

ORDOVICIAN NEWS

SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY
INTERNATIONAL COMMISSION ON STRATIGRAPHY

Number 32 (for 2014)

Edited by Ian G. Percival



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Cover photo

Upper Ordovician (Sandbian) carbonate succession of the uppermost Big Valley, McGlone, McGraw and lowermost Nealmont formations exposed in the North Fork Quarry near Riverton, West Virginia, USA. This locality will be visited as part of the 12th International Symposium on the Ordovician (ISOS) conference field trip to Germany Valley in the Appalachian Mountains in June, 2015 (photograph courtesy Stephen Leslie).

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ORDOVICIAN NEWS Number 32 (for 2014)

Chairman's Message

Research on our system continues with an ever upward trajectory. Interrogation of Google Scholar reveals over 7000 publications involving Ordovician research over just the last year. Once again a huge volume of varied Ordovician research is reported, underpinned by the essential work of systematic palaeontologists. Centre stage are the Great Ordovician Biodiversification and the end Ordovician extinctions as key foci for multidisciplinary research as we continue to seek the causes and chart the consequences of two of the most significant Phanerozoic events. Our colleagues continue to address key issues using large databases, the newest technologies provided by the synchrotron and CT scanners, while new faunas and floras are uncovered that consistently provide new insights into the early evolution of metazoan life and its communities. Much of this recent research is captured in volumes arising from two meetings of IGCP 591 'The Early to Middle Paleozoic Revolution': the 4th Annual Meeting, June 10–19, 2014 in Estonia, and the 2014 Field Workshop, August 12-21 in Yunnan, China (see conference reports later in this newsletter). Both meetings were supported by the Subcommittee in a range of talks, posters and the subsequent proceedings (in *Estonian Journal of Earth Sciences*, and *Palaeoworld*, respectively). Many of us met last October in the idyllic setting of Mendoza, Argentina for the 4th International Palaeontological Congress, where about 70 delegates attended the Subcommittee's topical session on the Ordovician biotas of Gondwana and related regions. A snapshot of our research activities is presented in this issue of *Ordovician News*, together with contact details of authors and their publications. *Ordovician News* together with our webpages (<http://ordovician.stratigraphy.org>) remains a key resource for Ordovician researchers.

We are, however, only a few weeks away from our own, quadrennial international meeting. The 12th International Symposium on the Ordovician System (ISOS) will be held in Harrisonburg in Virginia, in the most beautiful of settings in the Central Appalachian Mountains, from 8-11th June, and is to be preceded and followed by what will undoubtedly be memorable field excursions highlighting Ordovician stratigraphy in the eastern and central United States. More than 80 participants from 14 countries have so far registered. Further detailed information is available in the Third Circular and on the conference website. I would like to personally thank Stephen Leslie and his colleagues for a super programme of talks, posters, field trips and social events. It promises to a truly great landmark in the history of research on our system.

Finally once again I thank all friends of the Ordovician, particularly Ian Percival (Secretary) and Andrei Dronov (Vice Chair), for your continued important contributions and exemplary support. It is your system, we merely provide an infrastructure that we hope will aid, inform and stimulate your research