-logs. – More detailed information on the localities (stratigraphic age, depositional environment etc.) will be provided in the second circular. [Only in case of worst weather conditions in the Carnic Alps, the schedule for the trip will be changed and we will run an alternative program: e.g. Graz Paleozoic.]

#### Further Information

IGCP 580 home-page: <http://www2.ulg.ac.be/geolsed/MS/>

web-page: <http://erdwissenschaften.uni-graz.at/aktuelles/veranstaltungen/igcp580/>



# 34<sup>th</sup> International Geological Congress (IGC)

## Unearthing Our Past And Future – Resourcing Tomorrow

Brisbane Convention and Exhibition Centre  
Queensland, Australia  
5 - 10 August, 2012

[www.34igc.org](http://www.34igc.org)



The 34th IGC is supported by the member societies of the Australian Geoscience Council



### MAJOR SPONSORS AND CONTRIBUTORS



## **34<sup>th</sup> INTERNATIONAL GEOLOGICAL CONGRESS, 5-10 August 2012 - Brisbane (Australia)**

SDS will hold its Annual Business Meeting at Brisbane. After the meeting the term for the new SDS Officers and TMs will begin.

A joint symposium of IGCP 596 together with IGCP 580 will also be held. Below you will find the session synopsis. We hope that several colleagues will join this meeting. For further information please contact Peter KÖNIGSHOF: (peter.koenigshof@senckenberg.de)

### **Symposia**

#### **35.6 International Subcommission on Devonian stratigraphy: The Devonian of Asia and Australia**

**Coordinator: R. Thomas BECKER**

#### **Theme 3. Climate Change: Lessons from the Past; Implications for the Future**

Coordinators: Chris HOLLIS (c.hollis@gns.cri.nz, New Zealand) and Michael BIRD (Australia)

The geological record offers unique insights into understanding the multiple drivers and diverse consequences of climate change. Abrupt and rapid climatic changes in the past provide valuable analogues for future potential changes, and can be used to explore the veracity of climate models. We are interested in contributions addressing climate model-palaeoclimate data comparisons, climate sensitivity, ocean acidification, carbon cycle dynamics, geosphere-biosphere feedbacks, climate variability in a warmer world, multi-proxy approaches to climate-temperature-hydrology reconstructions, and polar ice sheets and sea-level change. Contributions from other important areas of palaeoclimate research such as climate and tectonics are also welcome.

#### **3.8. Climate change and biodiversity patterns in the Mid-Palaeozoic (Early Devonian to Early Carboniferous) [IGCP 596]**

The Mid-Paleozoic conforms to a time interval of dynamic long-term climate change. A rapid rise of land plants during the Middle Devonian which was coupled with strongly decreasing atmospheric CO<sub>2</sub> values during the latest Devonian was followed by a complete reorganisation of ecosystems with tremendous consequences for marine communities at global scales. We are interested in contributions related to refinement of taxonomic identification and the increase in documentation of all fossil groups indicating terrestrial, neritic and pelagic marine environments during the Mid-Palaeozoic for a better understanding of evolutionary trends in biodiversity during that time interval.

### *Keynote speakers:*

Wolfgang KISSLING (Germany), Anne-Christine DA SILVA (Belgium) and Carlton BRETT (United States)

#### **23.2 John Talent Symposium: Palaeozoic biofacies, biogeography and bioevents**

Coordinators: Ian PERCIVAL (Australia), Tony WRIGHT (Australia) and SHI Guang (Australia)

John TALENT was the first president of the International Palaeontological Association and this Symposium celebrates the breadth of his extensive palaeontological contributions. These extend from the Ordovician to Carboniferous and papers covering this broad interval are welcome.

### **Important dates:**

**17 February 2012:** Abstract Submissions

**30 March 2012:**

Formal notification to authors of the success or otherwise of their abstract/s

**30 April 2012**

Presenting authors of abstracts (oral and poster) accepted for presentation at the 34th IGC must register for the congress and pay their registration fees by this date. Presenting authors not registered and paid by this date will have their papers removed from the program and proceedings publication.

**web-page:** <http://www.34igc.org/>

#### **100<sup>th</sup> ANNIVERSARY OF THE GERMAN PALAENTOLOGICAL SOCIETY, 24-29.09.2012, BERLIN (GERMANY)**

#### **JAHRESTAGUNG ZUM 100 JÄHRIGEN BESTEHEN DER PALÄONTOLOGISCHEN GESELLSCHAFT**

Within the frame of the annual meeting of the German Palaeontological Society (100<sup>th</sup> anniversary) an IGCP 596 session will be organized (Session synopsis below). Symposium language is English.

#### **Symposium on Mid-Paleozoic Biodiversity Patterns (IGCP 596)**

During the Mid-Palaeozoic the development of organisms on land started a new chapter in the history of life. Except for the rapid rise of land-plants, tetrapods started to invade terrestrial habitats. The unique biodiversification on land during the Devonian, probably lead to sudden

changes in environmental conditions (e.g. drawdown of  $p\text{CO}_2$ , formation of soil) which resulted in a complete re-organisation of ecosystems globally.

In this symposium we intend to discuss about all kinds of different fossil groups (based on modern taxonomy & statistical analyses) to figure out if there existed distinctive trends in biodiversity patterns of climate sensitive compared with non-climate sensitive marine and terrestrial groups during Devonian to Carboniferous times.

web-page: <http://www.palges.de/tagungen/100-jahre-pal-ges-2012.html>

For further information please contact Peter KÖNIGSHOF: peter.koenigshof@senckenberg.de or Thomas SUTTNER: thomas.suttner@uni-graz.at

## FIRST CIRCULAR

International Subcommission on Devonian Stratigraphy (SDS)  
 IGCP 596 on “Climate Change and Biodiversity patterns in the Mid-Paleozoic”  
 Institut Scientifique, University Mohammed V – Agdal, Rabat

### International Field Symposium

#### “The Devonian and Lower Carboniferous of northern Gondwana”

in memory of Dr. Volker EBBIGHAUSEN

25<sup>th</sup> March to 1<sup>st</sup> April, 2013



An international meeting hosted by SDS, IGCP 596, the Institut Scientifique, Rabat, and the D/C Boundary Task Group will take place in the Tafilalt/Maider areas (eastern Anti-Atlas, Morocco) in late March and early April of 2013. It is devoted to the richly fossiliferous Devonian and Lower Carboniferous of the region, with some focus on the boundary between both systems. The weather in March will be ca. 25-30° C during the day. The field symposium will come as a complete package of conference fees, accommodation, food and field transportation (4-wheel drive).

**Organization**

Institute Scientifique, University Mohammed V, Agdal, Rabat, Morocco

Institute of Geology and Palaeontology, Westphalian Wilhelms University Münster, Germany

UNESCO IGCP 596 on "Climate Change and Biodiversity patterns in the Mid-Paleozoic"

IUGS, International Subcommission on Devonian Stratigraphy (SDS)

Task Group Devonian-Carboniferous Boundary

**Co-Sponsors**

Hassan II Academy of Sciences and Technology, Morocco

UNESCO Young Scientist Initiative Program

**Organizing Committee**

Prof. Dr. A. EL HASSANI Institute Scientifique, Rabat

Prof. Dr. A. TAHIRI Institute Scientifique, Rabat

Prof. Dr. R. T. BECKER WWU Münster, Germany

Prof. Dr. L. BAIDDER University Hassan II, Casablanca

Dr. P. KÖNIGSHOF Senckenberg Forschungsinstitute und Naturkundemuseum, Frankfurt

Dr. habil. D. KORN Museum für Naturkunde, Humboldt University, Berlin

Dr. Z. S. Aboussalam WWU Münster, Germany

Dr. M. ARETZ Université Paul Sabatier, Toulouse

**Symposium Topics:**

A – The impact of Mid-Paleozoic climate on evolution and palaeodiversity

B – Devonian chronostratigraphy – revisions, updates and regional correlations

C – The Devonian and Lower Carboniferous of North Africa

D – Open Session (Devonian/Lower Carboniferous)

**Venue and Program**

Current plans are to hold a one-day meeting with talks and poster contributions in a hotel of the Tafilalt area (NE Anti-Atlas, southern Morocco), where participants will be housed. The talks will be embedded in field trips to the Devonian and Lower Carboniferous of the Tafilalt and Maider. Additional talks, the Annual Business Meeting of SDS, and discussion rounds of IGCP 596 and the D/C Boundary Task Group will take place in the evenings. It is planned to show sections that have not been demonstrated during previous meetings and excursions. They will include:

1. A complete traverse through the Devonian, from the top Silurian to the uppermost Famennian
2. A sequence of Lower Carboniferous outcrops
3. Devonian/Carboniferous boundary sections of different facies settings
4. Sections with a focus on the climatically induced/influenced Devonian event succession

Accepted oral contributions will be 20 minutes (including discussion time). The conference room will be equipped for PowerPoint presentations and will have an overhead projector. Conference language is English. Poster presentations are encouraged in order to keep a tight schedule. Special time for poster presentation will be provided. Depending on the interest of participants, there is the option, on the way to Rabat, for an additional post-meeting excursion to the Devonian/Carboniferous of the Moroccan Meseta.

**Preliminary Itinerary****Day 1: Arrival**

Arrival at Ouarzazate, stay there for the night. There are cheap daily morning flights from Agadir and evening flights from Casablanca International Airport. As an alternative you can use the Lexus buses leaving from Agadir, Marrakesch, Fes, or Rabat.

**Day 2: The boundary between stable and Variscan Gondwana**

*Guides: R. T. Becker (with data from Münster research students) and L. Baidder*

- Drive from Ouarzazate towards the Tinerhir region.
- Examination of the southern margin of the Variscan orogenic front S of Jebel Tisdafine, with reworked fossiliferous Lower to Middle Devonian re-deposited in Viséan conglomerates/breccias or olistolites.
- Drive to the Tindjad region, with examination of the autochthonous Devonian at Oued Ferkla.
- Drive in the late afternoon to the Tafilalt area.
- Welcome reception at a hotel of the Tafilalt region (still to be selected).

**Day 3: Overview of the Devonian at the western margin of the Tafilalt Basin**

*Guides: R. T. Becker, A. El Hassani and L. Baidder*

Complete Devonian traverse at El Khraouia in the NE corner of the Amessouï Syncline (southern Tafilalt). The section ranges from the basal Lochkovian *Scyphocrinites* Limestone to the argillaceous upper/uppermost Famennian with clymeniids. Some focus lies on the Pragian-Emsian transition, the Eifelian change from stable platform to turbiditic basin, Kacak, *pumilio* and Taghanic Events, and the Frasnian-Famennian boundary interval in a thick basinal setting.

**Day 4: Symposium**

Morning and afternoon: Oral and poster presentations in the hotel

Evening: **SDS Business Meeting**

**Day 5: Devonian to Lower Carboniferous of the Amessouï Syncline (southern Tafilalt Plattform)**

*Guides: Z. S. Aboussalam, R. T. Becker, S. Hartenfels, D. Korn, J. Bockwinkel,*

- Middle to Upper Devonian at Oum el Jerane, with some focus on coral biostromes, the Taghanic Event in a neritic setting, Upper Givetian goniatite shales, shallow-water Frasnian and lower Famennian, and the Dasberg Event.
- The Devonian-Carboniferous transition at El Atrous, starting in the middle Famennian, with thick topmost Devonian siliciclastics, partly with brachiopods, and ending with deep-water Middle Tournaisian shales.
- Famennian of the Jebel Ouaoufilal region (eastern Amessouï Syncline), with isolated slabs of the *Annulata* Event interval, very rich ammonoid fauna of the Dasberg Event interval, and thick siliciclastics around the D/C boundary.
- Short stop at the Upper Tournaisian at “Bouhamed” (*Korn & Bockwinkel*)
- (option, if time allows: Frasnian-Famennian boundary interval in condensed facies).

Evening: **IGCP 596b Discussion.**

**Day 6: Lower Carboniferous of the SE Tafilalt**

*Guides: D. Korn, J. Bockwinkel, M. Aretz, A. Tahiri et al.*

Pelagic Lower Carboniferous with ammonoids, alternating with crinoidal or microbialitic limestones and mudmounds with neritic faunas, such as sponges, corals, and brachiopods.

**Day 7: Upper Devonian to Lower Carboniferous of the Maider**

*Guides: D. Korn, J. Bockwinkel, R. T. Becker, Z. S. Aboussalam, S. Hartenfels,*

- The “Stockum level” at Lalla Mimouna (*Korn & Bockwinkel*).
- The D/C boundary section Lalla Mimouna North (*Becker, Aboussalam & Hartenfels*).
- The uppermost Famennian to Tournaisian of the Aguelmous Syncline (*Korn et al.*).

Evening: **D/C Boundary Task Group discussion.**

**Day 8: Lower/Middle Devonian Events of the condensed western Tafilalt Platform**

*Guides: R. T. Becker, Z. S. Aboussalam*

- The lower Eifelian Chotec Event at Jebel Amelane.
- Givetian/Frasnian bio- and event stratigraphy at Mdoura-East, with a focus on the Taghanic, Frasnes, Rhinestreet, and Kellwasser Events.
- The Emsian at Jebel Ihrs, with a focus on the Chebbi, Upper Zlichov and Daleje Events.

Afternoon: Drive to Ouarzazate.

### **Optional post-meeting excursion to the Devonian-Carboniferous of the Moroccan Meseta**

- Drive from Ourzazate towards the Meseta, potential outcrops on the way (Day 1).
- Carboniferous of the Meseta: probably of the Khénifra region: details to be specified (Day 2).
- Oulmes area. Ain Jemaa: pelagic Eifelian, followed by Givetian reef, condensed and incomplete pelagic Upper Devonian, with the Hangenberg Event at the top; laterally with Eovariscan reworking of the whole succession. Moulay Hassane: Emsian to Famennian deeper-water succession of an adjacent tectonic block, overlain by synorogenic clastics with brachiopods near the D/C boundary (Day 3).
- Oued Cherrat Zone: Emsian and Givetian reefs, locally (Ain-as-Safah) with condensed *Manticoceras* Limestone, followed by siliciclastic Famennian and an Eovariscan major reworking event (conglomerates) (Day 4). End of excursion in Rabat.

### **Abstracts**

Abstract should not exceed two A4 pages, written in Times New Roman 11, and including references (to be formatted in the style of “Palaeo x 3”). An additional page with figures/photos is allowed. It is planned to publish the abstracts and excursion guide in the “Documents de l’Institut Scientifique” series.

### **Costs**

Preliminary upper estimates for the complete package (conference fees, abstract book, accommodation, all food, transportation from and to Ouarzazate and in the field) are at 100 €/day. A precise calculation will be included in the 2<sup>nd</sup> Circular. It is planned to (partly) support the attendance of some young scientists and organization members.

### **Dates/Deadlines:**

Answer to this Circular: **March 15<sup>th</sup> 2012**

Second Circular will be sent: June 2012 (with all details, including payment)

Abstracts: **October 31<sup>th</sup> 2012**

Registration fee: **November 30<sup>th</sup> 2012**

### **Contact and correspondance :**

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This Circular (and forthcoming information) can be viewed on the homepages of the Institut Scientifique, Rabat, and of SDS:

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**PRELIMINARY REGISTRATION FORM****SDS- IGCP 596 - Institute Scientifique Meeting  
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I am interested in a post-meeting field trip (three days) to the Moroccan Meseta

Yes	No
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This form should be returned as soon as possible (**before 1<sup>st</sup> April, 2012**) to:**Prof Dr. Ahmed ELHASSANI,**

Director

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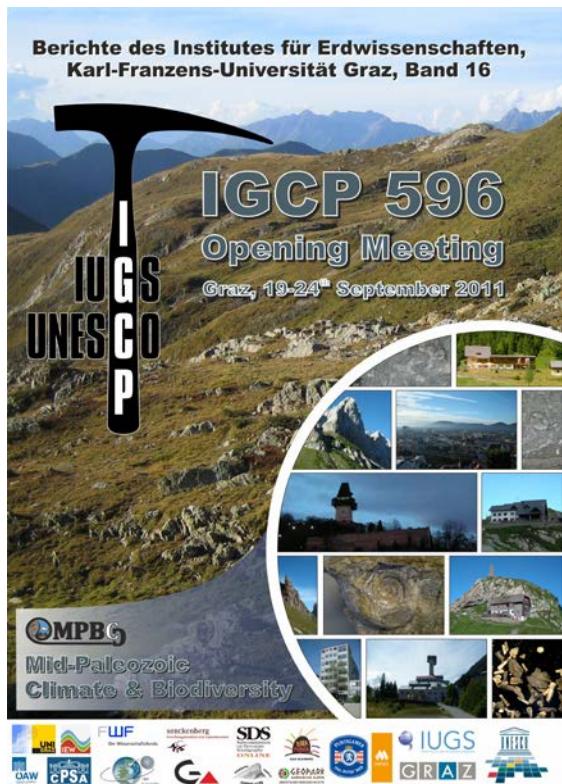
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## PUBLICATIONS

### IGCP 596 OPENING MEETING GRAZ, 19-24<sup>th</sup> SEPTEMBER 2011

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#### *Field-Workshop*

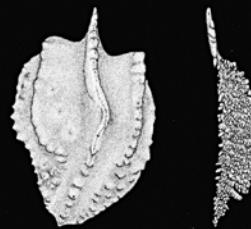
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## MÜNSTERSCHE FORSCHUNGEN ZUR GEOLOGIE UND PALÄONTOLOGIE

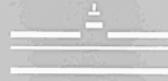
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## PSEUDOPOLYGNATHUS INORDINATUS NOV. NOM. – HOMONYM REPLACEMENT FOR AN UPPER FAMENNIAN (UPPER DEVONIAN) CONODONT SPECIES

**Harald TRAGELEHN & Sven HARTENFELS**

Shortly after the publication of the papers TRAGELEHN & HARTENFELS (2011) as well as HARTENFELS (2011), we recognized that the name *Pseudopolygnathus irregularis*, introduced for an upper Famennian conodont species, has already been established by the morphologically different taxon *Pseudopolygnathus irregularis* BRANSON 1934. Therefore *Pseudopolygnathus irregularis* TRAGELEHN & HARTENFELS 2011 is a junior homonym.

We propose *Pseudopolygnathus inordinatus* nov. nom. as a replacement. The name refers to the characteristic ornamentation of the platform, which shows inordinated nodes.

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### NEW VOLUME ON THE KITAB RESERVE EMSIAN GSSP AREA (UZBEKISTAN)

**ERINA, M.V., BAKHAREV, N.K. & YAZIKOV, A.Y. 2011 (Eds.).** News of Paleontology and Stratigraphy – Supplement to “Geologiya i Geofizika”, **15**, 246 pp., Siberian Branch, Russian Academy of Sciences, Novosibirsk Publishing House SB RAS, ISBN 978-5-7692-1188-1 [three papers, marked below, in English, all others in Russian with English summaries; main series editor A.V. KANYGIN, foreword by N.V. SENNIKOV on p. 5]

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- YOLKIN, E.A., BAKHAREV, N.K., YAZIKOV, A.Y., IZOKH, N.G., SENNIKOV, N.V., KIM, A.I., ERINA, M.V., RAHMONOV, U.D. & TSMEIREK, E.S. Lithostratigraphy of the Stratotype section for the lower boundary of the Emsian stage (GSSP), Lower Devonian (Zinzelban Gorge, Zeravshan-Gissar mountainous area, Uzbekistan). pp. 7-24
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- IZOKH, N.G., YOLKIN, E.A., WEDDICE, K., ERINA, M.V. & VALENZUELA-RÍOS, J.I. Late Pragian and early Emsian conodont polygnathid species from the Kitab State Geological Reserve sequences (Zeravshan-Gissar mountainous area, Uzbekistan). pp. 49-63. [in English]

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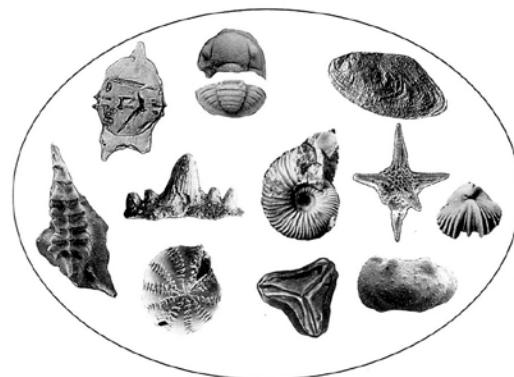
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Issue 15, 2011



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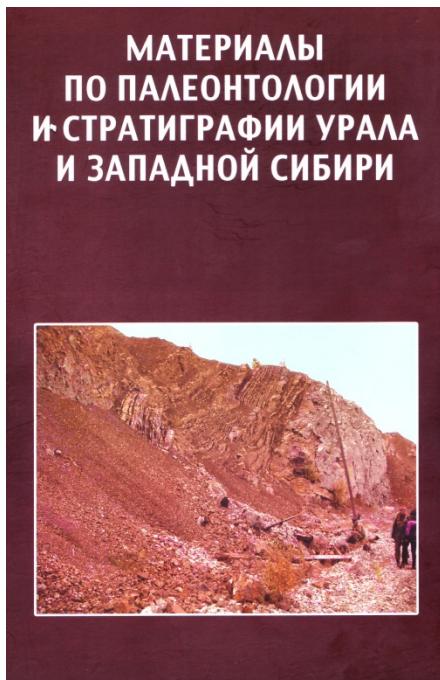
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Rossiiskaya Akademiya Nauk, Uralskoe Otdelenie, Institut Geologii i Geokhimii, 223 pp., Ekaterinburg, ISBN 978-5-7691-2214-9 [in Russian with English summaries of individual chapters; introduction by the main coordinator B.I. CHUVASHOV on pp. 3-4]

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- CHUVASHOV, B.I. & CHERNYKH, V.V. Devonian sediments of the Bolshoy Ick River (Muradymovsky canyon, western slope of South Urals). pp. 99-109.
- CHUVASHOV, B.I., CHERNYKH, V.V., ANTSYGIN, N.Y., BAKHARERV, N.K. & KLETZ, A.G. On biostratigraphy and lithology of Lower Devonian deposits of Turinskaja zone (Eastern slope of Northern Urals). pp. 110-118.
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- KRASNOV, DUBALOTOV, V.N. & PEREGOEDOV, L.G. Stratigraphy and paleolandscapes of the Lower Carboniferous of the West Siberian Plain. pp. 158-189.
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R. Th. BECKER

### Trilobites

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SDS Members: Please report other papers that cross your attention for future Newsletters.

## THE GEOLOGIC TIME SCALE 2012

F. GRADSTEIN, J.G. OGG, M.D. SCHMITZ & G. OGG

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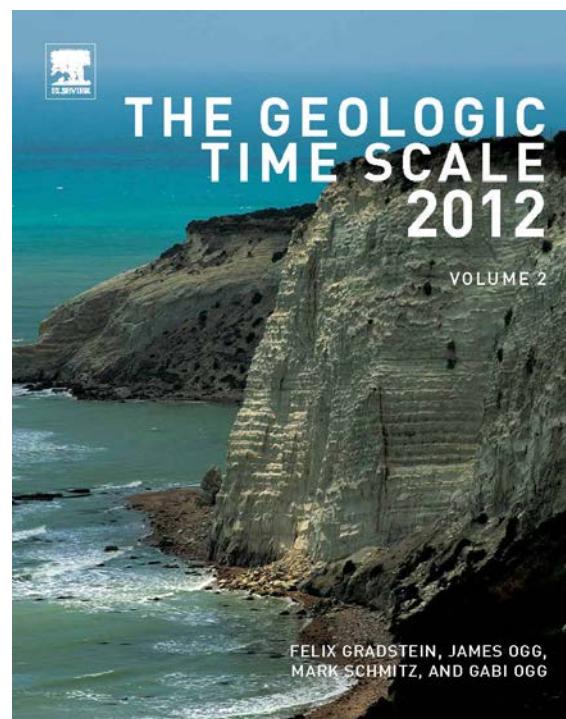
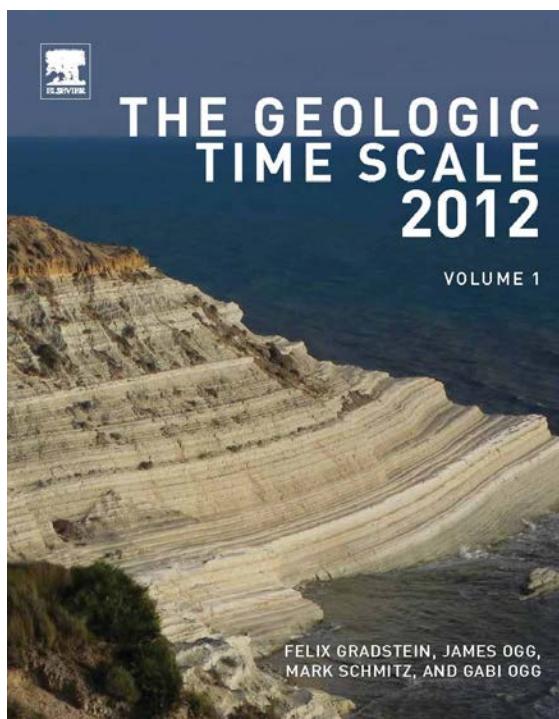
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M.D. SCHMITZ

## MEMBERSHIP NEWS

### CM Olga V. ARTYUSHKOVA

I have been working my whole professional career in the South Urals. My scientific interests lie in studying fossil imprints of conodont teeth that occur at bedding planes of Paleozoic siliceous rocks. In the Devonian sections located on the eastern slope of the South Urals siliceous rocks usually form part of jasper-basaltic or other volcanic associations.



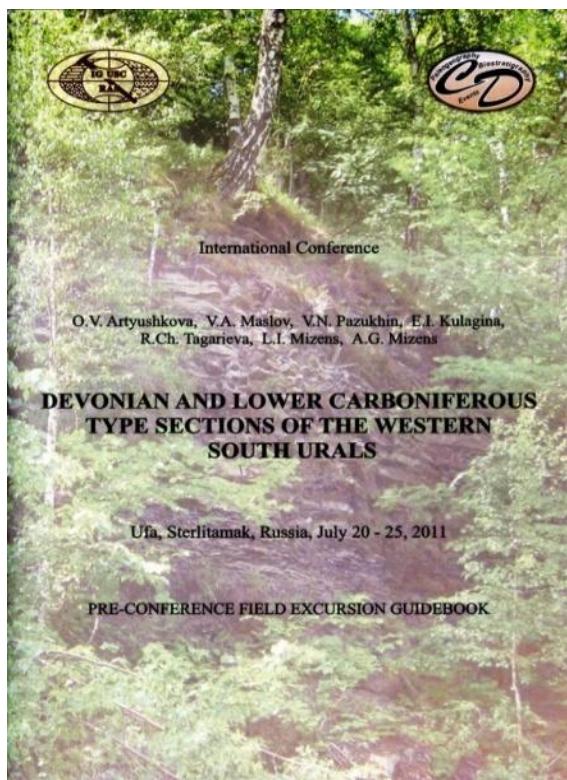
Stratigraphic research on the subdivision and age determination of volcano-sedimentary deposits using conodonts began in the late 1970s by my boss Viktor A. MASLOV. We continue to work with him till present. Volcanogenic rocks play an important and decisive role in the Devonian succession on the eastern slope of the South Urals. In this region sedimentary deposits are represented mainly by cherts, flyshoid clastics and to a subordinate extent by carbonate rocks. Siliceous rocks are developed throughout the Devonian section where they form interbeds or members between volcanites. But frequently they also make up monotonous formations. We have done tremendous work over many years. The exact number of conodont occurrences can hardly be counted, but they exceed 1000 individual records. All local strata, including ore-bearing formations, are characterized by conodonts, their stratigraphic scope being essentially refined. It became possible to elaborate a detailed Devonian stratigraphic scheme based on conodont biostratigraphy. The established sequence suggests a continuity of the Devonian succession. When elaborating the stratigraphic scheme, different aspects of the regional sedimentary history have been clarified. Among them are (a) the subaqueous

nature and duration of volcanism at different time intervals and (b) the relative depths of the basin. The dependence has been revealed by conodont biodiversity and the nature of volcanism. All data on the stratigraphy of the eastern slope of the South Urals were summarized in the monograph by V.A. MASLOV and O.V. ARTYUSHKOVA under the title "Stratigraphy and Correlation of Devonian Deposits in the Magnitogorsk Megazone of the South Urals", Ufa, DesignPolygraphService, 2010, 288 pp., 71 figs., 2 insets, ISBN 978-5-94423-215-1 (in Russian). They were also presented as a poster at the International Conference "Mid Paleozoic Climate and Biodiversity", IGCP 596 Opening Meeting, Graz, September 19-24, 2011. By the way, at the same conference I had the chance to deliver poster presentations prepared by my colleague Tatiana MAVRINSKAYA on Lower Devonian (Lochkovian) conodonts and by my postgraduate student Rezeda TAGARIEVA on conodont biodiversity at the F/F boundary interval in carbonate sections of the western slope of the South Urals.

The first half of 2011 was devoted to the organization of the geological excursion "Middle-Upper Devonian and Lower Carboniferous Biostratigraphy of the South Urals". It showed sections of the western slope of the South Urals prior to the International Conference "Biostratigraphy, Paleogeography and Events in Devonian and Lower Carboniferous" (SDS/IGCP 596 joint field meeting, Ufa, Novosibirsk, Russia). The excursion took place on July 21-25, 2011. Sites chosen for the field trip included complete sections or their representative fragments situated within the West Uralian Folded Zone. Regional facies specifics and the completeness of faunal characteristics were significant aspects. The excursion program incorporated visits to type and reference sections of the Middle/Upper Devonian and Lower Carboniferous in the South Urals. Places visited during the excursion were as follows:

1. The section on the right bank of the Inzer River along the railroad track, upstream from the village of Gabduikovo, which presents a Devonian section in the deep-water facies composed of Emsian (Lower Devonian), Frasnian and Famennian deposits.
2. The reference sections of the Frasnian-Famennian boundary deposits within coquina (brachiopod) facies (Kuk-Karauk) and the boundary deposits of the Devonian and Carboniferous Systems at Sikaza River.
3. The section on the Ryauzyak River represents a complete condensed section of Frasnian deposits. The uniqueness of this section is that it displays several groups of benthic and nektonic macro- and microfaunas.
4. In the Akkyr section on the Zilim River a new stratotype of the Barma Horizon is most complete, showing the boundary between the Frasnian and Famennian Stages.

All the sections demonstrated arose great interest among the excursion participants and became the subject of fruitful debates. The section of the Inzer facies type located on the Inzer River 4 km upstream from Gabdyukovo village displays a sequence of several sedimentary cycles. The section has no interval corresponding to the whole Middle Devonian. The Upper Devonian succession constitutes a continuous section, testified by conodont and goniatite findings. A debatable problem for this section is the age of terrigenous deposits occurring at its base. Most geologists think that these deposits belong to the Takata Formation ( $D_1e$ ), yet CHIBRIKOVA (1977) assigned them to older rocks of Early Devonian age. The problem of their boundary with underlying Vendian units caused disputes as well. Besides, some specialists paid attention to the fact that sandstones of the Vanyashkino Formation are also associated in this section with sandstones of the Takata Formation, not with the Vyazovaya Formation, and the latter rests with a gap upon underlying deposits. Apparently, this section requires further clarification and investigation.



In the sections of the South Urals on the **Sikaza** (Kuk-Karauk), **Ryauzyak** and **Zilim** Rivers that display Upper Devonian deposits of the Askyn facies type, the Frasnian/Famennian boundary interval is represented by continuous sequence of shelly limestone facies. The boundary is determined by the simultaneous appearance of the conodont *Pa. triangularis*, the index species of the lower Famennian, and by the brachiopod *Parapugnax*

*markovskii*, a guide species of the Barma Horizon. In many regions of the world one can observe gaps of different duration at this level or the occurrence of black bituminous limestones and shales in deep-water facies. Sedimentary change accompanied by mass extinction of the majority of various faunal taxa was called the (Upper) Kellwasser Event. It can be ascertained that this event is also sedimentologically expressed in a number of South Ural sections, by gaps of different duration – from one to several conodont zones (ABRAMOVA & ARTYUSHKOVA 2004). This is a result of the overall shoaling of the basin. In the continuous sections the event is not clearly lithologically expressed and considered to be a biotic one, expressed by the sudden change in the conodont and brachiopod assemblages. All Frasnian taxa of the genus *Palmatolepis* become extinct. Many brachiopod genera die out; an abrupt decrease in the populations of the orders *Pentamerida* and *Atypida* takes place (Mizens, 2009).

The Hangenberg Event of the same rank at the Devonian/Carboniferous boundary, expressed by the appearance of black clays and shales between limestones, probably also took place in the South Urals. In particular, in the **Sikaza** and **Zigan** sections this boundary is noted for clay interbeds and a successive replacement of conodonts belonging to the phylogenetic lineage *Siphonodella praesulcata* – *S. sulcata* (PAZUKHIN et al. 2009).

All the excursion participants shared the opinion that the **Ryauzyak** section is incomparable in the quality of its exposure and detailed paleontological exploration. It is precisely at this place that the reference section of the Sargaev Horizon was described for the first time (MARKOVSKY, 1930.). A thin condensed section that represents the whole Frasnian sequence has been thoroughly subdivided with the recognition of all the standard conodont zones (ABRAMOVA et al., 1990, ABRAMOVA, 1999).



The Ryauzyak section: Outcrop of Lower Frasnian clayey and bituminous limestones.

Some intervals are known for goniatite findings. It is one of the few sections in the South Urals that

gives the opportunity to establish the Middle/Upper Devonian boundary. All the stratigraphic intervals are rich in conodonts, making the section very attractive for interregional correlations.

In recent years new information has been obtained on the biostratigraphy of Frasnian/Famennian boundary deposits in the **Akkyr** section. Using a large amount of material, A.N. ABRAMOVA (ABRAMOVA 1999, ABRAMOVA & ARTYUSHKOVA 2002, 2004) proved that the F/F boundary interval is represented by brachiopod coquina limestones. The boundary is determined by the simultaneous appearance of *Pa. triangularis* and *Parapugnax markovskii* (see above). However, judging from brachiopods of the Akkyr section studied by A.G. MIZENS (2009), it turned out that the lower portion of the Barma Horizon, distinct from other similar sections, was associated with the *linguiformis* Zone of the Upper Frasnian Stage. Detailed analysis of faunal distribution across the section showed that a 10 cm interval assigned to the Frasnian remained uncharacterized by conodonts. Based on additional investigations with centimeter-by-centimeter sampling for conodonts and brachiopods, the assertion that the F/F boundary in this section should be marked, too, at the base of the Barma Horizon was corroborated (TAGARIEVA, 2010).

The participants of the South Ural international excursion held in July 2011 emphasized that the demonstrated sections gave a good idea of the peculiar features of sedimentation during the Devonian and Early Carboniferous. The sections were well prepared for demonstration, with the

proper measures taken to facilitate the safety of participants. Many of the specialists took samples for different types of analyses and made paleontological collections.

The organization of the excursion gave further impetus to study the Devonian sections on the western slope of the South Urals. They were acknowledged to be extremely interesting and important for the Devonian stratigraphy and moreover devoid of some of the peculiar problems of Devonian reference sections in Central Siberia.

The field excursion was organized by scientific institutions of the Russian Academy of Sciences. These are the Institute of Geology (Ufa Scientific Centre, RAS) and the A.N. Trofimuk Institute of Petroleum Geology and Geophysics (Siberian Branch, RAS). It was attended by more than 30 specialists from Russia, Kazakhstan, China, France, Czechia and Switzerland.

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The participants of the South Ural international geological excursion

## CM Gordon BAIRD

### 2011 Research activities:

Despite an increased workload associated with new departmental chair responsibilities, regional study of the end-Devonian succession has continued. During summer and autumn 2011, field mapping of end-Devonian deposits (Cleveland Shale, Bedford Formation, Berea Sandstone) as well as basal Carboniferous strata (basal Orangeville succession) continued westward across northern Ohio with the assistance of Joe HANNIBAL (Cleveland Natural History Museum) and Bob CARR (Concordia College, Illinois). New unpublished observations include: (1) correlation of the Euclid siltstone member to the equivalent "Sagamore Member" within the Cuyahoga Valley, showing that these two entities, described in earlier literature, regionally connect laterally and represent one apparent geologic event; (2) observation of regional southeastward erosive overstep of the entire red Bedford succession below the base-Berea disconformity in the Cuyahoga Valley and, possibly, to the east of there as well; (3) evidence of localized erosive removal of most of, to all of, the Berea Sandstone succession beneath a base-Mississippian unconformity, a contact heretofore not recognized as a discontinuity of this magnitude. Work continues across the Cleveland metropolitan area of northern Ohio to identify key biomarker horizons for geochronologic control, the extent and nature of complex structural deformation of rock units, and the regional time-rock relationships of the enigmatic, offshore marine, red Bedford succession to inferred paleoclimatic changes and Hangenberg biocrisis events.

### 2011 Meeting – related activities:

Co-chaired a large symposium at the Geological Society of America combined North-Central-Northeastern Sections Meeting in Pittsburgh, PA, March 21-22, 2011 (with David BREZINSKI and D. Jeffrey OVER). The symposium title was *Devonian Climate and Paleoecology – Insight from Stratigraphic Studies*. 28 presentations comprised the symposium venue.

### Devonian Shale theme session - Announcement for April 23-24, 2012:

An upcoming theme session of the topic of Devonian Shale (with Gordon BAIRD, Chuck VER STRAETEN, and Jeff OVER) is planned for the North-Central Regional Meeting of the Geological Society of America in Dayton, Ohio (see below):

### *Shales during the Devonian: Facies observed through new stratigraphic, sedimentologic, and paleoenvironmental perspectives*

North-Central Geological Society of America Meeting  
Dayton, Ohio, April 23-24, 2012

[Abstract deadline was January 24, 2012]

Gordon BAIRD – Geosciences, S.U.N.Y. Fredonia, Fredonia, New York

Jeff OVER, Geology, S.U.N.Y. Geneseo, Geneseo, New York

Chuck VER STRAETEN, New York State Geological Survey, Albany, New York

Despite their economic significance, Devonian shales and mudstones remain variably enigmatic with regard to existing depositional models. Problems such as the long-standing question of water column depth as well as newer questions regarding the pace and nature of mud accumulation, bottom energy levels, the geochemical nature of oxygen-deficient settings, and the relationship of black shales to surrounding strata, are benefiting from a host of ongoing stratigraphic, chronostratigraphic, sedimentological, and geochemical discoveries and new ideas. Hence, we call for contributions from a broad spectrum of research on Devonian organic-rich shales and other strata from foreland basin settings to cratonic platforms, arches, and terrestrial environments to honor these developments.

### Publications for 2011

#### Peer-review publication:

BRETT, C.E., BARTHOLOMEW, A., DESANTIS, M. & BAIRD, G.C. 2011. Sequence stratigraphy and revised sea-level curve for the Middle Devonian of eastern North America. - Paleogeography, Palaeoclimatology, Palaeoecology, **304**: 21-53.

#### Guidebook article:

VER STRAETEN, C.A., BAIRD, G.C., BRETT, C.E. & OVER D.J. 2011. The Marcellus Subgroup of New York and beyond: Stratigraphy, sequences, mudrocks, and sedimentology. - New York State Geological Association, 83rd Annual Field Trip Guidebook, pp. 23-86.

#### Papers presented:

BAIRD, G.C., OVER, D.J., HANNIBAL, J.T., CARR, R.K., MCKENZIE, S.C. & RALPH, M.J. 2011, End-Devonian successions in northwest Pennsylvania and northern Ohio compared: review of potential unit relationships to the Hangenberg Biocline. - Geological Society of America, Abstracts with Programs, North-Central-Northeastern Sections Meeting, **43** (1): 152, Pittsburgh.  
ZAMBITO, J. IV, JOACHIMSKI, M., BAIRD, G.C., BRETT, C.E., DAVIS, W.E. & OVER, D.J., 2011, Preliminary analysis of conodont apatite oxygen isotope ratios through the Late Givetian global Taghanic biocrisis in the northern Appalachian Basin. - Geological Society of America, Abstracts with Programs, North-Central-Northeastern Sections Meeting, **43** (1): 137, Pittsburgh.

## TM R. T. BECKER and the MÜNSTER GROUP

Early in 2011 the German Research Foundation finally approved a new joint three-year research project on "Eovariscan evolution of the southern and northern Prototethys: high-resolution stratigraphy, facies developments, biogeography, and geodynamic interpretation". It mainly deals with the precise dating of Eifelian to Tournaisian facies changes in the Moroccan Meseta and in the Rhenish Massif, in order to compare the trends of sea-level changes, subsidence, Eovariscan uplift, and faunas at the northern margin of Gondwana and southern margin of Laurussia. There is some focus on the regionally different reef developments, reworking events (synsedimentary conglomerates), and on the boundary between stable and Variscan deformed Gondwana, just South of the High Atlas. Our main Moroccan counterparts are Ahmed EL HASSANI, Fouad EL KAMEL, El Mostafa BENFRIKA, and Mohammed RAJI. The first field season took place in late October and early November and concentrated on the Rabat-Tiflet and Oued Cherrat Zones, the Coastal Block, and the Ben Ahmed and Oulmes regions. It is planned to hold a workshop in Münster early in July, with informal presentations by all involved, including the many research students, and a field trip along the northern margin of the Rhenish Massif.



Fig. 1. The Kacak Event (shale depression, with hidden Thomas for scale) at Ottara-East (central Tafilalt), also showing the wide local Frasnian depression in the background.

Previously, in spring 2011, another Morocco trip continued the work in the Tafilalt and Maider regions. Complete traverses through the Devonian were sampled in conjunction with the current revised mapping of the southern Tafilalt. This was done in cooperation with Abdelilah FEKKAK, Lahcем BAIDDER and Ahmed. The most complete successions are exposed at the transition from the Tafilalt Platform to the Tafilalt Basin, for example at Hassi Nebech and El Khraouia (Fig. 1), in the NE corner of the Amessoui Syncline. New stratigraphical charts are in preparation for the 2013 field symposium, where only sections that have never been shown to SDS will be presented. In

spring we also completed our sampling for the Lower/Middle Frasnian event stratigraphy of the region, for the conodont dating of the Chotec Event, for the D/C Boundary at Lalla Mimouna, and for the Lower Emsian (e.g., at Jebel Ihrs). As a big surprise, the *Sandbergeroceras* Bed of Seheb-el-Rhassal produced the first large-eyed Middle Frasnian phacopids. The sparse material will be of highest value for our understanding of phacopid evolution in the big record gap between the Frasnes Event and Famennian recovery.

Data from previous trips enabled the finalization of long manuscripts on the famous pharciceratid faunas of Hassi Nebech (BOCKWINKEL et al. in prep.) and on the Lower Carboniferous trilobites of the Anti-Atlas (HAHN et al. in press). The Givetian work shall be continued with Jürgen BOCKWINKEL, probably with the pharciceratids from the northern Maider as the next step. Material from Tafilalt Platform sections and from the old iron mines of Germany (Fig. 2) includes a range of new species.



Fig. 2. The very evolute *Lunupharciceras* n. sp. from the Upper Givetian red iron limestone of the southern Rhenish Massif (Museum für Naturkunde, Berlin, MB.C.3610).

Other current ammonoid studies deal with the Tournaisian faunas of the Tafilalt and Moroccan Meseta and with two new interesting small faunas from the Emsian of Central Victoria (BECKER & EARL in prep.). The description and interpretation of the goniatites from the Middle/Upper Devonian transition of the Rudny Altai (BECKER & BAKHAREV in prep.) will be submitted to the planned "Palaeodiversity and Palaeoenvironments" issue. Alyosha KIM provided some wonderful new goniatites from the Lower Emsian of the Kitab Reserve that shall be part of the planned full description of new findings from the region, perhaps jointly with Kenneth DE BAETS. There are also a few additional goniatites from Bolivia retrieved by Ian TROTH. The first Devonian ammonoids from the *Annulata* Black Shale of Bulgaria will be published jointly with Iliana BONCHEVA and Valerie SACHANSKI. MA Xue-Ping sent pictures of new and

important ammonoid finding from the Junggar Basin of NW China.

Several research students (see below) work on reefal sections, boreholes, or on well-known cephalopod limestone outcrops of the Rhenish Massif. They are jointly supervised with Sven and Sarah, especially when it comes to conodonts and microfacies. High-resolution re-sampling at Martenberg tries to follow the fate/justification of the *jamieae* Zone in its type-section.

The Devonian chapter for the forthcoming second, much more voluminous edition of the Phanerozoic Time Scale was finally completed in autumn 2011. I agreed to write also a Devonian chapter for the planned Encyclopedia of Stratigraphy. After a long delay, the joint publication on the D/C Boundary in the Tafilet and Maider (KAISER et al. 2011) finally appeared. It was long written before we discovered (independently from S. FRÖHLICH, D. KORN and colleagues) the interesting section Lalla Mimouna North, which is covered in this issue by a preliminary report.

#### Sven HARTENFELS

successfully completed the edition of his very voluminous monograph on the *Annulata* and Dasberg events/crisis for our Münster journal, which is run by a student society (see Devonian Publications section). He is continuing together with H. TRAGELEHN work on a similarly extensive documentation of the Famennian conodont faunas of Franconia. A joint manuscript on the age of the widely quarried *Gonioclymenia* Limestone of the Tafilet is close to completion. Overlying beds, that were often not kept separate, produced more pre-Hangenberg "siphonodelloids" that are of highest importance for the understanding of siphonodellid taxonomy and evolution across the Devonian-Carboniferous boundary. In early autumn Sven started to sample various Famennian sections of southern France and the Spanish Pyrenees that may be useful for a cyclostratigraphic evaluation of conodont zone durations.

#### Z. Sarah ABOUSSALAM

runs independently the conodont, microfacies and carbon isotope part of the new joint DFG project. First results proved that many of the Meseta samples are productive. This will allow a precise dating of regional reef growth and of sudden Eovariscan erosional and re-working events of specific structural blocks. A large number of samples was additionally processed for the mapping project of the southern Tafilet. They resulted in new regional records of taxa and the discovery of restricted Lochkovian and Pragian faunas. A set of conodont and microfacies plates has been prepared for the explanation volumes that will be published together with the maps. One of the basinal Frasnian-Famennian boundary sections, with very calm deposition, yielded surprisingly a last *Ancyrodella*

from the basal Famennian bed. This resembles the (so far unpublished) situation at section Mont Peyroux SE-b of the Montagne Noire, where several ancyrodellids from the basal *Pa. triangularis* Zone have been regarded as potentially reworked although no reworked polygnathids or palmatolepids could be spotted.



Fig. 3. Polymict Eovariscan (upper Famennian?) conglomerate at Oued Tiflet, East of Rabat.

Samples from the Rhenish Massif allow partly a precise dating of reef drowning and transgression in the Wülfrath, Wuppertal, Hagen and Höhne Valley regions. The revision of the Giebringhausen section has been completed and a long manuscript is in preparation. The detailed re-sampling of the Blauer Bruch allowed a precise recognition of the levels of the Taghanic and Frasnes Events. As at Giebringhausen, there are new and rare species both in the Upper Givetian and basal Frasnian.

#### Ph. D. Students

Stephan EICHHOLT successfully completed his M.Sc. on the unexpectedly complex taxonomy and phylogeny of Upper Frasnian beloceratids from the Canning Basin. In spring he took the Ph.D. position of the DFG project, with the task to compare the Givetian/Frasnian reef palaeoecology of the northern and southern margins of the western Prototethys. He has started with the reefs of the Oued Cherrat Zone and Oulmes region (Moroccan Meseta), as well with a cored well through the lower half of a reef near Wülfrath.

Stephan HELLING produced a voluminous M.Sc. thesis on various rare trilobites from the Lower and Middle Devonian of the Anti-Atlas. His work should lead to several publications on new proetids (*Gerastos*) and phacopids. For his Ph.D. he will concentrate on the latter, with the aim to follow with greatest time precision the impact of climatic trends and events on phacopid diversity at the margins of Gondwana and Laurussia. Currently tests are done to evaluate the potential of phacopid calcite to preserve original sea-water isotope chemistry. There are already several new phacopid taxa from the Emsian, Givetian, and Frasnian of the Tafilet and from the

Eifelian and Frasnian of the Kuznetsk Basin that wait for taxonomic treatment.



Fig. 4. Stephan and Sören sample well-bedded shallow-water limestones below the Givetian biostrome (background) at Douar Zerahna/Oued Targa (Oulad Abbou area, Coastal Block, Morocco).

### M.Sc. Students

A group of master students will take part in a southern Morocco field trip this March/April. Tobias FISCHER will sample Uppermost Famennian ammonoids for a taxonomic and palaeobiogeographic comparison with Germany (Rhenish Massif, Franconia), based on detailed ontogenetic morphometry. Marie-Kristin RYTINA will study the polymict Viséan conglomerates and olistolites near Tinerhir which are composed of Ordovician quartzites and Devonian limestones. The analysis of microfacies and conodont faunas shall allow to reconstruct the depositional history of the later completely eroded Devonian at the northernmost margin of stable Gondwana. Dustin WARD will produce an Arc-GIS correlation of Tafilelt and Maider sections but will also study the northernmost autochthonous Devonian outcrops N of Tinjdad. To complete the regional modeling, Sören STICHLING will concentrate on the shallow-water to biostromal Middle Devonian at the northern margin of the Maider.

Hendrik NOVAK just finished his survey of the upper part of the Wülfrath reef and the reef extinction, based on a cored well and on a large active quarry. The supposed regional Iberg facies in the upper part of the complex is rather an open, shallow platform facies, with many microbialites and conodont faunas. The F-F boundary falls in an unconformity, with many Frasnian conodonts occurring in a mixed late Lower Famennian fauna. His thesis was part of the very fruitful cooperation with geologists of the Rheinkalk GmbH.

### B.SC. Students

Felix TEMMERSFELD completed his conodont and microfacies study of the famous Ballberg section near Hövel (Sauerland). Conodonts suggest that the locally exposed distinctive black shale is the Upper *Annulata* Shale. There are plans to publish the results jointly, with Sven taking a lead. Klaus

SCHWERMANN studied unusual occurrences of reefal organisms in the deeper-water, shaly Middle Devonian of the eastern Dra Valley (Tata region). He concentrated on the chaetetid sponges, but rare stromatoporoids and colonial Rugosa occur as well. Nikola PUCK is currently mapping the Hofermühle reefal complexes (NW margin of the Rhenish Massif east of the Rhine), where conflicting models were proposed in the past to explain the presence of up to three reefal intervals. Unfortunately, dating with conodonts proved to be difficult.

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- BONCHEVA, I., SACHANSKI, V. & BECKER, R.T. 2011. Sedimentary and faunal evidence for the Late Devonian Kellwasser and *Annulata* events in the Balkan Terrane (Bulgaria). - Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 26-27.

### TM Alain BLIECK

Continuing to work on Palaeozoic early vertebrates, and in particular Early Devonian agnathans. Material to be published or prepared includes: Lower Devonian from the Ardenne-Rhenish massif, eastern Poland, Spitsbergen, etc. A collaboration with Prof. Dr. D.K. ELLIOTT (Northern Arizona University) and the research project of a Master student of Lille 1 university will be devoted to relationships between eurypterids and vertebrates in the Lower Devonian of the Ardenne and the Rhenish Slate Massif.

### Publications

(papers dealing with Devonian only)

- BLIECK, A., TURNER, S., BURROW, C.J., SCHULTZE, H.P., REXROAD, C.B., BULTYNCK, P. & NOLAN, G.S. 2011. Fossils, histology and phylogeny: Why conodonts are not vertebrates. Episodes, **33** (4) [2010]: 234-241.
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- GEORGE, D. & BLIECK, A. 2011. Rise of the Earliest Tetrapods, An Early Devonian Origin from Marine Environment. PLoS ONE, **6** (7): e22136; doi: 10.1371/journal.pone.0022136: 7 p.; Supporting Information: 10 p., 2 tables.

### CM Iliana BONCHEVA

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### Research interests

Silurian/Devonian and Carboniferous conodonts, taxonomy, biostratigraphy, sedimentology, facies changes, paleoenvironment, biogeographic affinities, CAI, investigation the effect on the conodont textures from hydrothermal activity, low-grade metamorphizm, hydrocarbon exploration.

### Research activities

(1) Paleontological and stratigraphical investigations of the Silurian, Devonian and Carboniferous in southeastern Bulgaria and northwestern Turkey based on conodonts. (2) Partner in a joint project on “Tectonostratigraphic Characteristics of Istranca Massif and Correlations of the Sequences at Turkish-Bulgarian Border” by the General Directorate of Mineral Research and Exploration (MTA) and the Geological Institute of the Bulgarian Academy of Sciences (BAS). In this context, concerning the geological mapping of the Istranca mountain, I had much field work during 2011 in SE Bulgaria and Turkey. The aim of the project is to complete a monography and geological maps (1:50 000) for the Istranca Massif.

### Papers /Abstracts Published

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### TM Carlton E. BRETT

Continued efforts to produce syntheses of work on Middle Devonian sequence stratigraphy, cycles, paleoenvironments and bioevents, with Gordon BAIRD (SUNY Fredonia) and several former graduate students, culminated in publication and submission of a number of papers and dissertations. First, the special volume on Middle Devonian cycles and bioevents, in *Palaeogeography, Palaeoclimatology, Palaeoecology* was officially published early in 2011, including 11 papers by a number of Devonian workers. Second, Annalisa FERRETTI, Kathleen HISTON, Pat MC LAUGHLIN and I are working on another edited volume dealing with time-specific facies (TSF), for *Palaeo-3*, dedicated to Otto WALLISER, which will feature several papers

on TSFs in the Devonian. Third, I completed two manuscripts related to comparative facies and paleoecology of rhythmic trilobite beds from the Emsian of SW Morocco and elsewhere, based on work initiated in 2007 on a National Geographic grant. These are in press with *Palaeo-3* and *Palaios*. Fourth, we are still working toward a compilation of updated articles and field guides from the North American Paleontological Conference, together with related fieldtrips conducted since that time as a book through Cincinnati Museum Center, a companion to our book on the Ordovician of the Cincinnati Arch that came out in 2008.

In addition, two University of Cincinnati PhD students completed dissertations related to the Devonian since the last newsletter: Mike DESANTIS finished his dissertation on the Kacak and related late Eifelian bioevents in eastern North America and Jay ZAMBITO completed his work on the Taghanic bioevents in the Appalachian Basin.

In continuing collaboration with Drs. Eberhard SCHINDLER, Rainer BROCKE, and Peter KÖNIGSHOF, of the Senckenberg Institute, Frankfurt, Germany, I spent some time in late July, examining Givetian facies and sequence stratigraphy in the Eifel region of Germany. This proved very interesting as we discovered that a large outcrop in the Eich Quarry of the Wotan Quarry complex, previously ascribed to the Wotan Member, actually comprises older strata. This is particularly intriguing given that very analogous peritidal facies, previously miscorrelated, record recurrence of very similar conditions. New drill cores obtained from this area will provide additional insights into the detailed sequence and event stratigraphy of these facies, facilitating comparisons with the Appalachian Basin.

During 2012, I helped to lead two field workshops on the Devonian of the central New York area in central New York: one for Paleontological Research Institution and a second for the New York State Geological Association, in conjunction with Chuck VER STRAETEN (NY State Museum), Gordon BAIRD, Jeff OVER (SUNY Geneseo), and Theresa JORDAN (Cornell University), on the stratigraphy and sedimentary environments of the now-famous Marcellus Shale in its type area.

In the upcoming summer, Brad CRAMER and I will co-host, with, a field conference for IGCP 591: *The Early to Middle Paleozoic Revolution*, at the University of Cincinnati and a variety of field locations in Ohio, Kentucky, Indiana, and Illinois.

### **IGCP 591 Annual Meeting: Foerste Symposium Cincinnati, Ohio, USA, July 22-28, 2012**

Organised by B. CRAMER & C.E. BRETT. Pre-conference excursion to Katian-Wenlock - Southern Appalachian Basin (KY, OH, IN); post-conference excursion to Wenlock-Lochkovian - Illinois Basin/Michigan Basin (IL, IN). Special volume in *Stratigraphy* (eds. CRAMER & MELCHIN). For more

details, visit the IGCP 591 website: <http://www.igcp591.org/meetings.php>.

### **Publications**

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- ZAMBITO, IV, J.J. 2011. Re-Examination of the Global Taghanic Biocrisis Type Strata: Approaches for Characterizing Ancient Bioevents and the Fate of the Hamilton Fauna. - Unpublished PhD Dissertation, University of Cincinnati.

## CM Denise BRICE (Lille, France)

During 2011 my research, in collaboration with Bernard MOTTEQUIN and Marie LEGRAND-BLAIN, has focused on the radiation-extinction of rhynchonellid and spiriferid brachiopods during the Latest Devonian and the survival or first occurrences of taxa in the Early Carboniferous; such index species being valuable tools to recognize the D/C boundary. Three papers on this subject are in preparation for publication. The first one develops the subject presented in Perth (2011) with productids taxa, the second one concerns new data on Late to Latest Famennian Cyrtiopsinae (Brachiopoda) from the Middle East (Afghanistan and Iran). The last concerns the reassignment of brachiopods described by DEHÉE (1929) and the systematic description of new collections from the Latest Famennian "Strunian" in Avesnois (NE France)

### Publications

#### Papers

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- BRICE, D. 2009. A new bio-marker Devonian brachiopod genus. - In Prospectives en Paléontologie et Palynologie. Congrès A.P.F. et 21<sup>ème</sup> Réunion A.P.L.F. Lille (2-4 juin 2009), Abstract: p.21.
- BRICE, D. & MOTTEQUIN, B. 2011. Rhynchonellid and spiriferid brachiopods as valuable tools for correlation of shelly fauna near the Devonian/Carboniferous boundary. - The XVII International Congress on the Carboniferous and Permian, Perth Geological Survey of Western Australia, E. HAKANSSON & J. A. TROTTER (Eds), Programme & Abstract, p. 48.
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(Strunien) du « Calcaire d'Etroeungt » (Avesnois, N. France): systématique, biostratigraphie. - Géoreg, Lille, Octobre 2011.

- MISTIAEN, B. & BRICE, D. 2008. La vie créatrice de roches - les roches sources de vie. - Journées nationales du Patrimoine, 20-21 Septembre 2008.
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- BRICE, D. & MISTIAEN, B. 2008. Le stratotype du Givétien à Givet. - Livret guide excursion Société géologique du Nord 08 mars 2008: 1-18, 9 fig.
- BRICE, D. & MISTIAEN, B. 2008. Le stratotype du Strunien à Etroeungt. - Livret guide excursion Société géologique du Nord 22 mars 2008: 1-18, 9 fig.
- MISTIAEN, B. & BRICE, D. 2011. De l'Université catholique de Lille à l'Hospice Comtesse; ce que disent nos pierres. - Georeg, Lille, Octobre 2011, Livret guide: 1-28.
- MISTIAEN, B., BRICE, D., HUBERT, B.L.M. & LOONES, C. 2011. Classical Devonian and Carboniferous sites in Ferques area, Boulonnais, Northern France. - In M. ARETZ & E. POTY. (Eds.), Field Guides, 11<sup>th</sup> Symposium on Fossil Cnidaria and Sponges, Liège, August 19-29, 2011. Kölner Forum Geol. Paläont., **20**: 51-98, 78 fig.
- MISTIAEN, B., BRICE, D. & LOONES, C. 2009. Le Boulonnais. 4<sup>ème</sup> Congrès APF - 21<sup>ème</sup> Réunion APLF, Prospectives en Paléontologie et Palynologie, Lille, 2-5 juin 2009. - Livret guide excursion, 05 juin 2009: 1-34, 46 fig.
- MISTIAEN, B., HUBERT, B.L.M., BRICE, D. & PINTE, E. 2008. Upper Palaeozoic of Belgium and Northern France (Avesnois, Meuse Valley, Ardenne). - Guide book of the post congress fieldtrip B. Palaeozoic Climates International Congress: 1-113, 105 figs.

## CM Rainer BROCKE

In 2011 research activities were focussed mainly on sedimentary sequences equivalent to the Mid Devonian basal Choteč Event. Together with Chuck VER STRAETEN, Dick LINDEMANN and Eberhard SCHINDLER several Emsian/Eifelian sections in the Appalachian Basin (eastern USA) have been sampled, predominantly for palynomorphs and dacryoconarids. This field work took place after the GSA meeting in Pittsburgh in March where results of the ongoing project: "Phytoplankton bloom (prasinophytes) during the basal Choteč Event" has been presented.

In October, the "Choteč activities" were expanded to southern France; together with Eberhard SCHINDLER and in cooperation with Raimund FEIST we measured and sampled sections in the Montagne Noire (e.g., Col du Puech de la Suque). We revisited

and sampled also for tentaculites and palynomorphs) of the Upper Devonian (e.g., La Serre).

More Upper Devonian (palynological) material was collected from the Kellwasser type locality in the Harz mountains, in cooperation with Eberhard and with Brooks ELLWOOD and his team, who sampled in great detail for magneto susceptibility (MS). In addition to our long-term Mid Devonian activities in the Eifel area (mainly with Carl BRETT and the colleagues from Senckenberg), Brooks took also a suite of “initial samples” for MS.

Furthermore, results of the Turkish-German research project DEVEC-TR in the Taurides were presented during the GSA meeting in Pittsburgh. This cooperation will be continued by a subsequent project starting in 2012.

German SDS note: Eberhard SCHINDLER's function as secretary of the German ‘Subkommission für Devon-Stratigraphie’ ended in 2011, and I was elected for the new secretary.

### Publications

- BROCKE, R., BERKYOVÁ, S., FATKA, O., LINDEMANN, R.H., SCHINDLER, E. & VER STRAETEN, C.A. 2011. The early Mid-Devonian Choteč Event: Do palynomorphs have the potential for long-distance correlations? – Geological Society of America, Abstracts with Programs, **43** (1): 97; Boulder.
- SCHINDLER, E., BOZDOĞAN, N., BROCKE, R., NAZIK, A., ÖZKAN, R., WEHRMANN, A., WILDE, V., YALÇIN, M.N. & YILMAZ, İ. 2011. Devonian sequences of the Central and Eastern Taurides (Turkey) – biostratigraphy, facies, and global events. – Geological Society of America, Abstracts with Programs, **43** (1): 96; Boulder.
- SCHINDLER, E., BROCKE, R., SCHROEDER, R., WILDE, V. & KRAUSE, R.A. 2011. Alfred Wegener – Die Hypothese von der Drift der Kontinente wird 100. – SENKENBERG – naturforschung museum, **141** (11/12): 340-341; Frankfurt am Main.
- SCHINDLER, E., BROCKE, R., SCHROEDER, R., WILDE, V. & KRAUSE, R.A. 2011. Die Hypothese von der Drift der Kontinente wird 100 – Alfred Wegeners Idee hat Geburtstag. – Gmit, **45**: 24; Bonn.

### CM Pierre BULTYNCK

I made a systematic study of the conodont collection of the late O.H. WALLISER from the GSSP for the base of the Givetian at Jebel Mech Irdane (Tafilet, SE Morocco) and made a comparison with the Bou Tchrafine (Tafilet) and the Ou Driss (Ma'der) sections. The results have been published (see below).

I also started the study of upper Silurian, Lochkovian, Pragian and Emsian conodonts NE of the BouTchrafine ridge.

### Publication

- WALLISER, O.H. & BULTYNCK, P. 2011. Extinctions, survival and innovations of conodont species during the Kacak Episode (Eifelian-Givetian) in south-eastern Morocco. - Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre, **81**: 5-25.

### CM Carole BURROW

(Brisbane, Australia) continues collaborating with Jan DEN BLAAUWEN (the Netherlands), Bob DAVIDSON (Scotland), John LONG (Los Angeles), John MAISEY (New York), Mike NEWMAN (Wales), Kate TRINAJSTIC (Perth), Sue TURNER (Brisbane), and Gavin YOUNG (Canberra) on various Devonian early vertebrate faunas. She is a CI with Gavin, Kate, Tim SENDEN and John LONG on an ARC Discovery project (mid2010-2013), the “Origin of jaws the greatest unsolved mystery of early vertebrate evolution”. She attended CAVEPS in Perth and participated in two field trips organized by Kate TRINAJSTIC to the Western Australian Carnarvon and Canning Basins in 2011.

### SDS-related Publications 2011

#### *Refereed papers*

- BURROW, C.J., NEWMAN, M.J., DAVIDSON, R.G. & DEN BLAAUWEN, J.L. 2011. Sclerotic plates or circumorbital bones in early jawed fishes? – Palaeontology, **54** (1): 207-214 [doi: 10.1111/j.1475-4983.2010.01003.x]
- NEWMAN, M.J., DAVIDSON, R.G., DEN BLAAUWEN, J.L. & BURROW, C.J. 2011. The Early Devonian acanthodian *Euthacanthus gracilis* from the Midland Valley of Scotland. – Scottish Journal of Geology, **47** (2): 101-111

#### *Papers in press*

- NEWMAN, M.J., DAVIDSON R.G., DEN BLAAUWEN J.L. & BURROW C.J. (in press). The Early Devonian acanthodian *Uraniacanthus curtus* from the Midland Valley of Scotland. – Geodiversitas.

### TM Jean-Georges CASIER

During 2011, and in collaboration with A. PRÉAT (University of Brussels), X. DEVLEESCHOUWER and E. PETITCLERC of my Institute, I have published two papers on Early Givetian ostracods and their lithological context at the Mont d'Haur (Givet, France). The first one is devoted to the Hanonet Fm / Trois-Fontaines Fm transition and the second one to the stratotype of the Terre d'Haur Fm.

Approximately 870 ostracods, and 48 species, were extracted from samples collected in the Hanonet Fm and Trois-Fontaines Fm in a section located along the south-western rampart of the historic entrenched military camp at the Mont d'Haur, and more than 5,500 ostracods, and 52 species, were extracted from samples collected in the stratotype for the Terre d'Haur Fm. They belong to several assemblages of the Eifelian Mega-Assemblage, from lagoonal environments to neritic marine environments below fair-weather wave-base some even below storm-wave base.

The study of the 5,320 ostracodes present in the stratotype of the Mont d'Haur Fm is still in progress and will end a series of paper on this geological structure.

In collaboration with S. MAILLET (University of Lille), I have also studied ostracods collected at the Givetian / Frasnian transition in the Sourd d'Ave section (Dinant Synclinorium, Belgium). Ostracods collected by MILHAU (1983) and by CASIER (1987) have been also reviewed. Forty-four ostracod species are identified in the Fromelennes Fm and 29 in the Nismes Fm. They belong exclusively to the Eifelian Mega-Assemblage, and several assemblages indicative of restricted and shallow marine, sometimes agitated, environments are recognized in the Fromelennes Fm. The great rarity of ostracods in the upper part of this formation provides evidence for less favorable lagoonal conditions probably related to increasing aridity at the end of the Givetian. In the Frasnes Group, assemblages are exclusively open marine and indicative of increasing water depth. The majority of ostracod species recognized in the Givet Group are missing in the base of the Frasnes Group as a consequence of the Frasnes Event, but the important modification of the environmental conditions at the boundary is mostly responsible for these disappearances.

The level of the Givetian / Frasnian boundary in the Dinant Synclinorium is still in debate. In fact, the Givetian / Frasnian boundary should be close the Givet Group / Frasnes Group boundary in the Dinant Synclinorium, and certainly below the boundary designated in 1986 by the Subcommission on Devonian Stratigraphy, in the auxiliary stratotype at Nismes (CASIER & PRÉAT 2009, 2010). That boundary is based on a "late morph" of *Ancyrodella rotundiloba*. In the Sourd d'Ave section, the Givetian / Frasnian boundary coincides arbitrarily with the Givet Group / Frasnes Group boundary at the base of the bed where the first *Ancyrodella* have been recorded by BULTYNCK (1974), after a 15 m-thick episode without any conodonts. The ostracod study and the sedimentological analysis of the GSSP located at Puech de la Suque (Montagne Noire, France), where the boundary corresponds to the entry of an "early morph" of *Ancyrodella rotundiloba* (KLAPPER *et al.* 1987), suggests that the G/F transition corresponds to the initiation of a sea-level rise (CASIER & PRÉAT 2007). This contribution to IGCP 596 has been presented at Graz and Minneapolis

#### **Devonian related publications and abstracts 2011**

CASIER, J.-G., DEVLEESCHOUWER, X., PETITCLERC, E. & PREAT, A. 2011. Ostracods, rock facies and magnetic susceptibility of the Hanonet Formation and Trois-Fontaines Formation boundary (Early Givetian) at the Mont d'Haur (Givet, France). - Bulletin de l'Institut royal de Sciences naturelles de Belgique, Sciences de la Terre, **81**: 63-96.

[[http://www.naturalsciences.be/pdf/bulletin/earth\\_sciences](http://www.naturalsciences.be/pdf/bulletin/earth_sciences)]

CASIER, J.-G., DEVLEESCHOUWER, X., MOREAU, J., PETITCLERC, E. & PREAT, A. 2011. Ostracods, rock facies and magnetic susceptibility records from the stratotype of the Terres d'Haur Formation (Givetian) at the Mont

d'Haur (Givet, France). - Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre, **81**: 97-128.

[[http://www.naturalsciences.be/pdf/bulletin/earth\\_sciences](http://www.naturalsciences.be/pdf/bulletin/earth_sciences)]

CASIER, J.-G., DEVLEESCHOUWER, X., MAILLET, S., PETITCLERC, E. & PREAT, A. 2011. Ostracods, rock facies and magnetic susceptibility of the Givetian/Frasnian transition at Ave-et-Auffe (Dinant Synclinorium, Belgium). - Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 30-31.

DEVLEESCHOUWER, X., CASIER, J.-G., PETITCLERC, E. & PREAT, A. 2011. Drowning of a carbonate platform at the Givetian/Frasnian boundary (Sourd d'Ave section, Belgium): a comparison of different proxies (magnetic susceptibility, microfacies and gamma-ray spectrometry). - Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 36-38.

CASIER, J.-G., DEVLEESCHOUWER, X., MAILLET, S., PETITCLERC, E. & PREAT, A. 2011. Ostracodes, rock facies and magnetic susceptibility of the Givetian/Frasnian transition at Sourd d'Ave (Dinant Synclinorium, Belgium). - Abstracts with Programs Geological Society of America Annual Meeting & Exposition, Minneapolis, Minnesota, October 9-12, **43** (5): 427 + pdf, 3 pp.

[[http://gsa.confex.com/gsa/2011AM/finalprogram/abstract\\_190485.htm](http://gsa.confex.com/gsa/2011AM/finalprogram/abstract_190485.htm)]

#### **CM Carlo CORRADINI**

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

In Sardinia several upper Silurian and lowermost Devonian outcrops and sections were restudied in order to update the stratigraphical information on the basis of recent taxonomical novelties (with M.G. CORRIGA). A couple of sections of the same time span have been sampled in the Spanish Pyrenees (with J.I. VALENZUELA-RIOS, M.G. CORRIGA and J.C. LIAO).

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

The project, coordinated by T. SUTTNER (Graz) and me, involves several colleagues from various countries and is open to everybody can give a contribution. Within this project, several sections from Silurian to Upper Devonian are in study in various areas of the Carnic Alps (with L. SIMONETTO, M. PONDRELLI, M.G. CORRIGA, C. SPALLETTA, T. SUTTNER, E. KIDO and others).

Research on Late Devonian and Early Carboniferous are mainly related with the International working Group on the redefinition of the Devonian/Carboniferous Boundary (led by M. ARETZ, Toulouse). In this respect a paper on taxonomic problems of early siphonodellids (with S.I. KAISER) and the revision of genus *Protognathodus* (with S.I. KAISER, M.C. PERRI and C. SPALLETTA) have been published. Also, some sections in central Iran (Tabas and Kerman areas) have been studied (with A. BAHRAMI, Isfahan), as well as a few new sections in the Clymeniae Limestones of SE Sardinia.

Maria G. CORRIGA has successfully defended her PhD thesis on conodont taxonomy and biostratigraphy across the S/D boundary in Sardinia and the Carnic Alps. She proposed a regional conodont zonation for the two investigated areas and she will continue to work on the same time frame.

Ali BAHRAMI (Isfahan, Iran) spent several months in Cagliari within his PhD project on Late Devonian and Early Carboniferous conodonts from several sections of central Iran. He defended his PhD in June 2011 in Isfahan University.

Angelo MOSSONI defended a Master thesis on Famennian conodonts from SE Sardinia and is going to start a PhD on selected Famennian events.

#### **Published papers and abstracts related to the Devonian (2011)**

- BAHRAMI A., CORRADINI C. & YAZDI M. 2011. Conodont biostratigraphy across the Devonian-Carboniferous boundary in the Shotori Range, Tabas area, central east Iran Microplate. *Bollettino della Società Paleontologica Italiana*, 50 (1): 35-53.
- BAHRAMI A., GHOLAMALIAN H., CORRADINI C. & YAZDI M. 2011. Upper Devonian conodont biostratigraphy of Shams Abad section, Kerman province, Iran. - *Rivista Italiana di Paleontologia e Stratigrafia*, 117 (2): 199-209.
- CORRADINI C., KAISER S.I., PERRI M.C. & SPALLETTA C. 2011. *Protognathodus* (Conodonta) and its potential as a tool for defining the Devonian/Carboniferous boundary. - *Rivista Italiana di Paleontologia e Stratigrafia*, 117 (1): 15-28.
- CORRIGA M.G., SUTTNER T.J., KIDO E., CORRADINI C., PONDRELLI M., & SIMONETTO L. 2011. The age of the La Valute limestone-Findening limestone transition in the La Valute Section (Lower Devonian, Carnic Alps, Italy). - *Gortania Geologia, Paleontologia, Planetologia*, 32: 5-12.
- KAISER S.Î. & CORRADINI C. 2011. The early Siphonodellids (Conodonta, Late Devonian-Early Carboniferous): overview and taxonomic state. - *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 261: 19-35.

- KIDO E., SUTTNER T.J., KOPTIKOVA L., PONDRELLI M., CORRADINI C., CORRIGA M.G., SIMONETTO L., BERKYOVÁ S. & VODRÁŽKA R. 2011. Magnetic susceptibility as tool for high-resolution correlation of pelagic and distal slope facies of the Middle Devonian in the Carnic Alps: preliminary results. - In KOPTIKOVA L., HLADIL J. & ADAMOVIC J. (Eds): Miroslav Krs Conference: Time, Magnetism, Records, Systems and Solutions. The 2011 Annual IGCP 580 Meeting, October 12-18 Prague, Czech Republic, Abstract Volume, Institute of Geology ASCR, v. v. i.: 31-32.
- KIDO E., SUTTNER T.J., PONDRELLI M., CORRADINI C., CORRIGA M.G., SIMONETTO L. & BERKYOVÁ S. 2011. Correlation of Mid-Devonian coral deposits of the Carnic Alps across the Austro-Italian border. - *Kölner Forum für Geologie und Paläontologie* 19: 77-81.
- KIDO E., SUTTNER T.J., PONDRELLI M., CORRADINI C., CORRIGA M.G., SIMONETTO L. & BERKYOVÁ S. 2011. Middle Devonian rugose corals of the Carnic Alps and their relation to the Late Eifelian Kacak Event. - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, 16: 54-56.
- PONDRELLI M., CORRADINI C., CORRIGA M.G., KIDO E., SIMONETTO L., SPALLETTA C., SUTTNER T.J., & CARTA N. 2011. Pragian to Famennian depositional evolution of the M. Pizzul area (Carnic Alps, Italy): preliminary results. - *Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz*, 16: 78-79.
- SPALLETTA C., CORRADINI C., KAISER S., MATYJA H., OVER D.J. & PERRI M.C. 2011. Methods in taxonomy and biostratigraphy, and some note on chronostratigraphy: the Devonian-Carboniferous Boundary. - SDS Newsletter, 26, 30-33.

#### **TM Jed DAY**

#### **Western Alberta Miette and Ancient Wall Detached Reef Platform and Basinal Successions**

J.DAY and C.M. MICHAEL WHALEN (University of Alaska-Fairbanks) have published a series of papers focused on Givetian-Early Famennian syntheses of the sea level and magnetic susceptibility record from Alberta Rocky Mountain outcrop studies (WHALEN & DAY 2010). We have also focused recent attention on paleoceanographic-isotopic-trace elemental studies of the late Early to Middle Frasnian interval spanning the *punctata* Zone Event (PZE) as outlined in recent papers by CM WHALEN'S graduate student M. ŚLIWIŃSKI (see ŚLIWIŃSKI et al. 2010a, 2010b, 2011). A significant recently completed (see abstract by WHALEN et al. 2011 in press) investigation focused on spectral analysis of Magnetic susceptibility data sets that permits astronomical calibration of the Frasnian Stage, to be followed by subsequent follow-up studies, one from higher resolution data that is in development from the Iowa Basin.

#### **Lochkovian-Famennian of the Iowa and Illinois Basins.**

*Eifelian-Early Famennian of the Iowa Basin Iowa.* T.M J. DAY and collaborators (CM Brian WITZKE, Univ. of Iowa; Billy BUNKER, Iowa Geological

Survey) have completed our latest synthesis of the Eifelian-Early Famennian event history of the Iowa Basin region and will submit it for publication in early 2012. This incorporates new conodont biostratigraphic data from continuous sampling of Middle Givetian-Latest Famennian in three cores from eastern, southeastern, and north-central Iowa and older published data, as well as new data on the Late Eifelian-Late Frasnian platform shelly faunas.

#### *Late Frasnian-Famennian Event Stratigraphy-Biostratigraphy and Carbon Isotope and Trace Element and REE Geochemistry.*

A working group (TM J. DAY, CM B.J. WITZKE, Univ. of Iowa; Harry ROWE, Univ. of Texas-Arlington; Chris HOLMDEN, Univ. Saskatchewan) have completed development of Carbon isotopic record through the Middle Givetian-Latest Famennian strata of the Iowa Basin. The Middle Givetian to Early Famennian epeiric carbon isotopic record will be published in 2012.

#### *Regional Latest Frasnian-Tournasian of the Iowa-Western Illinois Basin.*

TM J. DAY and CM Brian WITZKE are very near completion our biostratigraphic study and regional stratigraphic synthesis of the Latest Frasnian-Latest Famennian shale and carbonate platform succession in the Iowa and western Illinois Basin, with detailed new conodont data (400+ samples) from onshore cores as well as the largely hemipelagic shale dominated core sections noted in earlier reports. Our Famennian carbon isotopic records span the entire Famennian, with evidence of a lowstand truncating our two records of the very latest Famennian Hangenberg Excursion in cores. We hope to have this paper completed later in 2012.

#### *Lochkovian-Middle Givetian of the Southern Illinois Basin.*

J. DAY (and students) with Dr. Sofie GOUWY and Ken MACLEOD (Univ. of Missouri) are presently engaged in restudy of the sequence stratigraphy, conodont & brachiopod biostratigraphy, sequence and stable carbon and oxygen isotopic chemostratigraphy of Grand Tower and Saint Laurent formations in the southern Illinois Basin Sparta Shelf area. Carbon isotopic data documented a significant  $\delta C^{13}$  excursion coincident with the initial major marine flooding event of Devonian T-R cycle If, at or just above the Eifelian-Givetian boundary, recognized elsewhere in Europe. Conodont work by S. GOUWY demonstrate that the Grand Tower spans the *serotinus* through *ensensis?* Zones, and outcropping Saint Laurent as young as *timorensis* Zone (Early Givetian). Significant conodont apatite  $\delta O^{18}$  isotope excursions are noted in the upper half of the Grand Tower (Eifelian) and Saint Laurent (Early Givetian) formations. These data will be presented at the Pander Society Symposium in 2012.

We have also begun study of a long core penetrating the entire Lower to Middle Devonian (Lochkovian-Middle Givetian) in the southern Illinois Basin that features a much more complete conodont sequence from the formations mentioned above, with older Emsian, Pragian, and Lochkovian faunas with samples processed at alternate one foot intervals through the Devonian part of the core (1100 feet, 335 m).

#### **Middle-Upper Frasnian of the Great Basin-Nevada**

J. DAY and collaborators from Idaho State University (Dr. Leif TAPANILA, and graduate students) have been investigating the conodont and brachiopod biostratigraphy of the Guilmette Formation above and below the Alamo Breccia in the type area and areas northward southern and central Nevada with significant new Middle Frasnian brachiopod faunas recovered from reef-cavity (concentration lagerstat) fillings in RESO's Reef and off-reef platform deposits. Thus far samples collected by TAPANILA's students yield a diverse fauna from reef-cavity fillings and off-reef platform deposits including species of *Hypothyridina*, *Coeloterorhynchus*, *Spinatrypina* (*Exatripysa*), *Desquamatia* (*Seratripysa*), *Tenticospirifer*, *Eleutherokomma*, *Cyrtina*, *Warrenella* (*Warrenella*), *Schizophoria* (*Schizophoria*), *Productella*, *Leioproductus*, *Eostrophalosia*, *Strophodonta* (*Strophodonta*), *Nervostrophia*, *Gypidula*, and *Cranaena* (very large). These are associated above the Alamo Breccia with MN Zone 6 and 7 conodont faunas. Systematic descriptions of these new faunas are underway, as well as related faunas from western Alberta (Upper Cairn-Perdix), and the southern NWT (Hay River fauna). I hope to have the first of these papers (Nevada) out in the coming year.

#### **Publications 2009-2011**

- JOACHIMSKI, M.M., BREISIG, S., BUGGISH, W., TALENT J.A., MAWSON, R., GEREKE, M., MORROW, J.R. DAY, J., & WEDDGE, K. 2009. Devonian climate and reef evolution: Insights from oxygen isotopes in apatite. - Earth and Planetary Science Letters, **284**: 599-609.  
 WHALEN M. T., DAY, J., MISSLER, R. & OVER D. J. 2009. Magnetic Susceptibility and Insights into Devonian Sea Level and Climate Change, Alberta Rocky Mountains, Western Canada. - In OVER, D.J., ed., Paleontographica Americana, **64**: 228-229.  
 WITKZE, B.J., DAY, J. & BUNKER, B, 2009. Middle-Upper Devonian (Middle Givetian-Early Famennian) Record of Relative Sea Level and Climate Change in the Iowa and Western Illinois Basins, Western Laurussia. - In OVER, D.J., ed., Paleontographica Americana, **64**: 229-231.  
 ŚLIWINSKI, M.G., WHALEN, M.T. & DAY, J. 2010. Comparison of MS and other geochemical proxies from the Middle-Late Frasnian of the Canadian Rocky Mountains: Implications for interpreting paleoenvironmental change and the mid-Frasnian *punctata* Event. - Przegl'd Geologiczny, **58** (1): 10 pp.

- ŚLIWINSKI, M.G., WHALEN, M.T. & DAY, J. 2010. Trace element variations in the Middle Frasnian *punctata* Zone (Late Devonian) in the western Canada Sedimentary Basin—changes in oceanic bioproductivity and paleoredox spurred by a pulse of terrestrial afforestation? - *Geologica Belgica*, **13** (4): 459–482.
- WHALEN, M.T. & DAY, J. 2010. Cross-Basin Variations in Magnetic Susceptibility Influenced by Changing Sea Level, Paleogeography, and Paleoclimate: Upper Devonian, Western Canada Sedimentary Basin. - *Journal of Sedimentary Research*, v. 80, 1109–1127.
- ŚLIWINSKI, M.G., WHALEN, M.T., NEWBERRY, R.J., PAYNE, J.H. & DAY, J. 2011. Stable isotope ( $\delta^{13}\text{C}_{\text{carb}}$  and org,  $\delta^{15}\text{N}_{\text{org}}$ ) and trace element anomalies during the Late Devonian ‘*punctata* Event’ in the Western Canada Sedimentary Basin. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **307** (1–4): 245–271.

#### *Published Abstracts 2010–2011*

- DAY, J. 2010. Subtropical Record of Upper Devonian (Late Frasnian-Early Famennian) Sea Level Event and Kellwasser Extinction Bioevents, Southern Ouachita Margin-Western Laurussia (Arizona-New Mexico, central and northern Mexico). - *GSA Abstracts with Programs*, **42** (2): 89.
- DAY, J. 2010. Middle and Upper Devonian (Late Givetian-Early Famennian) Conodont Sequence in the subsurface of southeastern Iowa: Stratigraphic Condensation, Leaks and Submarine erosional Reworking along the western Margin of the Illinois Basin. - *GSA Abstracts with Programs*, **42** (2): 50.
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- PARISH, A., DAY, J., MYERS, R., TAPANILA, L. & BECKER, R.T. 2011. *Comiotoechia* and *Xinshaoella*? (Rhynchonellida-Ladogidae) from The Middle? And Late Frasnian of the Euramerican Tropics (North America and Germany): First known occurrences outside of the Russian Platform. - *GSA Abstracts with Programs*, **43** (1): 166.
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#### *Field Conference Publications 2009–2011*

- DAY, J. 2010. New Developments and Refinements to Lower Cedar Valley Group Conodont Biostratigraphy in Eastern Iowa. - In MARSHALL T. & FIELDS, (eds.), *The Geology of Klein and Conklin Quarries, Johnson County, Iowa*. - Geological Society of Iowa Guidebook **87**: 93–104.
- DAY, J. 2011. Field Guide to the Devonian Geology at the Moscow Quarry, Muscatine County, Iowa. - *Geological Society of Iowa Guidebook*, **89**: 11–31.
- DAY, J., QUADE, D. & ANDERSON, R.R. 2011. Geology of the Moscow Quarry, northwest Muscatine County, Iowa. - *Geological Society of Iowa Guidebook*, **89**: 31 pp.

#### **CM James R. EBERT**

Research in the Helderberg Group (Přídolí – Lochkovian) in New York with long-time colleague Damon MATTESON continues at a reduced rate, owing to my duties as department chairperson. We continue to examine problems in litho- and biostratigraphy within the Helderberg Group and have made some inroads on locating the base of the Lochkovian Stage.

#### **Progress on Locating the Silurian/Devonian Boundary in the Appalachian Basin**

Damon MATTESON and I continue to examine the occurrences of scyphocrinitid loboliths in the Green Vedder Member of the Manlius Formation. This includes the close occurrence of plate and cirrus loboliths, perhaps on the same bedding plane at an outcrop in the Hudson Valley (MATTESON & EBERT 2011). We have linked these loboliths to the positive  $\delta^{13}\text{C}$  excursion documented by WILLIAMS & SALTZMAN (2004) and KLEFFNER et al. (2009) at Cherry Valley. The excursion has also been documented at Clockville (WILSON, EBERT & MATTESON 2011). Preliminary studies of chitinozoans (BEVINGTON, EBERT & DUFKA 2010), coupled with the occurrences scyphocrinitids and the positive  $\delta^{13}\text{C}$  excursion (likely the Klonk event), suggest that the Silurian-Devonian boundary is probably in the upper beds of the Green Vedder Member, a position that is considerably lower than our previous estimates, but much higher than suggested by RICKARD (1975).

#### **Field Trips**

In October, 2011, former graduate students Randall WILSON, Damon MATTESON and I led a field trip for the 83rd Annual Field Conference of the New York State Geological Association (WILSON, EBERT & MATTESON 2011). This trip, built upon the framework of WILSON’s (2010) master’s thesis, concentrated on the sedimentology and stratigraphy of the Green Vedder Member of the Manlius Formation.

## Recent Publications

- BEVINGTON, K. S., EBERT, J.R., & DUFKA, P. 2010. Early Devonian (Lochkovian) chitinozoan biostratigraphy of the lower Helderberg Group, Appalachian Basin, New York State and the age of the "Kalkberg" K-bentonite. - Geological Society of America, Abstracts with Programs, **42** (1): 136.
- EBERT, J.R., MATTESON, D.K., & WILSON, R. 2010. Sedimentologic Observation and Stratigraphic Interpretation of the Lower Devonian (Lochkovian) Manlius Formation along the Mohawk River Valley in Upstate New York: A Discussion. - Journal of Geology, **118**: 333-337.
- MATTESON, D. & EBERT, J. 2011. Where Does the Devonian Begin in the Appalachian Standard Succession? Recognition of the Silurian – Devonian Boundary Event in the Helderberg Group of New York State. - Geological Society of America Abstracts with Programs, **43** (1): 97
- WILSON, R.H. 2010. The Sedimentology and Stratigraphy of the Manlius Formation (Přídolí) and Adjacent Units: Lower Helderberg Group, Central New York. - State University of New York, College at Oneonta, unpublished M.A. thesis, 148 pp.
- WILSON, R., EBERT, J. & MATTESON, D. 2011. The Green Vedder Member – a Highstand Systems Tract in the "Peritidal" Manlius Formation. - New York State Geological Association Fieldtrip Guidebook, 83<sup>rd</sup> Annual Meeting, p.87-106.
- WILSON, R. H. & EBERT, J.R. 2010. Unconformities and stratigraphic relationships within the Manlius Formation (Helderberg Group (Přídolí?)) of central New York State. Geological Society of America, Abstracts with Programs, **42** (1): 136.

## CM Raimund FEIST

Systematics and biostratigraphy of late Frasnian trilobites from the Canning Basin, NW Australia, are now accomplished. With 51 taxa present (2 styginids, 5 odontopleurids, 7 harpetids, 11 phacopids, 2 aulacopleurids, 4 tropidocoryphids and 13 proetids) the fauna is the the richest known worldwide characterising the terminal Frasnian. The associations allow an unbroken, fine-scaled biostratigraphy from Zone 11 to 13b that strengthens conodont and goniatic acid based zonations. Eleven species disappear within the *linguiformis* Zone marking the base of the time interval corresponding to the Upper Kellwasser horizon though the latter is not materialized in the sections.

Trilobite contribution to investigations to redefine the Pragian/Emsian boundary in the Zinzilban section, Uzbekistan, was published within the frame of a monograph on Uzbekistan trilobites from the Early and Middle Devonian (OWENS et al., 2010). Main outcome is a remarkable increase of diversity within the critical interval (beds 40.1-40.9) characterized by the first entry of *P. excavatus*: 14 genera with 5 new species were recognized.

Current work concerns the description, ecological behaviour and biostratigraphical significance of Devonian scutelluid trilobites from SE Morocco.

## Recent publications

- MCNAMARA, K., FEIST, R. & EBACH, M. 2009. Patterns of Evolution and Extinction in the last harpetid trilobites during the Late Devonian (Frasnian). - Palaeontology, **52** (1): 11-33.
- FEIST, R., McNAMARA, K. J., CRÔNIER, C. & LEROSEY-AUBRIL, R. 2009. Patterns of extinction and recovery of phacopid trilobites during the Frasnian-Famennian (Late Devonian) mass extinction event, Canning Basin, Western Australia. - Geological Magazine, **146** (1): 12-33.
- FEIST, R., LEROSEY-AUBRIL, R. & JOHNSON, R. 2010. Coaptative devices, enrollment, and life habits in *Paralejurus*, a particular case in scutelluid trilobites. - Palaeobiology and Palaeoenvironment, **90**: 125-137.
- OWENS, R.M., IVANOVA, O. KIM, I., POPOV, L.E. & FEIST, R. 2010. Lower and Middle Devonian trilobites from southern Uzbekistan. - Memoirs of the Association of Australasian Palaeontologists, **39**: 211-244.
- ELLWOOD, B.B., TOMKIN, J.H., EL HASSANI, A., BULTYNCK, P., BRETT, C., SCHINDLER, E., FEIST, R. & BARTHOLOMEW, A. 2011. A climate-driven model and development of a floating point time scale for the entire Middle Devonian Givetian Stage: A test using magnetostratigraphy susceptibility as a climate proxy. - Palaeogeogr, Palaeoclimatol, Palaeoecol., **304**: 85-95.

## TM Nadezhda G. IZOKH and the NOVOSIBIRSK GROUP

During the year 2011 our team continued the investigation of Devonian stratigraphy at the south of West Siberia. 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 and N.V. SENNIKOV, T.P. KIPRI-YANOVA, O.A. RODINA, A.YU. YAZIKOV, PhD student T.A. SHCHERBANENKO, and Dr. O.P. IZOKH from the SOBOLEV Institute of Geology and Mineralogy SB RAS.

The international conference "Biostratigraphy, paleogeography and events in Devonian and Lower Carboniferous" in memory of leading Russian Devonian stratigrapher Dr. Evgeny A. YOLKIN was held during July, 20 – August, 10, 2011 in Novosibirsk and Ufa. It gathered 62 participants with 32 oral presentations and 23 posters, and two video-presentations. The program of the Pre-Conference excursion to the South Urals included the examination of reference sections with well-defined Frasnian and Famennian stages and Devonian/Carboniferous boundaries. This excursion was guided by Drs. O.V. ARTYUSHKOVA, E.I. KULAGINA, V.N. PUCHKOV and PhD student R.CH. TAGARIEVA from the Institute of Geology USSc of RAS. The Post-Conference excursion was carried out in the Kuznetsk Basin and Salair (Russia) during July, 29 to August, 10. It was guided by Drs. N.K. BAKHAREV, N.G. IZOKH, O.T. OBUT, A.YU. YAZIKOV and S.A. ANASTASIEVA from the Institute of Petroleum Geology and Geophysics SB RAS.



The participants of the International conference (IPGG SB RAS, Novosibirsk).



The first finding of ammonoids in the type section of the Safonovo Formation (Zarechnoe village, NE Salair, section B-8333, bed 11). (Post-Conference excursion, 2011)



Last day of the Post-Conference excursion, camp on right bank of the Tom' River.

Participants examined multi-facies Devonian and Lower Carboniferous sequences in the Salair and at the margins of the Kuznetsk Basin.

The preparation of the guidebook for the Post-conference excursion included a revision of all data on Devonian and Carboniferous micro- and macrofauna obtained so far from the Salair and the northern margin of the Kuznetsk Basin. New data on the distribution of brachiopods, ammonoids, conodonts and some other fauna can be found in the excursion's guidebook (Middle-Upper Devonian, 2011). We continue the revision of data on the Devonian sequences from the western part of the South Tien Shan. A number of papers on the Lower and Middle Devonian Kitab State Geological Reserve was published by a large group of authors. Among them are: YOLKIN E.A., KIM A.I., APEKINA L.S., BAKHAREV N.K., ERINA M.V., IZOKH N.G., KIM I.A., MESHCHANKINA, N.A., RAKHMONOV U.D., SALIMOVA F.A., SENNIKOV N.V., KARIMOVA, F.S., TSMEIREK, E.S., YAZIKOV A.YU., WEDDIGE K., VALENZUELA-RIOS J.I., NEKHOROSHEVA, L.V., AND MESENTSEVA, O.P. New data of the lithology and paleontologic characteristics of the upper part of the Pragian, Emsian and lower part of the Eifelian sequences exposed in the Zinzilban and Khodzha-Kurgan Gorges of the Kitab State Geological Reserve (Uzbekistan Republic) were presented. For the first time the detailed (bed-by-bed) description of the upper part of Pragian to the lower part of Emsian section exposed along the Zinzil'ban Gorge, where Emsian GSSP was established, was published. Location of paleontological samples and the panorama view of the sections are shown. Biostratigraphic analysis of fauna (brachiopods, conodonts, tentaculites, tabulate and rugose corals, crinoids and bryozoan) were given. These papers were published in Journal News of Paleontology and Stratigraphy, 2011, Issue 15. Supplement to Journal Geologiya i Geofizika, 52.

**TM NADEZHDA G. IZOKH**, in cooperation with student S.V. CHERNIGOVSKY, have got new Lochkovian conodont collections from the Tom'-Chumysh (upper part) and Petz stratotype sections (Tolstochikha Quarry, Gur'evsk town, NE Salair). Conodonts were recovered from all carbonate samples. Species of *Panderodus*, *Pandorinellina*, *Pelekysgnathus*, *Ozarkodina* and *Belodella* are found through the entire section. The first discovery of *Icriodus woschmidtii transiens* CARLS & GANDL was made in the lower part of the section. Along with them *Pedavis* cf. *Ped. breviramus* MURPHY & MATTI was also obtained from this lower interval. Predominant in the conodont collection are *Panderodus* (up to 75 %) and *Pandorinellina* elements.

**N.G. IZOKH**, in cooperation with PhD student D.S. SHAROVKA, analyzed conodont collections from cores of 72 wells drilled in 51 exploratory areas of

the West Siberia Geosyncline (WSG). Most wells were drilled in the central part of the WSG – in the Nyurol'ka and Var'yogan facial zones. The conodonts obtained are mainly Devonian plus a few Carboniferous taxa. Ordovician and Silurian conodonts are represented by single specimens. The conodont Color Alteration Index (CAI) was determined by using a binocular microscope and comparison with a standard collection kindly provided by Dr. Anita G. HARRIS. On the whole, the Paleozoic rocks yielded conodonts with CAI s mainly 1–4 from a standard scale of 10 (EPSTEIN et al., 1977). Most of the observed conodont CAI s were between 1.5 and 2. The data obtained indicate the low grade of thermal annealing for the studied Paleozoic carbonates from the West Siberia Geosyncline.

**CM NIKOLAY K. BAKHAREV**, together with Dr. E.S. SOBOLEV, studied ammonoids from the Safonovo Formation (Prokopievsk town, NE Salair) as well as from the Akarachkino Beds, Mamontovo Horizon, (Gurievsk town, NE Salair). Ammonids assemblage includes: *Agoniatites vanuxemi* (HALL, 1879) Group, *Fidelites* sp. and *Cabrierooceras salairicum* NIKOLAEVA, 2010. During the field excursion in 2011 for the first time ammonoids were discovered (by A.A. DEREUIL) from the limy aleurolites in the type section of the Safonovo Formation (Zarechnoe village, NE Salair, section B-8333, bed 11). The obtained assemblage belongs to the Upper Eifelian *Agoniatites costulatus* Zone of the standard zonation by BECKER & HOUSE (2000).

#### **CM Olga T. OBUT**

Frasnian-Famennian radiolarian associations were found in the carbonate-siliceous Akbasay Formation cropping out in the Kule Gorge along the left bank of the Dzhindz-Darya River in the Zeravshan-Gissar mountains of the South Tien Shan. Remarkable is that radiolarians have been discovered together with conodonts (OBUT & IZOKH, 2010). The *punctata* Zone association is represented by moderately preserved *Trilonche hindea* (HINDE), *Tr. davidi* (HINDE), *Tr. elegans* HINDE, *Astroentactinia stellata* NAZAROV, *A. paronae* (HINDE), *Haplentactinia* cf. *rhinophyusa* FOREMAN, *Radiobisphaera* sp. and *Palaeoscenidium* sp. The uppermost Frasnian and F/F (*linguiformis*- ?lowermost *triangularis* zones) interval is dominated by well-preserved, diverse and very abundant *Trilonche davidi* (HINDE), *Tr. elegans* HINDE, *Tr. echinata* (HINDE), *Tr. minax* (HINDE), *Tr. guangxiensis* LI & WANG, *Tr. cf. variacanthina* (FOREMAN), *Astroentactinia stellata* NAZAROV, *A. paronae* (HINDE), *Palaeothalomnus* cf. *quadriramosum* (FOREMAN), *P. timokhini* AFANASIEVA, and rare *Polyentactinia* cf. *circumretia* NAZAROV & ORMISTON, *Nazarovites* cf. *bioculus* AFANASIEVA, *Palaeoscenidium cladophorum* DEFLANDRE, *Moskovistella* cf. *allbororum* AFANASIEVA, *Haplentactinia* cf.

*rhinophyusa* FOREMAN, and *Spongoentactinella* ? sp. The lower Famennian *crepida* Zone association is dominated by moderately preserved abundant *Trilonche vetusta* HINDE, *Tr. davidi* (HINDE), *Tr. echinata* (HINDE), *Tr. minax* (HINDE), *Tr. hindea* (HINDE), and rare *Haplentactinia* cf. *rhinophyusa* Foreman, *Astroentactinia* cf. *stellata* NAZAROV, A. sp., *Polyentactinia* sp., *Radiobisphaera* sp., and *Palaeoscenidium* sp. The middle Famennian *marginifera* Zone association produced few moderately well-preserved *Trilonche minax* (HINDE), *Tr. echinata* (HINDE), *Tr. vetusta* HINDE, *Tr. guangxiensis* LI & WANG, *Tr. cf. variacanthina* (FOREMAN), *Astroentactinia* cf. *stellata* NAZAROV, A. sp. and indet. radiolarians.

The studied radiolarian associations are characterized mainly by spherical forms dominated by diverse spongellarians: abundant entactiniids, few haplentactiniids and rare polyentactiniids, as well as spiny palacantholithids and palaeoscenidiids. However ceratoikiscids, characteristic for the Upper Devonian, are lacking.

**Aleksandr Yu. YAZIKOV and Tat'yana A. SHCHERBANENKO** studied brachiopods from the Frasnian and Famennian sequences in Barzass region, north-eastern margin of the Kuznetsk Basin. Three brachiopod assemblages were distinguished.  
 1. An assemblage with *Cyrtospirifer schelonicus* NAL. and *Anathyris supraphalaena* KHALF. occurs in Beds 1–14 of Section Ya-9013 and is most taxonomically diverse (25 species). Along with typical Frasnian species, such as *Mucrospirifer ales* (KHALF.), *M. mesocostalis* (HALL), *Cyrtospirifer achmet* NAL., *Sibiratrypa vassinensis* RŽON., and *S. websteriformis* RŽON., it includes a number more typical Givetian forms, including *Protodouvillina alchedatica* GRATS. & YAZ., *Elytha* cf. *undifera* (ROEM.), *Xystostrophia* ex. gr. *umbraculum* (SCHLOTH.), *Productella subaculeata* (MURCH.), etc.  
 2. An assemblage with *Cyrtospirifer ussoffi* KHALF. and *Anathyrella monstrum* KHALF. was recovered from Beds 2–13 (only from the lower part of Bed 13) in Section Yo-9014. A total of 14 species was found. Amongst them there are *Mucrospirifer mesocostalis* (HALL), *Athyris concentrica* (MURCH.), *Cyrtina* cf. *recta* HALL, *Cyrtospirifer conoides* (Roem.), and *Productella subaculeata* (MURCH.). *Anathyris* ex. gr. *helmerseni* (v. BUCH) is present in the underlying strata. Only three species, *Athyris concentrica* (MURCH.), *Adolfia* cf. *zickzack* (ROEM.) and *Praewaagenoconcha* cf. *speciosa* (HALL) were recovered from overlying lower Famennian strata. Two former species were not found in the section above Bed 13, the latter – lower than Bed 13, thereby characterizes a Frasnian–Famennian transition interval.

3. An assemblage with *Cyrtospirifer tschernyschewi* KHALF. and *Mesoplica praelonga* (SOW.) occurs in Beds 13 (upper part) – 21 in Section Yo-9014 and is characterized by 18 species. Only *Adolfia* cf.

*zickzack* (ROEM.) and *Praewaagenoconcha* cf. *speciosa* (HALL) were obtained from the underlying upper Frasnian strata. Productidins, represented by 7 species, belong to three genera and are predominant in this assemblage.

The aforementioned three brachiopod assemblages are characteristic for the Vassino, Solomino and Peshchorka horizons respectively and are in accord with those reported from a number of sections in northeast and north-west margins of Kuznetsk Basin.

4. Brachiopods and conodonts (data by N.G. IZOKH) from the Frasnian/Famennian boundary strata in the Barzass region, north-eastern margin of the Kuznetsk Basin, were under special investigation. The position of the F/F boundary was proved by paleontological data and localized in an interval of 40 cm. This interval is characterized by a gradual change in the brachiopod succession. The *Cyrtospirifer ussoffi* KHALF. and *Anathyrella monstrum* KHALF. (index-species for the Solomino Horizon) assemblage changes to an association of *Cyrtospirifer tschernyschewi* KHALF. and *Mesoplica praelonga* (SOW.) (index-species for the Peshchorka Horizon). The conodont assemblage recovered is poor and represented mainly by *Polygnathus*. From Beds 12–14 the following conodonts characteristic for F/F interval were found: *Polygnathus brevilaminus* BRANSON & MEHL, *Po. aff. brevis* MILLER & YOUNGQUIST, *Po. ex gr. gracilis* KLAPPER & LANE, *Polygnathus* sp., *Mehlina gradata* YOUNGQUIST and *Mehlina* sp. The Upper Frasnian part of the section is characterized by homoctenids (tentaculites); they lack in the Famennian part.

**Olga P. Izokh** studied carbon and oxygen isotopic composition variation in sections of Lower and Upper Devonian strata in the Zeravshan-Gissar area (Uzbekistan), Salair and South Urals (Russia).

At first, petrographic studies and geochemical investigation of the whole rock samples were carried out to identify diagenetically altered carbonate material. The state of brachiopod shell preservation was assessed using cathodoluminescence microscopy. As a result,  $\delta^{13}\text{C}$  curves that characterize primary carbon isotopes variations were obtained for the Salair region (Salairka Horizon, B-799 section, lower Emsian), Zeravshan-Gissar area (Zinzelban section, lower Emsian), and for the South Urals region (Akkyr, Bol'shaya Barma and Ryauzyak sections, Frasnian–Famennian, Upper Devonian).

Variations of the carbon isotopic composition in the Zinzelban section show a negative excursion just above the Pragian/Emsian boundary (base of *kitabicus* conodont Zone), where  $\delta^{13}\text{C}$  values change from 2 to -0.7‰, with a subsequent increase in  $\delta^{13}\text{C}$  up to 3‰. For the Salairka Horizon the  $\delta^{13}\text{C}$  record starts at 6.75 meters above its lower boundary where first carbonates appear in the section. The  $\delta^{13}\text{C}$  curve is characterized by two positive excursions, with

values increasing from 0.3 to 2.7‰ in the middle part of the lower Salairka subhorizon, and from 0.4 to 3.4‰, in the middle part of Middle Salairka subhorizon. Comparison of the observed curves has shown a record of a global negative excursion followed by an increase in  $\delta^{13}\text{C}$  values at the base of the Emsian (base of the *kitabicus* conodont Zone). The negative shift coincides with the appearance of well-developed Pa element of *Polygnathus kitabicus*, *Polygnathus pannonicus* and *Polygnathus sokolovi*, established by E. YOLKIN and N. IZOKH. The following increase in  $\delta^{13}\text{C}$  values is coeval with the rise of biodiversity in brachiopods and tabulates (IZOKH 2011).

A synchronous  $\delta^{13}\text{C}$  positive excursion was established for the three Frasnian-Famennian sections in the South Urals. In all of them, the increase of  $\delta^{13}\text{C}$  values starts at the base of the Barma Beds that coincide with the Frasnian-Famennian boundary.  $\delta^{13}\text{C}$  values grow from 1 to 5.3‰ in the Bol'shaya Barma section, from 1 to 6.7‰ in the Akkyr section, and from 1 to 5.1‰ in the Ryauzyak section. The magnitude and absolute values of  $\delta^{13}\text{C}$  in the Akkyr section are higher than those in the Bol'shaya Barma and Ryauzyak sections, and higher than in same age carbonate sections. Comparison of the  $\delta^{13}\text{C}$  fluctuation with the changes in conodont biodiversity reconstructed by R.Ch. TAGARIEVA and O.V. ARTUSHKOVA (ARTYUSHKOVA et al. 2011) shows correlation between  $\delta^{13}\text{C}$  variation and ranges of conodont genera immediately above the F/F boundary. The maximum  $\delta^{13}\text{C}$  values corresponded to the expansion of *Icriodus* indicating shallowing of the marine basin. Higher  $\delta^{13}\text{C}$  values in the Akkyr section compared to the Bol'shaya Barma and Ryauzyak sections could be explained by even shallower sedimentary environments. This assumption is confirmed by the distribution of relatively deep-water brachiopod species in the Bol'shaya Barma section than in the Akkyr section (Mizens, 2009), and by the maximum numerical abundance of *Icriodus* forms in the Akkyr section at this level (ARTYUSHKOVA et al., 2011).

## References 2010

### Papers

IZOKH, N.G., SENNIKOV, N.V. & KLETS, T.V. 2010. Stratigraphic value of the first finding of marine microfauna in the Lower Devonian of North Minusa depression (Khakasiya, Russia). - News of Paleontology and Stratigraphy, 14: 11-16. Supplement to Journal Geologiya i Geofizika, 51.

### Abstracts

BAKHAREV, N.K. 2010. Middle and Upper Devonian ostracods from the Salair and Kuznetsk Basin, Russia. - Third International Palaeontological Congress, London, 2010, June 28 – July 3, p. 79.

IZOKH, N.G. 2010. Upper Devonian conodonts of West Siberia, Russia. - Third International Palaeontological Congress, London, 2010, June 28 – July 3, p. 209.

IZOKH, O. & IZOKH, N.G. 2010. Relationship between conodonts evolution and delta 13 C variation in early Emsian. - Abstracts of 6-eme Congress de la Societe Francaise des Isotopes stables, Toulouse, France, 25-29 October, 2010, p. 66.

OBUT, O.T. & IZOKH, N.G. 2010. Upper Devonian radiolarians from the zerafshan-gissar mountainous area (uzbekistan Republic). - Programme & Abstracts of Third International Palaeontological Congress, London, 2010, June 28 – July 3, p. 298.

## References 2011

### Guidebook

N.K. BAKHAREV, N.G. IZOKH, O.T. OBUT, J.A. TALENT. (AUTHORS: N.K. BAKHAREV, N.G. IZOKH, A.Y. YAZIKOV, T.A. SHCHERBANENKO, S.A. ANASTASIEVA, O.T. OBUT, S.V. SARAEV, L.G. PEREGOEDOV, V.G. KHROMYKH, O.A. RODINA, I.G. TIMOKHINA & KIPRIYANOVA, T.P. (Eds.) 2011. Middle-Upper Devonian and Lower Carboniferous Biostratigraphy of Kuznetsk Basin. - Field Excursion Guidebook, International Conference "Biostratigraphy, paleogeography and events in Devonian and Lower Carboniferous" (SDS / IGCP 596 joint field meeting), Novosibirsk, July 20 – August 10, 2011, 98 p., Novosibirsk, Publishing House of SB RAS.

### Papers

[see separate section "Devonian Publications": CONTENT OF "News of Paleontology and Stratigraphy", 15, Supplement to Journal Geologiya i Geofizika, 52.]

### Abstracts

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- (proposed CM) Leona KOPTÍKOVÁ
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## CM Ervīns LUKŠEVIČS

### Devonian of the Baltic area

Present studies deal mostly with Devonian vertebrates and stratigraphy of the western part of the East European Platform. Field work at the Pavari fossil site (upper Famennian of Latvia) resulted in a new extensive material on one of the first Devonian tetrapods *Ventastega curonica*, as well as the detailed sedimentological and taphonomical data gained from the Ketleri Formation. Taphonomy of the Devonian vertebrates from Latvia and NW Russia has been discussed in several contributions to the scientific meetings and in some papers submitted for publishing in *Leithaia* and *Estonian Journal of Earth Sciences*, working within a small team of

palaeontologists (Ervīns LUKŠEVIČS, Sandijs MĒŠĶIS, Jeļena VASIĻKOVA, Ivars ZUPIŅŠ) and sedimentologist (Ģirts STINKULIS) from University of Latvia. The first attempt to analyse the geological structure of the Famennian section in Latvia using methodology of the sequence stratigraphy has been made in collaboration with students of University of Latvia.

Participation in a collaborative project of Institute of Geology, Komi Scientific Centre, Uralian Division of RAS, Syktyvkar, Russia (Pavel BEZNOSOV), University of Uppsala, Sweden (Per E. AHLBERG), and University of Latvia (Ervīns LUKŠEVIČS) “Late Devonian vertebrates and the discovery of a new primitive tetrapod from the South Timan” (2009-2011) with significant contribution of Jennifer CLACK (Cambridge University) has resulted in several contributions to the scientific meetings in London (2010), Rīga (2010), St.-Petersburg/Luga (2011), and Dallas (2011).

Since the foundation of the Baltic Regional Stratigraphical Commission in 1969, which was reorganised in 1990 by its membership into a less formal Baltic Stratigraphical Association (BSA), the Baltic cooperation in regional stratigraphy is rather active. The BSA, which unites the national stratigraphical commissions of Estonia, Latvia, and Lithuania, as well as regional stratigraphical commission of NW Russia, organises regular scientific conferences devoted to various aspects of regional geology and stratigraphy. Last year the Eighth Baltic Eighth Baltic Stratigraphical Conference was held on 28 August – 1 September 2011 in Riga. This meeting has attracted more than 70 participants from 10 countries; 64 abstracts dealing with various aspects of regional geology, biostratigraphy and palaeontology, event stratigraphy, isotopic geochronology and chemostratigraphy, stratigraphical methodology, regional aspects of applied geology, sequence stratigraphy and other topics have been published (LUKŠEVIČS et al. 2011). Special sessions of IGCP Project 591 “The Early to Middle Palaeozoic Revolution” and IGCP Project 596 “Climate change and biodiversity patterns in the Mid-Palaeozoic (Early Devonian to Late Carboniferous)” were organized in conjunction with the 8<sup>th</sup> BSC, and geological excursion to the most exciting outcrops of the Devonian and Quaternary deposits of northern Latvia has been organised (STINKULIS & ZELĀRS 2011).

### Recent publications

*BSA meeting abstract volume:*

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*BSC field guidebook:*

STINKULIS, G. & ZELĀCS, V. (eds.) 2011. The Eighth Baltic Stratigraphical Conference. Post-Conference Field Excursion Guidebook. - University of Latvia, Riga. 60 p.

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OLIVE, S., LEBEDEV, O., IVANOV, A., CLÉMENT, G., LUKŠEVIČS, E., BLIECK, A., ZAKHARENKO, G., ZUPINŠ, I. & STŪRIS, V. 2011. 2009-2010 Russo-Franco-Latvian expeditions in the Main Devonian Field (north-western Russia). - In LEBEDEV O. & IVANOV A. (eds.), II International Obruchev Symposium "Palaeozoic Early Vertebrates". St. Petersburg – Luga, August 1-6, 2011, Abstracts: 38.

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**CM LUO Hui****Devonian publications**

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**TM MA Xueping**

During the year of 2011, previous Devonian projects continued. Our July fieldwork in western Junggar of Xinjiang, northwestern China, was concerned with several localities in the Hoboksar

and Hoxtolgay region and discovered some more large-sized ammonoids (similar to *Cyrtoclymenia*, which can apparently serve as a marker layer in the region).

In August, we visited a few important sections of neritic and neritic-rift basin facies in South China. Panxi section of eastern Yunnan Province is a well-known neritic sequence that is characterized by abundant benthic fossils (corals, brachiopods etc.) of Eifelian through Frasnian ages. The August field work concentrated on the Eifelian and Givetian, with benthic fossil collections as well as conodont samples. We need to do more work on the Frasnian sequence this coming summer. The Dabakou section of central Hunan Province is a neritic-rift basin facies sequence of mid-Givetian through mid-Frasnian times; abrupt lithological variation from massive reef limestone to thin-medium bedded limestone probably marks the Middle and Upper Givetian boundary. Geochemical samples across the G-F boundary have been processed and the results are being analyzed. The Xikuangshan section of central Hunan Province is well known for its Famennian sequence; our aim here was to compare it with the Famennian sequence in western Junggar.

Currently four students of mine are working with me on the Devonian. ZONG Pu works on the Famennian stratigraphy of the western Junggar region and is about to finish her PhD thesis. ZHANG Yubo works on Givetian-Famennian sedimentary environments and faunal changes; he is now in his 2<sup>nd</sup> year of PhD program. ZHANG Meiqiong is currently in a Master of Science program and works mainly on some brachiopods across the Middle and Upper Devonian boundary. LÜ Dan has just started her Master program.

### **CM Elga Mark-Kurik**

A joint paper by two authors, E. M.-K. & Anne PÖLDVERE (Geological Survey of Estonia), under the name "Devonian stratigraphy in Estonia: current state and problems" will be soon published in the Estonian Journal of Earth Sciences, 2012, **61** (1), 1–15 (just now finished reading its proofs). The paper includes an updated version of the Devonian stratigraphical chart of Estonia; absolute time scales by ICS, 2010 and B. KAUFMANN, 2006; conodont and miospore zonations and three fish zonations (agnathans, placoderms and acanthodians). Differences in the position of series and stage boundaries and age determination of regional units in the Baltic area, Belarus and NW Russia are dealt with. A modified version of the correlation chart of the Middle Devonian and lowermost Upper Devonian of Scotland and Estonia (presented on the Society of Vertebrate Paleontology meeting in Bristol, 2009) shows two key markers for correlation of these distant areas. Fish 'endemics' of these areas have a tendency to diminish gradually. It is

important to note that not only inarticulate brachiopods, e.g. *Bicarinatina* (in one case also *Orbiculoloidea*) come from the Middle Devonian rocks, but also rare articulated brachiopods as moulds have been discovered in poorly cemented siliciclastic deposits.

A talk on the Middle Devonian correlation problems in the Main Devonian Field, i.e. NW of the East European Platform was presented at the 8th Baltic Stratigraphical Conference in Riga, on August 28-30, 2011. A couple of days later Ieva UPENIECE received her doctors degree (E. M.-K. had a honour to be one of her opponents). Ieva's numerous publications and dissertation fulfil various gaps in our knowledge as taphonomy of fossils and classification of burial types of the famous Lode locality in Latvia, known for the articulate fish specimens *Panderichthys*, *Laccognathus*, *Asterolepis* etc. She has specially studied a specific lens-like bed with numerous juvenile specimens of different fossil fishes. And she also has described fish parasites and oldest host-parasite association.

Bite marks, found on exoskeletal bones of the Middle Devonian large psammoseid heterostracans have attracted attention of Brittish colleagues Zerina Johanson, Moya M. Smith and C. HOWARD. The material comes from the collections of the Institute of Geology, Tallinn University of Technology. First results of this extraordinary histological study, applying modern technique, were presented as a poster "Evolution of vertebrate bone repair" on the Palaeontological Association, 55th Annual Meeting 2011 in Plymouth, UK on December 17-20.

### **TM John MARSHALL**

#### **2010**

In 2010 I took some long awaited study leave and was able to spend part of this in Nanjing, China working with their Devonian palaeobotanists and palynologists (Zhu Huacheng, WANG Yi & XUE Honghe) on Devonian spores from Yunnan and Xinjiang. This was supported by the Chinese Academy of Sciences. The early part of the year was also dominated by getting ready for the SDS/IPC3 fieldtrip to the ORS of Scotland. This was quite complicated and involved boats, trains and automobiles but everything more or less went off as planned. Thanks to those who supported it by coming along and those who helped. Following the SDS trip and the IPC3 conference the next trip was our long delayed outing to Svalbard with Chris BERRY (plants), Charlie WELLMAN (Early Devonian spores) and Zivile ZIGAITE (fish). We visited sections in Mimerdal and Munidal that were studied in detail for palynomorphs by Keith ALLEN in the 60's. The sections are also famous for the early plant collections of HØEG including, of course, *Svalbardia*. We also had the visit to Southampton by Olga TEL'NOVA from Syktyvkar, Russia to jointly

study samples from the Frasnian/Famennian section that we drilled in 2009.

2010 finally saw the publication (online at least) of our 2 long papers (TROTH et al., MARSHALL et al.,) in the SDS *Palaeo*<sup>3</sup> Middle Devonian volume. These are from long sections from Bolivia where we can recognize Devonian events at high palaeolatitudes and the terrestrial Taghanic Event in the ORS of Scotland that we visited during the Scottish fieldtrip. ASTIN et al was also published. This gives detailed stratigraphical information and a new environmental interpretation for the important tetrapod (*Acanthostega*) localities in East Greenland and shows that the animals did not generally live in the environments where they died.

- TROTH, I., MARSHALL, J.E.A., RACEY, A & BECKER R.T. 2010. Middle Devonian sea-level change at high palaeolatitude: testing the global sea-level curve. - *Palaeo*<sup>3</sup>.  
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[doi:10.1016/j.palaeo.2010.10.016]
- ASTIN, T.R., MARSHALL, J.E.A., BLOM, H., BERRY, C. M. 2010. The Sedimentary Environment of the Late Devonian East Greenland Tetrapods. - Special Publication Geological Society of London, **339**, 93-109.

## 2011

In 2011 I continued my visiting professorship at NIGPAS in Nanjing, China. I was able to visit 3 times and worked with ZHU Huacheng, WANG Yi and XUE Honghe largely on Devonian spores from Xinjiang. We completed interesting work on the micro and megaspores from the Devonian volcanic arcs of the Altaids. These visits were supported by the Chinese Academy of Sciences and culminated in attending the 60<sup>th</sup> anniversary of NIGPAS in September.

In June I visited the Shetland Islands for the first time since 1985. This was where I did my PhD work. We identified a level in South east Shetland that looks like an Eday Marl correlative, i.e. the terrestrial Taghanic. We also collected more spores from the West Shetland volcanic sequence at Eshaness. These again prove to be Early Devonian in age and appear to be reworked. If so, they are the only evidence for Early Devonian in the Shetland Islands.

In late June I visited Bulgaria to supervise undergraduate student mapping. I didn't see any Devonian rocks but importantly met with some of their geologists who work on Devonian rocks and are keen to demonstrate these to the SDS at some future time.

Early August was occupied by the excellent conference and fieldtrip to Novosibirsk. I was then busy in Southampton helping with Ian HARDING to organise the AASP (American Association of Stratigraphic Palynologists) conference where we

got nearly 100 delegates. We managed a full day on the Palaeozoic including many Devonian talks. This was in honour of Bernard OWENS who has contributed much to Devonian and Carboniferous palynology.

The final trip out was to Bolivia with Ian TROTH (now with BG in Rio) and a new PhD student Jon Lakin. This time we worked on the Altiplano trying to extend the acritarch epibole correlations established at outcrop in the sub-Andean Zone by Ian.

As regards future publications most of 2011 was spent working on Chinese material from Xinjiang and the Frasnian/Famennian boundary sections from East Greenland and in the Komi Republic, Russia.

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- MARSHALL, J.E.A., TEL'NOVA, O.P., VETOSHKINA, O.S. 2011. Ecosystem crisis at the Frasnian-Famennian boundary (Southern Timan). - *Doklady Earth Sciences*, **440**, 1396-1398.
- XU, H.-H., BERRY, C.M., WANG, Y., MARSHALL, J.E.A., 2011. A new species of *Leclercqia* Banks, Bonamo et Grierson (Lycopsida) from the Middle Devonian of North Xinjiang, China, with a possible climbing habit. - *International Journal of Plant Science*, **172**, 836-846.

## CM Bruno MISTIAEN

During the last years, my research topics were always focused on Devonian stromatoporoids and tabulate corals with the systematic, biostratigraphy, palaeobiology, palaeobiogeography approaches. But a part of my activities was also devoted to valorization and protection of geological patrimonial areas of North of France (Boulonnais) and historical aspects. Moreover I organized some field trips for several national or international congresses taking place in Lille (France).

After the two PhD thesis presented in 2008 two other PhD thesis were prepared and presented in 2011. The Reza AARIPOUR PhD Thesis, co-tutored with Dr. MOSAVI, devoted to "Microfacies, sedimentary environment and sequence stratigraphy of Devonian strata in East Alborz Mountains" Shahid BEHESHTI University, was presented in January 2011. The Emilie PINTE PhD thesis, co-tutored with Dr. C. CRONIER, and entitled "Coraux tabulés givétiens d'Ardenne méridionale: paléobiodiversité et implications paléoécologiques", was presented in November 2011.

My present projects are to focalize on Strunian stromatoporoids from Avesnois (in relation with F/F and D/C crisis) in collaboration developed by D. BRICE and also complete the collaboration with Dr. Isabel MENDEZ-BEDIA, Oviedo University, Spain, relatively to the study of the lower Devonian stromatoporoids in Cantabrian Mountains. Another

project, with B. HUBERT, subsequently to one month of fieldtrip in Queensland, managed by J. TALENT in 2010, concerns the paleontological study and sedimentological analysis of several sections where reefs are well developed.

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- BLIECK, A., BRICE, D. & MISTIAEN, B. 2009. Le Griset et l'inventaire du Patrimoine Géologique National. - AVDG – Association pour Valoriser le Dévonien au Griset édit.: 1-128 Ko. - In *Patrimoine géologique*, 3 p. [<http://www.avdg.fr/pdfs/Griset%20et%20Patrimoine%20National.pdf>]
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- BLIECK, A., MISTIAEN, B. & BRICE, D. 2010. Groupe Français du Paléozoïque. Historique: 1. [<http://sites.google.com/site/groupefrancaispaleozoique/historique>]
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- MISTIAEN, B. & BRICE, D. 2009b. Le Boulonnais sous les tropiques. Les carrières du Griset et du Banc Noir à Ferques. In : « Des roches aux paysages dans le Nord – Pas-de-Calais. Richesse de notre patrimoine géologique ». - Société Géologique du Nord et Conservatoire des Sites Naturels au Nord et du Pas-de-Calais: 68-71.
- MISTIAEN, B. & BRICE, D. 2009c. Le Strunien. Le passage graduel entre le Dévonien et le Carbonifère. - In: Des roches aux paysages dans le Nord – Pas-de-Calais. Richesse de notre patrimoine géologique. - Société Géologique du Nord et Conservatoire des Sites Naturels au Nord et du Pas-de-Calais: 114-115.
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- MISTIAEN, B., BRICE, D., LOONES, C. & DE SOUSA, A. 2011. Intérêt d'affleurements temporaires pour la connaissance de la géologie régionale. Contact Formation de Beaulieu – Formation de Ferques (Boulonnais). - *Géoreg*, Lille, Octobre 2011.
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- PINTE, E. & MISTIAEN, B. 2010. What's impact of taghanic event on tabulate corals of Ardennes? - Third International Palaeontological Congress, London, June 26 – July 7<sup>th</sup>, 2010.
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Kölner Forum für Geologie und Paläontologie, **20**: 151-98, 45 figs.

#### **TM Jeff Over**

##### *Siphonodella sulcata*

In order to assess the holotype of *Siphonodella sulcata* as part of the D-C working group I contacted the curators at the Indiana University Paleontological Collections, as well as John REPETSKI at the US Geological Survey. The holotype card is present, but the specimen is missing. Gil KLAPPER reports that John HUDDLE communicated in the early 1960's that the holotype was missing. The type locality – Huddle (1934 – loc. 9) – is no longer accessible, it is completely covered and the roadway has been raised, so there is very little chance of it emerging. I am currently examining HUDDLE'S thesis materials and have collected two localities in southern Indiana in which a student – Scott EVANS – has recovered several specimens of *Siphonodella* from the same stratigraphic interval from which the holotype was likely recovered. The identity of *Siphonodella sulcata* is not in question based on HUDDLE'S illustrations; our goal is to have Indiana comparative specimens at-hand and higher resolution illustrations for study.

**In other activity:** Work with Gordon BAIRD on northern Appalachian Basin D-C boundary strata moves apace; collaborative work with BAIRD, Carl BRETT, and Chuck VER STRAETEN on the type Marcellus (Eif-Giv) and the biostratigraphy of the same unit is underway; magnetic susceptibility study of the D-C boundary in Oklahoma with Brooks ELLWOOD, and the boundary in southern Indiana and Kentucky is also active. Student Ali BAHRAMI is describing interesting Middle – Upper Devonian conodonts from Iran, nominally under my direction, and the tutelage of Carlo CORRADINI.

#### **CM Maria Cristina PERRI**

It has been a heavy academic year during which (as in previous years) I was in charge of the committee concerned with programs of studies. This is now at an end, allowing me to accelerate my conodont-research output extending through the Devonian into the Early Carboniferous. My research on the Devonian is now focused mainly on identification and evaluation of global environmental changes responsible for faunal diversity in space and time in the various Devonian events, especially around the Frasnian–Famennian (Fr–Fm) boundary. Despite the large number of papers produced in recent years on the end-Frasnian extinction event elsewhere in the globe, almost nothing has been published on that event in Southern

Alps sections. Portions of the carbonate sequence spanning the Fr–Fa boundary of two stratigraphic sections in the Carnic Alps (Italy and Austria) have been analysed. Both lack a black shale interval connected with the Upper Kelwasser Event. That interval is expressed sedimentologically in the Carnic Alps in shallow-water, bioturbated carbonate facies. Detailed sedimentologic, palaeontologic and geochemical analyses have been undertaken through the Carnic Alps sections in order to develop a complete database on what occurred across the Frasnian–Famennian boundary. It will enable comparison and precise stratigraphic alignment with the most significant coeval successions elsewhere globally. The research is in collaboration with Italian colleagues Enzo FARABEGOLI, Claudia SPALLETTA (both of Bologna) and Monica PONDRELLI (Pescara). Anita ANDREW (Sydney) has undertaken isotope analyses for the project.

With the same colleagues, I am involved with an Austrian-Italian project for formal definition and consistent nomenclature for pre-Variscan lithostratigraphic units of the Carnic Alps. My contribution concerns Devonian-Early Carboniferous conodont biostratigraphy for dating the units.

I have recently examined the conodont genus *Prothognathodus* in the hope of finding species that might be useful as marker(s) for definition of the Devonian-Carboniferous boundary. Results to date focused on *Protognathodus* have been inconsequential, but the project might yet produce useful results if expanded vigorously worldwide. The research has been performed in collaboration with Carlo CORRADINI (Cagliari), Sandra KAISER (Bonn) and Claudia SPALLETTA (Bologna). Progress reports are as follows:

CORRADINI, C., KAISER, S.I., PERRI, M.C., SPALETTA, C. 2010. Conodont genus *Protognathodus* as a possible tool for recognizing the Devonian/Carboniferous boundary. - Third International Palaeontological Congress (IPC3), London June 28-July 3, Programme and Abstracts:131.

CORRADINI, C., KAISER, S.I., PERRI, M.C., SPALETTA, C. 2011. Conodont genus *Protognathodus* as a possible tool for recognizing the Devonian/Carboniferous Boundary. - Rivista Italiana di Paleontologia e Stratigrafia, **117** (1):15-28.

SPALETTA, C., CORRADINI, C., KAISER S.I., MATYA, H., OVER, D.J., PERRI, M.C., 2011. Methods in taxonomy and biostratigraphy, and some note on chronostratigraphy: the Devonian-Carboniferous Boundary. - SDS Newsletter, **26**: 30-33.

## TM Grzegorz RACKI

Devonian successions in the Holy Cross Mountains and adjoining regions are intensively investigated, in different contexts, by the Silesian

University research group, and the most important recent publications are summarized below.

### ZATOŃ, M. & KRAWCZYŃSKI, W. 2011.

New Devonian microconchids (Tentaculita) from the Holy Cross Mountains, Poland. - Journal of Paleontology, **85**: 757-769.

Microconchid tubeworms from uppermost Emsian to upper Givetian fully marine environments during transgressive pulses are described. As the fossil group is poorly known, this Polish material contributes significantly to our understanding of the diversity of this extinct benthic group. In addition, the tubeworms are also studied by the same authors in the F-F passage beds of the Central Devonian Field, Russia (Palaeontology, **54**: 1455-1473). Remarkably, during the Early Famennian recovery, the brachiopod shell encrusters greatly flourished.

### FILIPIAK, P. 2011.

Palynology of the Lower and Middle Devonian deposits in southern and central Poland. - Review of Palaeobotany and Palynology, **166**: 213-252.

An extensive palynological investigation, in taxonomic, biostratigraphic and ecological terms, has been carried out on samples obtained chiefly from boreholes. Miospore zonation was established for the deposits. Palynofacies data strongly suggest terrestrial to shallow-marine conditions in the Early-Middle Devonian transition. During the early Eifelian, uniform marine conditions were established across the investigated region.

### Filipiak, P. & Zatoń, M. 2011.

Plant and animal cuticle remains from the Lower Devonian of southern Poland and their palaeoenvironmental significance. - Lethaia, **44**: 397-409.

Plant and arthropod remains are reported from the clastic facies, dated as Pragian-Emsian/Eifelian. The plant material comprises higher plant cuticles with stomata, and more enigmatic remains (nematophytes; ? related to extant liverworts), whilst animal remains are mostly of eurypterid and probably scorpion origin. The presence of such mixed assemblages indicate marginal-marine and/or alluvial environments spreading in the southern margin of Old Red Continent.

### VIEREK, A. & RACKI, G. 2011.

Depositional versus ecological control on the conodont distribution in the Lower Frasnian fore-reef facies, Holy Cross Mountains, Poland. - Palaeogeography, Palaeoclimatology, Palaeoecology, **312**: 1-23.

Lateral changes of conodont faunas in storm-affected reef habitats are traced at Wietrzni. The reworking pattern is incorporated into newly proposed taphofacies scheme. The primary ecological signals are still partly preserved, indicating scarcity of truly residual, lag-like taphofacies. The hydraulic sorting was most effective in the middle-slope setting affected by unidirectional and/or oscillatory flows.

**MARYNOWSKI, L., RAKOCIŃSKI, M., BORCUCH, E., KREMER, B., SCHUBERT, B.A., JAHREN, A.H. 2011.** Molecular and petrographic indicators of redox conditions and bacterial communities after the F/F mass extinction (Kowala, Holy Cross Mountains, Poland). – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **306**: 1-14.

Web-like structures and biomarkers suggest elevated microbial activity in basin habitats after the global F-F bio-crisis. Growth of cyanobacterial mats implies the prevalence of suboxic to oxic but photic near-bottom conditions. Common isorenieratane and other green sulphur bacteria biomarkers, as well as small pyrite framboids suggest that portions of the water column were at least occasionally euxinic. The depositional model of the Early Famennian evolving intrashelf basin, coupling the surprising observations, is developed.

In addition, two new Devonian projects financed by the newly-established Polish government executive agency, National Science Centre, just started. The grant for L. MARYNOWSKI is scoped on molecular, petrographic and morphological indicators of microbial activity during the Late Devonian global events in the basinal environments with low light intensity. In particular, characteristics of the F-F post-crisis water column structure, with a special attention to redox conditions, is planned. The main aim of another grant for M. ŹATOŃ is an investigation of dynamics of sessile, hard substrate organisms before and after the F-F crisis in areas of the East European Platform. A taxonomic diversity of encrusting and boring biota will be studied, and the final effect will consist of a detailed succession model in the fate of this biodiversity collapse, paired regionally with a sea regression.

## CM Mena SCHEMM-GREGORY

After having suffered unemployment, I gained a six months post-doc working on Portuguese brachiopods at the Universidade de Coimbra and the Universidade de Trás-os-Montes (both Portugal) paid by the DAAD. In this time span, I was visiting several brachiopod collections and could establish a database with the obtained data which is supporting my current research.

Since February 2011 I have a post-doc position at the Universidade de Coimbra paid by the Portuguese Fundação da Ciência e Tecnologia (FCT). The project is to revise Devonian Portuguese brachiopods in museum collections and to study further material from – if still accessible – classical and new outcrops. Even though suffering severe cuts due to the economic crises in Portugal, field work in Lower to Middle Devonian strata including collection of new material in three regions could be done: in the vicinities of Portalegre (southern

Portugal), Dornes (Central Portugal), and Porto (northern Portugal). Right now the collected brachiopod faunas are under investigation. A first publication describing a new genus and species from Siegenian to Emsian strata around Dornes is already published. The data confirms the belonging of today's Portugal to northern Gondwana. In 2012 further field work, especially in northern Portugal, is planned. The aim is the exact stratigraphical assignment of these strata and their correlation with sections in Central and southern Portugal.

In October 2010 I spent two weeks in southern England, visiting the Natural History Museum and taking Devonian brachiopod samples at the southern coast of Devon. Special attention was paid to the Meadfoot Group whose stratigraphical assignment is still a matter of debate. Field work was done in collaboration with KEVIN PAGE (University of Plymouth). Preliminary results were presented at the SDS / IGCP 596 Meeting in Novosibirsk and the Annual Meeting of the Spanish Palaeontological Society this year. For the next year field work visiting classical and new outcrops in northern Devon is planned. The final results of this project shall be published in the monograph series of the Palaeontographical Society. This research project is paid by synthesys and the Palaeontographical Society Research Fund.

## Publications

### *Journal articles (2010-2011)*

- SCHEMM-GREGORY, M. 2011. *Lusitanispirifer lusitanensis* n. gen. et sp. – A new delthyridoid spirifer and its palaeogeographical implications for the Dornes Syncline (Lower Devonian, Portugal). – *Bollettino della Società Paleontologica Italiana*, **50** (2): 85-94.
- SCHEMM-GREGORY, M. (2011). The howellellid branches within the delthyridoid spiriferids (Brachiopoda, Silurian to Devonian). 115-128. – In: SHI, G.R., WELDON, E.A., PERCIVAL, I.G., PIERSON, R.R. & LAURIE, J.R. (eds): Brachiopods: extant and extinct – Proceedings of the Sixth International Brachiopod Congress, 1-5 February, 2010, Melbourne, Australia, Memoirs of the Association of Australasian Palaeontologists, **41**, 366 p.
- SCHEMM-GREGORY, M. 2011. A new species of *Neopaulinella* (Brachiopoda, Terebratulida) from the Eastern Iberian Chains, Spain (Lower Devonian). – *Bulletin of Geosciences*, **86** (2): 227-240. [doi: 10.3140/bull.geosci.1244]
- SCHEMM-GREGORY, M. 2011. The origin of *Cyrtospirifer* (Brachiopoda) from the Middle Devonian of the Western Sahara (Northwest Africa). – *Revista Italiana di Palaeontología e Stratigrafia*, **117** (1): 3-13.
- SCHEMM-GREGORY, M. (2011): Revision of Devonian Brachiopods from Devon. – *Palaeontographical Society Research Fund Reports, Newsletter of the Palaeontographical Society*, 27; London.
- SCHEMM-GREGORY, M. 2010. *Intermedites STRUVE*, 1995 (Brachiopoda, Middle Devonian) – Discovery of a South Chinese immigrant. – *Acta Palaeontologica Sinica*, **49** (4): 425-438.
- SCHEMM-GREGORY, M. 2010. *Leonispirifer leonensis* gen. et sp. nov., a rare new delthyridoid spirifer from northern Spain (Brachiopoda, Lower Devonian). –

*Paläontologische Zeitschrift*, **84**: 345-364. [doi: 10.1007/s12542-009-0048-y]  
 HARPER, D.A.T., ALVAREZ, F., BOUCOT, A.J., WILLIAMS, A., WRIGHT, T. & SCHEMM-GREGORY, M. 2010. *Tropidoleptida* (Brachiopoda): Devonian hopeful monsters or misplaced orphans. – *Special Papers in Palaeontology*, **84**: 119-136.

### Abstracts (2010-2011)

- SCHEMM-GREGORY, M. & FELDMAN, H.R. 2011. Systematics of the Paraspiriferidae TERMIER & TERMIER, 1949. – GSA Annual Meeting in Minneapolis (9–12 October 2011), Geological Society of America, Abstracts with Programs, **43** (5): 87.
- SCHEMM-GREGORY, M. & PAGE, K. 2011. New observations on the earliest marine faunas of the type Devonian succession of SW England: the brachiopods of the Meadfoot Group, Torquay, Devonshire, UK. – *Newsletter of the Palaeontological Association*, **78**: 37; London.
- SCHEMM-GREGORY, M. & PAGE, K. 2011. Devonian brachiopods from Southern Devon, UK. – Biostratigraphy, Paleogeography and events in Devonian and Lower Carboniferous (SDS / IGCP 596 joint field meeting): Contributions of International Conference in memory of Evgeny A. Yolkin. Ufa, Novosibirsk, July 20 – August 10, 2011: 146, Novosibirsk, Publishing House of SB RAS, 2011.
- SCHEMM-GREGORY, M., PAGE, K. & BORDER, M. 2011. The Brachiopod Fauna auf the Meatfood Group (Southern Devon, UK). – *Paleontologia i evolució*, Memoria especial 5, XXVII Jornadas de la Sociedad Española de Paleontología, Simposios de los proyectos PICG 587 y 596: 423-424.
- SCHEMM-GREGORY, M. & PIÇARRA, J. 2011. A new endemic spiriferid genus from the Lower Devonian of Central Portugal. – *Newsletter of the Palaeontological Association*, **78**: 74; London.
- FRANCHI, F., PIERRE, C., SCHEMM-GREGORY, M., CAVALAZZI, B., BARBIERI, R. 2011. Methane-related Ca-carbonates and other evidences of seepage in the Kess Kess conical mounds (Eastern Anti-Atlas, Morocco). – In: BÁDENAS, B., AURELL, M. & ALONSO-ZARZA, A.M. (eds.): 28th IAS Meeting of Sedimentology; Zaragoza, Spain: 589.
- FRANCHI, F., SCHEMM-GREGORY, M. & KLUG, C. 2011. The Maïder Basin carbonate buildups – shelter for the last *Ivdelinia* community (Lower Givetian, Morocco). – *Paleontologia i evolució*, Memoria especial 5, XXVII Jornadas de la Sociedad Española de Paleontología. Simposios de los proyectos PICG 587 y 596: 421-422.
- SCHEMM-GREGORY, M. & ZAMBITO, J. 2010. The revision of Middle and Upper Devonian Ambocoeliids from Northeastern North America by modern 3D reconstructions. – *Newsletter of the Palaeontological Association*, **75**: 71; London.
- SCHEMM-GREGORY, M. 2010. El origen del género *Intermedites* (Delthyridoidea, Brachiopoda). – In: SANTOS, A., MAYORAL, E., MELÉNDEZ, G., MARQUES DA SILVA, C. & CACHÃO, M. (eds.): Libro de resúmenes. Livro de resumos. III Congresso Ibérico de Palaeontología e XXVI Jornadas de la Sociedad Española de Paleontología. – *Publicaciones del Seminario de Paleontología de Zaragoza (SEPAZ)*, **9**, 2010: 295.
- SCHEMM-GREGORY, M. & ZAMBITO, J.J. 2010. Nueva especie de *Ambocoelia* (Brachiopoda) del Devónico Medio (Zona *Ensis*) de las pizarras de Silica del noroeste de Ohio (E.E.U.U) – In: SANTOS, A.,

- MAYORAL, E., MELÉNDEZ, G., MARQUES DA SILVA, C. & CACHÃO, M. (eds.): *Libro de resúmenes. Livro de resumos. III Congresso Ibérico de Palaeontología e XXVI Jornadas de la Sociedad Española de Paleontología*. – *Publicaciones del Seminario de Paleontología de Zaragoza (SEPAZ)*, **9**, 2010: 293.
- SCHEMM-GREGORY, M. & ZAMBITO, J.J. 2010. La taxonomía revisada y la interpretación paleoautecológica del género braquiópodo *Ambocoelia* del Devónico Medio y Superior del Estado de Nueva York. – In: SANTOS, A., MAYORAL, E., MELÉNDEZ, G., MARQUES DA SILVA, C. & CACHÃO, M. (eds.): *Libro de resúmenes. Livro de resumos. III Congresso Ibérico de Palaeontología e XXVI Jornadas de la Sociedad Española de Paleontología*. – *Publicaciones del Seminario de Paleontología de Zaragoza (SEPAZ)*, **9**, 2010: 294.
- SCHEMM-GREGORY, M. 2010. *Intermedites* (Delthyridoidea, Brachiopoda): The discovery of a South Chinese immigrant. – Programme and Abstracts, 3rd International Paleontological Congress, London 2010, June 28 to July 3: 344; London.
- SCHEMM-GREGORY, M. 2010. New implications on the life habit of *Cyrtina* (Brachiopoda, Lower Devonian). – Programme and Abstracts, 3rd International Paleontological Congress, London 2010, June 28 to July 3: 345; London.
- SCHEMM-GREGORY, M. 2010. The phylogeny of delthyridoids spiriferids – A new implication. – In: Program and Abstracts, 6th International Brachiopod Congress, 1-5 February 2010, Melbourne, Australia; Geological Society of Australia Abstracts, **95**: 95.
- SCHEMM-GREGORY, M. 2010. A new life habit of *Cyrtina* in the Oriskany Formation (Brachiopoda, North America, Lower Devonian). – In: Program and Abstracts, 6th International Brachiopod Congress, 1-5 February 2010, Melbourne, Australia; Geological Society of Australia Abstracts, **95**: 96.
- HARPER, D.A.T., ALVAREZ, F., BOUCOT, A.J., WILLIAMS, A., WRIGHT, A.D. & SCHEMM-GREGORY, M. 2010. *Tropidoleptus* (Brachiopoda): New order for an unusual Devonian taxon. – In: Program and Abstracts, 6th International Brachiopod Congress, 1-5 February 2010, Melbourne, Australia; Geological Society of Australia Abstracts, **95**: 49.
- ZAMBITO, J. & SCHEMM-GREGORY, M. 2010. New Taxonomic and Paleoautecologic Insights into Middle and Upper Devonian Ambocoeliids from Northeastern North America. – Geological Society of America. Abstracts with Programs, **42** (5): 96; Denver.
- ZAMBITO, J. & SCHEMM-GREGORY, M. 2010. Revised Taxonomy and Paleoautecological Interpretation of the Brachiopod Genus *Ambocoelia* in the Middle and Upper Devonian Appalachian Basin of New York State. – Programme and Abstracts, 3rd International Paleontological Congress, London 2010, June 28 to July 3: 421; London.
- ZAMBITO, J. & SCHEMM-GREGORY, M. 2010. A new species of *Ambocoelia* (Brachiopoda) from the Middle Devonian (*Ensis* Zone) Silica Shale of Northwestern Ohio, U.S.A. – Programme and Abstracts, 3rd International Paleontological Congress, London 2010, June 28 to July 3: 421; London.

## TM Eberhard SCHINDLER

(As my annual report for the year 2010 - which I had turned in - didn't make it to SDS Newsletter No. 26, I combine it now with that of 2011.

In 2010 most of my research activities have continued. It was a year of manifold activities. It was the first year after the IGCP Project 499 terminated which had continued in 2009 'on extended term' (see references below for final reports).

A long-lasting "project" has been finished: The special volume of Palaeo<sup>3</sup> on "Sea-level cyclicity, climate change, and bioevents in Middle Devonian marine and terrestrial environments" has been completed during a stay of TM Carl BRETT in Frankfurt (see below: BRETT, SCHINDLER & KÖNIGSHOF). The printed version will be issued early in 2011.

Main research activities spread in different directions:

As a first result of the Turkish-German cooperation project DEVEC-TR, a paper was published about the Eastern and Central Taurides (WEHRMANN, YILMAZ, YALÇIN et al.). In October, further results were presented during the '7<sup>th</sup> International Symposium on Eastern Mediterranean Geology', held from 18-22 October 2010 at the Çukurova University, Adana (Turkey), in a series of talks on different subjects about the geology and palaeontology of the Taurides (WEHRMANN, YILMAZ, WILDE et al.; SCHINDLER, YILMAZ et al.; WILDE et al.) – a field guide was also prepared (YILMAZ et al.). During fieldwork some additional samples from one of the sections as well as important additional samples from a new section were collected.

Land-sea interactions were addressed in two ways: First, a paper on Lower Devonian siliciclastic sections, especially from the highest part of the Lower Emsian at Alken (Mosel area of the Rheinisches Schiefergebirge) was published (WEHRMANN, WILDE et al.). During the joint meeting of the 'GeoDarmstadt 2010' Conference, held in October in Darmstadt (Germany), a scientific session on this topic has been organized (SCHINDLER, BROCKE, WEHRMANN, WILDE). An own contribution dealt with patterns and processes in the accumulation of plant debris in different macrotidal environments (WEHRMANN & SCHINDLER).

One of the highlights of the year was the 3<sup>rd</sup> International Palaeontological Congress (IPC 3) in London coupled with a superb field trip to the Devonian of Northern Scottish mainland and the Orkney Islands organized and guided by TM John MARSHALL (thanks to him and the other wonderful guides: John BROWN, Mike NEWMAN, Bob DAVIDSON). During the congress it was a great honor for me to give the keynote lecture in a session which TM Carl BRETT together with Annalisa FERRETTI, Kathleen HISTON, and Pat MCLAUGHLIN

had put together. The theme of the session, "Time-specific facies" (TSF), was devoted to the idea of my supervisor Otto H. WALLISER who meanwhile passed away unexpectedly (see obituary in SDS Newsletter No. 26). Besides this presentation, a second talk was given on one of the examples to which TSF can be applied: It is the detailed correlation in the course of the Kellwasser Crisis as own work in combination with that of German colleague Manfred GEREKE showed during the past years (SCHINDLER & GEREKE). A poster on scutelloid trilobites was also presented (LEROSEY-AUBRIL et al.).

Among the continuing projects, the investigation of Middle Devonian strata especially in the Eifel Hills area went on together with Senckenberg and American colleagues (e.g., TM Carl BRETT).

Work also continued with CM Brooks ELLWOOD on magnetic susceptibility of Devonian sections. A joint paper on Givetian sequences is included in the Palaeo<sup>3</sup> volume mentioned above (ELLWOOD et al.); together with Vietnamese colleagues a poster was presented at the IGCP 580 Meeting in Guilin, held in November/December (LUU THI PHUONG LAN et al.).

Work in Morocco has been addressed in two ways: A paper on a reef mound from the Western Sahara is included in the Palaeo<sup>3</sup> volume (SCHINDLER & WEHRMANN); together with American colleagues a talk on Lower Devonian cyclic trilobite-rich sequences in the Dra Valley of the Moroccan Anti-Atlas was presented at the IPC3 in London (BRETT, BAIRD et al.).

Work on the Choteč Event together with CM Rainer BROCKE and colleagues from the Czech Republik has continued. Results were presented in a talk at the IPC3 in London (BROCKE et al.).

As mentioned earlier, work on the type locality of the Kellwasser Horizons in the Kellwasser Valley of the German Harz Mountains has continued after the section had been enlarged quite substantially (LUPPOLD, SCHINDLER et al., LUPPOLD, RÖHLING et al.). The Kellwasser type locality will now be one of the geosites of one of the so-called 'landmarks' in the European Geopark 'Harz – Braunschweiger Land – Ostfalen'.

In 2011 research activities have been continued in many ways. Early in the year, the long-lasting Palaeo<sup>3</sup> volume (see above) has been printed (see below: BRETT, SCHINDLER & KÖNIGSHOF).

In the aftermath of the IPC3 Congress in London (2010), papers have been completed for the proceedings volume to be published by the organizers of the symposium on "Time-specific facies" (TSF) in a special volume of Palaeo<sup>3</sup> (see above). Meanwhile, two of them are available online, whereas others have been submitted and are in review or revision, respectively. The published ones deal with the relation of global biological crises (the Kellwasser Crisis serving as an example) and TSF (GEREKE & SCHINDLER) and with the paradox of "rhythmic event beds" which can be found in the

Dra Valley of the Moroccan Anti-Atlas (BRETT, ZAMBITO et al.).

Concerning the research in the Turkish Taurides, a talk has been given in March at the GSA Northeast/North Central regional meeting in Pittsburgh (SCHINDLER, BOZDOĞAN et al.) and a proposal for a follow-up project of DEVEC-TR has been put forward. A positive decision was made just before the end of the year, so Turkish-German cooperation will be continuing in the Taurides.

Results of the ongoing project together with Czech and American colleagues on the Choteč Event have also been presented at the meeting in Pittsburgh (BROCKE et al., LINDEMANN et al.). Fieldwork on this topic, on Emsian/Eifelian sections, and on dacryoconarids bearing Lower and Middle Devonian strata has been carried out after the meeting during a trip with CM Chuck VER STRAETEN, CM Rainer BROCKE, Bill KIRCHGASSER, and Dick LINDEMANN. In order to include the Montagne Noire in these studies, fieldwork together with CM Rainer BROCKE has been conducted with the help of Raimund FEIST.

Research activities also continued in the Eifel. In addition to the ongoing investigations with TM Carl BRETT, CM Brooks ELLWOOD also took samples for magnetic susceptibility studies in some of the sections. During fieldwork with Brooks, the now enlarged Kellwasser type locality in the Harz Mountains was revisited and sampled in great detail.

In May, a series of scientific talks in honor of Otto WALLISER has been organized in connection with the joint meeting of the German subcommissions on Devonian and Carboniferous Stratigraphy at Marburg University. During the meeting, the Chief Panderer, TM Maria Cristina PERRI, handed the Pander Society Medal for 2010 posthumously to his son Thomas. Helga GROOS-UFFENORDE and myself gave talks of various aspects of Otto's life and career. Connected with the meeting there was also a field trip to some areas of the eastern Rheinisches Schiefergebirge (HERBIG et al.).

Within the so-called "monster volume" edited by TM John TALENT in connection with the International Year of Planet Earth (IYPE), a review article on the Tentaculitoidea is included.

An administrational note: As the period of TM Uli JANSEN'S chairmanship of the German 'Subkommission für Devon-Stratigraphie' has expired, I was elected new chairman of the German SDS.

Two non-Devonian activities shall briefly be mentioned: Together with Senckenberg colleague Volker WILDE and colleagues from the Natural History Museum at Braunschweig and the Geopark 'Harz – Braunschweiger Land – Ostfalen', an exhibition on stromatolites has been prepared (HOCHSPRUNG et al.). And I was much involved in the preparation of an honorary colloquium on the 100 year anniversary of Alfred WEGENER's hypothesis on drifting continents on January 6, 2012 which he had presented in a talk of the 2nd Annual

Meeting of the 'Geologische Vereinigung' at the Senckenberg Museum on January 6, 1912 (SCHINDLER, BROCKE et al.).

### Publications 2010 – 2011 (in chronological order)

- KÖNIGSHOF, P., LAZAUSKIENE, J., SCHINDLER, E., WILDE, V. & YALÇIN, M.N. 2010. The IGCP project no. 499: "Devonian land-sea interactions: evolution of ecosystems and climate" (DEVEC) – final report (excerpt). – Subcommission on Devonian Stratigraphy, Newsletter, **25**: 17-18; Münster.
- WEHRMANN, A., YILMAZ, I., YALÇIN, M.N., WILDE, V., SCHINDLER, E., WEDDIGE, K., SAYDAM DEMIRTAS, G., ÖZKAN, R., NAZIK, A., NALCIOĞLU, G., KOZLU, H., KARSİLOĞLU, Ö., JANSEN, U., ERTUG, K., BROCKE, R. & BOZDOĞAN, N. 2010. Devonian shallow-water sequences from the North Gondwana coastal margin (Central and Eastern Taurides, Turkey): Sedimentology, facies and global events. – Gondwana Research, **17** (2-3): 546-560, 3 e-suppl. [Kochi. doi: 10.1016/j.gr.2009.09.011]
- KÖNIGSHOF, P., SCHINDLER, E., WILDE, V., LAZAUSKIENE, J. & YALÇIN, M.N. (2010): Final report of the IGCP- 499 – Devonian land-sea interactions: Evolution of ecosystems and climate" (DEVEC) – Episodes, **33** (1): 45-50; Bangalore.
- SCHINDLER, E., BRETT, C.E., BROCKE, R., JANSEN, U., KÖNIGSHOF, P., VER STRAETEN, C.A., WEHRMANN, A. WILDE, V. & YALÇIN, M.N. (2010). Zyklische Sedimente im Devon – Hinweis auf Meeresspiegelschwankungen und Klimaveränderungen. – Senckenberg 2007-2008: 44-45; Frankfurt am Main.
- LUPPOLD, F.W., SCHINDLER, E., BROCKE, R. & STOPPEL, D. 2010. Typlokalität der Kellwasser-Horizonte erweitert. – GMIT, **39**: 25-26; Bonn.
- LUPPOLD, F.W., RÖHLING, H.-G., GEORGE, K., SCHINDLER, E. & ZELLMER, H. 2010. The Late Devonian „Kellwasser Event“ mass-extinction horizons in Germany: Restoring the type locality for science and geotourism. – Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften, **66**: 111; Hannover.
- WEHRMANN, A., WILDE, V., SCHINDLER, E., BROCKE, R. & SCHULTKA, S. (2010). High-resolution facies analysis of a Lower Devonian deltaic marine-terrestrial transition (Nellenköpfchen Formation, Rheinisches Schiefergebirge, Germany): implications for small-scale fluctuations of coastal environments. – Neues Jahrbuch für Geologie und Paläontologie Abhandlungen, **256**: 317-334; Stuttgart. [doi: 10.1127/0077-7749/2010/0056]
- BRETT, C.E., BAIRD, G.C., BARTHOLOMEW, A.J., MC LAUGHLIN, P., SCHINDLER, E. & ZAMBITO, J. 2010. Mid Paleozoic rhythmic trilobite-rich beds: A time-specific signature of obtrusional events and diagenetic rhythms. – 3<sup>rd</sup> International Palaeontological Congress, Programme & Abstracts: 99; London.
- BROCKE, R., BERKYOVÁ, S., BUDIL, P., FATKA, O., FRÝDA, J. & SCHINDLER, E. 2010. The early Middle Devonian Choteč Event in the Barrandian area (Czech Republic): New insight from a phytoplankton bloom. – 3<sup>rd</sup> International Palaeontological Congress, Programme & Abstracts: 103; London.
- SCHINDLER, E. (2010). Time-Specific Facies – meaning, application, potential. – 3<sup>rd</sup> International Palaeontological Congress, Programme & Abstracts: 345; London.
- SCHINDLER, E. & GEREKE, M. 2010. Tracking biological and sedimentological changes in event-related crisis

- intervals across facies borders – do they represent “Time-Specific Facies”? The Kellwasser Horizons and their equivalents near the Frasnian/Famennian boundary. – 3<sup>rd</sup> International Palaeontological Congress, Programme & Abstracts: 346; London.
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### **CM Claudia SPALLETTA**

During 2011 I continued the study on stratigraphic sections at the Frasnian-Famennian boundary in the Carnic Alps, in collaboration with Enzo FARABEGOLI and M.Cristina PERRI (University of Bologna), and Monica PONDRELLI (University of Pescara). Our analysis are focused on conodont biostratigraphy, taxonomy, biofacies, lithostratigraphy and sedimentology.

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

With M. Cristina PERRI I am continuing studies on Famennian conodont biostratigraphy of many sections of the Carnic Alps, and started studies on event stratigraphy of Frasnian and Famennian stratigraphic sections. This last topic involves collaboration with Enzo FARABEGOLI and Monica PONDRELLI

A paper on the upper Famennian-lowermost Carboniferous species of *Protognathus*, co-authored with Carlo CORRADINI (University of Cagliari) Sandra KAISER (University of Bonn), and M. Cristina PERRI (University of Bologna), was published in vol. 117 of the *Rivista Italiana di Paleontologia e Stratigrafia* (CORRADINI et al., 2011).

### **CM Thomas J. SUTTNER**

2011 was a very successful year for the Austrian Devonian research group. In April a new IGCP project on climate change and biodiversity patterns in the Mid-Paleozoic has started (IGCP 596). The Opening Meeting for this project was organized by Thomas SUTTNER, Erika KIDO, Werner PILLER and Peter KÖNIGSHOF in Graz, Austria (19-24.September 2011). 36 participants from 13 countries presented 23 talks and 16 posters during the scientific sessions. Main topic of the first meeting was the “state of the art” of biostratigraphy, biodiversity patterns and evolution of fossils, as well as the impact of global events on marine organisms during the Devonian to Carboniferous. Therefore the general programme

has been divided into four sessions. Each of them was started with a keynote lecture: S.1. Biodiversity patterns and evolution of fossils (Keynote: ARIUNCHIMEG, Ya. - Carboniferous fossils of Mongolia); S.2. Climate perturbations: Effects on marine organisms (Keynote: JOACHIMSKI, M.M. & BUGGISCH, W. - Climate and Ice Volume History of the Mid-Palaeozoic: Insights from oxygen isotope proxies); S.3. Multidisciplinary approach: Geochemistry & Geophysics (\* joint session with IGCP 580) (Keynote: DA SILVA, A.C., PAS, D., MABILLE, C. & BOULVAIN, F. - Magnetic susceptibility evolution on Palaeozoic sedimentary settings, a clue for past palaeoenvironments); S.4. Mid-Paleozoic bio- and lithostratigraphy (Keynote: IZOKH, N.G. - Biodiversity of Devonian conodonts from the West Siberia); S.5. Short Course – “Paleobiology Database”. Among all abstracts submitted for the conference Abstract Volume, 36 contributions are related to Devonian studies. The Abstract volume can be downloaded for free via the following link:

[http://erdwissenschaften.uni-graz.at/publikationen/zeitschrift/band16/index\\_de.php](http://erdwissenschaften.uni-graz.at/publikationen/zeitschrift/band16/index_de.php)

The second part of the meeting was a two days lasting field-trip in the Carnic Alps (Silurian to Devonian neritic and pelagic deposits), which was joined by 18 participants.

Other meetings held in 2011 were organized by the Austro-Italian cooperation researching the pre-Variscan sequence of the Carnic Alps:

Carnic Alps Workshop (Part IV), Indoor Meeting, Udine, 15-16.April 2011, organised by Carlo CORRADINI, Thomas SUTTNER and Luca SIMONETTO.

Carnic Alps Workshop (Part V), Field Workshop, Kötschach-Mauthen, 03-12.August 2011, organised by Carlo CORRADINI and Thomas SUTTNER.

In this year another project, entitled “FWF P23775-B17: Late Eifelian climate perturbations: Effects on tropical coral communities”, was accepted by the Austrian Science Fund (Duration: 3 years). Erika KIDO, one of the principal investigators involved in this project already published a manuscript on the major focus of the research and presented first results at several conferences (see listing below). Although this project is granted by a national fund, we have intense cooperations with scientists from Czech Republic, Germany and Italy.

Additionally to all the achievements in this year, Devonian research in Austria received support by a new member! Claudia DOJEN started her position at the Landesmuseum Kärnten in May. We hope that she can adopt soon to the Austrian style of German language and enjoy Devonian research (and many other topics she has to concern within the frame of her duties at the Landesmuseum) together with us.

## Publications 2011

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- KIDO, E. & SUTTNER, T.J. 2011. A new project has launched: FWF P23775-B17 “Late Eifelian climate perturbations: Effects on tropical coral communities”. – *Jahrbuch der Geologischen Bundesanstalt*, **151** (3-4): 407-416, Wien.
- SUTTNER, T.J. & KIDO, E. 2011. Devonian and Carboniferous of the Carnic Alps. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 99-115, Graz.
- Abstracts 2011*
- CHEN, X.-Q. & SUTTNER, T.J. 2011. The distribution of *Zdimir* fauna and age in South China. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 32, Graz.
- CHEN, X.-Q., MAWSON, R., TALENT, J.A., MATHIESON, D. & SUTTNER, T. 2011. Brachiopods, conodonts and the Frasnian-Famennian boundary in Northwestern Xinjiang, China. Contributions of International Conference in memory of Evgeny A. YOLKIN, Biostratigraphy, Paleogeography and Events in Devonian and Lower Carboniferous (SDS / IGCP 596 joint field meeting) 20<sup>th</sup> July - 10<sup>th</sup> August 2011, 44-45, Ufa, Novoibirsk.
- DOJEN, C. 2011. Early Devonian Biostratigraphy with ostracodes: Problems, Progress und Possibilities. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 39, Graz.
- DOJEN, C., ABOUSSALAM, S. & BECKER, R.T. 2011. Early to Middle Devonian ostracodes from the Western Dra Valley (Morocco): first eventstratigraphical implications. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 41-42, Graz.
- DOJEN, C., ABOUSSALAM, S. & BECKER, R.T. 2011. Lowermost Emsian to lower Givetian ostracods from the Western Dra Valley (Morocco): First palaeoecological and event-stratigraphical data. – *Joansea Geol. Paläont.*, **11**: 53-54, Graz.
- KIDO, E., SUTTNER, T.J., KOPTIKOVA, L., PONDRELLI, M., CORRADINI, C., CORRIGA, M.G., SIMONETTO, L., BERKYOVÁ, S. & VODRÁŽKA R. 2011. Magnetic susceptibility as tool for high-resolution correlation of pelagic and distal slope facies of the Middle Devonian in the Carnic Alps: preliminary results. – In: KOPTIKOVA, L., HLADIL, J. & ADAMOVIC, J. (Eds.): Miroslav Krs Conference: Time, Magnetism, Records, Systems and Solutions. The 2011 Annual IGCP 580 Meeting, October 12-18 Prague, Czech Republic, Abstract Volume, Institute of Geology ASCR, v. v. i., pp. 52-53, Prague.

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- KIDO, E., SUTTNER, T.J., PONDRELLI, M., CORRADINI, C., CORRIGA, M.G., SIMONETTO, L. & BERKYOVÁ, S. 2011. Middle Devonian rugose corals of the Carnic Alps and their relation to the Late Eifelian Kačák Event. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 54-56, Graz.
- KIDO, E., SUTTNER, T.J., PONDRELLI, M., CORRADINI, C., CORRIGA, M. G., SIMONETTO, L. & BERKYOVÁ, S. 2011. Correlation of Mid-Devonian coral deposits of the Carnic Alps across the Austro-Italian border. – In: ARETZ, M., DELCULÉE, S., DENAYER, J. & POTY, E. (Eds.), 11th Symposium on Fossil Cnidaria and Sponges, Abstracts, Liège, August 19-24, 2011 - Kölner Forum für Geologie und Paläontologie, **19**: 73-76, Köln.
- KISSLING, W., SUTTNER, T.J. & KÖNIGSHOF, P. 2011. Marine biodiversity dynamics in the mid-Paleozoic oceans and their potential controls. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 57, Graz.
- PONDRELLI, M., CORRADINI, C., CORRIGA, M., KIDO, E., SIMONETTO, L., SPALLETTA, C., SUTTNER, T.J. & CARTA, N. 2011. Pragian to Famennian depositional evolution of the M. Pizzul area (Carnic Alps, Italy): preliminary results. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 78-79, Graz.
- SUTTNER, T.J. & KIDO, E. 2011. Magnetic susceptibility research in the Carnic Alps. – In: KOPTIKOVA, L., HLADIL, J. & ADAMOVIC, J. (Eds.): Miroslav Krs Conference: Time, Magnetism, Records, Systems and Solutions. The 2011 Annual IGCP 580 Meeting, October 12-18 Prague, Czech Republic, Abstract Volume, Institute of Geology ASCR, v. v. i., pp. 52-53, Prague.
- VINN, O., ZATÓŇ, M. & SUTTNER, T. 2011. Devonian to Carboniferous microconchid tubeworms: invasion of fresh-water habitats. – In: SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 91, Graz.

## Editorial 2011

- SUTTNER, T.J., KIDO, E., PILLER, W.E. & KÖNIGSHOF, P. (Eds.): 2011. IGCP 596 - Opening Meeting, Graz, 19-24th September 2011 – Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 1-120.

Fig.1. Left: Opening meeting of IGCP 596 (Graz, Austria); Right: Carnic Alps Workshop IV (Udine, Italy)



## TM Jenaro I. VALENZUELA-RIOS

I thought that 2010 was one of the more hectic years, but 2011 was even harder; this was mainly due to administrative burdens, but also to the scientific activities that involved major events as 1) become the new Secretary of the Spanish National Committee for the IGCP Program, 2) organize the Spanish working group for the new IGCP-596, which is closely related to SDS activities, 3) organize a special Symposium for the IGCP-596 for the Spanish Group within the frame of the Annual Spanish Palaeontological Society Meeting and 4) Submit (and get granted) a 3 years proposal to the Spanish National Agency (the now obsolete Ministry of Science and Innovation) for analyzing Lower Devonian Events in Spain.

The main research has involved advancements in biostratigraphy and systematic studies of Lower Devonian, Middle Devonian and Lower Frasnian sequences and conodonts from several regions, mainly from the Spanish Central Pyrenees. Most of the progress is referred in the list of papers shown below and has been presented in several professional meetings: 1) International Conference in memory of Evgeny A. YOLKIN, held in Siberia; 2) IGCP 596 Openning Meeting held on Austria; 3) Eight Romanian Symposium on Paleontology celebrated in Bucharest and 4) Annual Meeting of the Spanish Palaeontological Society, including the Special Symposium on IGCP that took place in Sabadell.

I want to give my special thanks again to the Siberian friends who made possible my participation and contribution on the Conference using the modern technologies. Although I would prefer rather be there sharing time and scientific discussions with many of you.

The combination of biostratigraphical and microfacies studies has produced a new insight into the Events in the Pyrenees that reinforces the value and power of palaeontological studies and caution about the use of "new physical methods" without

palaeontological control. I would like to further combine this kind of studies with isotopic ones for independently testing results.

In terms of "time-slices", I keep working on the Lower Devonian with emphasis on the Stage-boundaries. Currently, with one of my former students (Carlos MARTÍNEZ-PÉREZ) we start analyzing the intra-Emsian boundary in the Pyrenees. We hope to produce some results within 2012. The Givetian is another Stage that is being working out in the Pyrenees, mainly due to the effort of Teresa (Jau-Chyn LIAO). Cooperation with Sofie GOUWY strengthens the studies on Givetian and makes possible to start in the Eifelian of the Pyrenees (the three of us are finishing a paper dealing with Eifelian-Lower Frasnian conodonts from one relevant section in the Spanish Central Pyrenees).

This year a new Master Students (Helena CALVO) has started her Master Thesis on Lower Devonian Conodonts, which is expected to be finished next Spring.

Besides this quick outline of scientific activities I had to speedy act in avoiding the destruction of the *Polygnathus excavatus* stratotype. Last summer and on the occasion of a leading fieldtrip with students, I realised that a new road was built in the area and that the "projections" of the road would directly affect the stratotype. Immediately I contacted the regional government officers and after explaining the situation, went to the field with the technicians to mark on the maps the points that have to be preserved, and write a quick report supporting the need for preserving this point, they acted and forced the Engineers to change the curse of the road to protect this site.

## 2011 SDS-related publications

### Peer Review Papers

- LIAO, J.-C. & VALENZUELA-RÍOS, J. I. (in press). Upper Givetian and Fasnian (Middle and Upper Devonian) conodonts from Ampriú (Aragonian Pyrenees, Spain): Global correlations and Palaeogeographic relations. - *Palaeontology*.

- MARTÍNEZ-PÉREZ, C., VALENZUELA-RÍOS, J. I. NAVAS-PAREJO, P., LIAO, J.-C. & BOTELLA, H. 2011. Emsian (Lower Devonian) Polygnathids (Conodont) succession in the Spanish Central Pyrenees. - *Journal of Iberian Geology*, **37** (1): 45-6.  
[doi: 10.5209/rev\_JIGE.2011.v37.n1.4.]
- IZOKH, N. G., YOLKIN, E. A., WEDDICE, K., ERINA, M. V. & VALENZUELA-RÍOS, J. I. 2011: Late Pragian and Early Emsian conodont polygnathid species from the Kitab State Geological Reserve sequences (Zeravshan-Gissar Mountainous Area, Uzbekistan). - *News on Palaeontology and Stratigraphy*, *Geologiya i Geofizika*, **15**: 49-63.
- VALENZUELA-RÍOS, J. I. & LIAO, J.-C. 2011. Color/facies changes and Global Events, a hoax? A case study from the Lochkovian (Lower Devonian) in the Spanish Central Pyrenees. - *Palaeogeography, Palaeoclimatology, Palaeoecology* (in press).  
[doi: 10.1016/j.palaeo.2011.09.007.]
- YOLKIN, E. A., IZOKH, N. G., WEDDICE, K., ERINA, M. V., VALENZUELA-RÍOS, J. I. & APEKINA, L. S. 2011. Eognathoid and polygnathid lineages from the Kitab State Geological Reserve sections (Zeravshan-Gissar Mountainous Area, Uzbekistan) as the bases for improvements of Pragian-Emsian Standard conodont zonation. - *News on Palaeontology and Stratigraphy*, *Geologiya i Geofizika*, **15**: 37-45.
- Abstracts and Proceedings**
- LIAO, J.-C., GOUWY, S. & VALENZUELA-RÍOS, J. I. 201. Givetian local composite standard (Middle Devonian) from the Spanish Central Pyrenees. - *Biostratigraphy, Paleogeography and events in Devonian and Lower Carboniferous (SDS / IGCP 596 joint field meeting): Contributions of International Conference in memory of Evgeny A. YOLKIN*. Ufa, Novosibirsk, July 20 – August 10, 2011: 86, Novosibirsk, Publishing House of SB RAS.
- LIAO, J.-C., VALENZUELA-RÍOS, J. I. & GOUWY, S. 2011. Evaluation of the intended Givetian (Middle Devonian) Substages subdivision in the Spanish Central Pyrenees. - *IGCP 596 Opening Meeting Graz*, 19-24th September 2011, Berichte des Institutes für Erdwissenschaften der Karl-Franzens-Universität Graz/Austria, **16**: 68-69.
- LIAO, J.-C., VALENZUELA-RÍOS, J. I. & GOUWY, S. 2011. Evaluación de la sucesión de conodontos givetenses (Devónico Medio) del Pirineo Central Español en el contexto internacional. - *Memoria especial 5, XXVII Jornadas de la Sociedad Española de Paleontología. Simposios de los proyectos PICG 587 y 596*: 435-437.
- MARTÍNEZ-PÉREZ, C. & VALENZUELA-RÍOS, J.I. 2011. Sucesión de polygnátidos (conodontos) de la Zona *nothoperbonus* (Emsiense, Devónico Inferior) en los Pirineos Centrales Españoles. - *Paleontología i evolución*, Memoria especial **5**, XXVII Jornadas de la Sociedad Española de Paleontología. Simposios de los proyectos PICG 587 y 596: 425-429.
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## CM Chuck Ver STRAETEN

2012 was another busy year, a mix various activities and challenges. Very restricted budgets for New York State government agencies, restrictions on travel, and a threat to research at the New York State Museum/Geological Survey made for stressful times. But work and discovery continued, and we seem to have survived.

Three new Devonian research papers came out in 2011, *Mudrock Sequence Stratigraphy: A Multi-proxy (sedimentologic, paleobiologic, geochemical) Approach, Devonian Appalachian Basin* (by VER STRAETEN, BRETT and SAGEMAN, on mid-Eifelian to lower Famennian strata in New York); *Sequence stratigraphy and revised sea level curve for the Middle Devonian in eastern North America* (by BRETT, BAIRD, BARTHOLOMEX, DESANTIS, and VER STRAETEN, on mid-Eifelian through Givetian

strata in the eastern U.S.); and *The Marcellus subgroup in its type area, Finger Lakes region* (by VER STRAETEN, BAIRD, BRETT, LASH, OVER, KARACA, JORDAN and BLOOD, on currently famous mid Eifelian to lower Givetian Marcellus strata, including it's famous gas-/organic-rich facies). Another paper in press, with Heyo VAN ITEN and Victor TOLLERTON, examines a world-class lower Givetian conulariid epibole from New York State.

Ongoing Devonian projects variously examine: 1) the composition of Devonian conglomerates in New York, in an attempt to reconstruct an unroofing history of the Acadian mountain belt through ca. 40 million years of the Devonian (Pragian-lower Famennian; VER STRAETEN 2011 abstract, below); 2) additional various studies of New York Devonian strata, and implications for Acadian orogenesis (VER STRAETEN 2011 abstract, below); 3) Bedrock mapping of Eifelian to lower Givetian marine to terrestrial strata in eastern New York, in the Helderberg plateau west of Albany (Westerlo 7.5 minute quadrangle, completed 2011); 4) the broad geological perspective of mid Eifelian to lower Givetian "Marcellus subgroup" strata, including basinal to shoreface and terrestrial clastics in New York and across the Appalachian foreland basin (VER STRAETEN et al., 2011, below); 5) collaborative work on Emsian-Eifelian biostratigraphy of the eastern U.S. (including E. SCHINDLER, R. LINDEMANN, W. KIRCHGASSER, R. BROCKE and others). Annual field excursions have yielded a good amount of material to work with; we hope to move forward with increased sample processesing and analyses, beginning this year. Initial results on dacryocoanid (LINDEMANN et al., 2011 abstract, below) and palynological (BROCKE et al., 2011 abstract, below) biostratigraphy were presented at Devonian sessions during a meeting in the U.S. last March (see discussion of meeting below). Additional Devonian efforts include: 6) ongoing "pre-Gilboa", Givetian-age paleobotany discoveries in eastern New York; and 7) other projects.

With decreasing staff numbers at the New York State Museum/Geological Survey, we take on more duties. Mine include more efforts in Museum Education, the record of New York earthquakes, and membership in a New York team which reviews newly evolving U.S. K-12 Science Standards, among other work.

All in all, a busy year past, and a busy year ahead.

### **The 2011 Northeastern and North-Central Geological Society of America Meeting, Pittsburgh, Pennsylvania.**

Devonian studies were a significant focus of a combined March 2011 meeting of the Northeastern and North-Central sections of the Geological Society of America. During the meeting 104 talks and posters were given on Devonian topics, or

topics involving Devonian strata. This comprised 14% of all presentations at the three day meeting. Sixty nine of the talks occurred in seven Devonian-focused sessions, along with 35 additional presentations in various sessions.

The Devonian sessions included three symposia sessions on Devonian Climate and Paleoecology, organized by SDS members Gordon BAIRD and Jeff OVER, along with David BREZINSKI (28 talks); a session on Devonian Orogenesis in the Appalachian-Caledonian Mountain Belt (14 talks); a session on Devonian shales in general (6 talks), and two on the Marcellus shale, a current focus of gas drilling in the eastern U.S. (21 talks).

It made for a quite an interesting and exciting meeting for Devonian workers, including SDS members Eberhard SCHINDLER and Rainer BROCKE, who traveled from Europe to present research and attend field trips. Two multi-day field trips were planned as part of the meeting, on Devonian black shales in Pennsylvania, and on the classic Upper Devonian terrestrial succession at Red Hill, Pennsylvania. In addition, two informal Devonian field excursions/research trips also occurred after the meeting ended.

Many thanks to all who participated, and especially those who organized the sessions. Further thanks to Gordon BAIRD, whose extra efforts encouraged many to participate.

### **Publications**

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#### *Bedrock map completed 2011*

- VER STRAETEN, C.A. 2011. Bedrock geological map of the Westerlo 7.5 minute Quadrangle, Albany Co., NY. New York State Museum (a State Map project), completed 2011. [Entire quadrangle is composed of late Eifelian to early Givetian marine and terrestrial strata

correlative with Marcellus subgroup black shales in central to western New York.]

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- CM Michael WHALEN**
- Work on Devonian stratigraphy and bioevents in western Canada with my students and colleague Jed Day continues apace. A manuscript based on the work of my current PhD student, Maciej ŚLIWIŃSKI, dealing with magnetic susceptibility (MS), stable isotopes and major and trace element geochemistry of the Frasnian *punctata* zone event in western Canada, was published during 2011. A second paper, also with Maciej as lead author, applying factor analysis to furthering our understanding of the controls on MS signature, was accepted for publication in *Terra Nova*. Another significant publication concerning application of spectral analysis to our long, high-resolution MS data sets through the Frasnian of western Canada resulted from collaboration with David DE VLEESCHOUWER and Philipe CLAEYS (Vrije Universiteit Brussels, Belgium). This analysis significantly improved the error bars associated with age dates for the upper and lower boundaries of the Frasnian stage and provided astronomical calibration of the Frasnian time scale.
- In October I attended the third meeting of IGCP 580: Application of Magnetic Susceptibility on Paleozoic Sedimentary Rocks in Prague, Czech Republic. Anne-Christine DA SILVA (Liège university) and I helped organize the project and this meeting was spearheaded by Leona KOPTIKOVA and Jindrich HLADIL (Institute of Geology and Czech Academy of Sciences). The project fosters international collaboration on MS stratigraphy in the Paleozoic and future field conferences are planned for the Carnic Alps, Austria and Alberta, western Canada. During the previous IGCP 580 meeting in Guilin, China, during 2010, we collected a suite of samples from platform and basinal sections that span the F-F boundary. I, along with students Eric HUTTON, Colby WRIGHT, and Maciej ŚLIWIŃSKI began stable isotopic and major and trace element analyses of these samples and Anne-Christine DA SILVA has begun MS measurements that will form the basis for future publications.

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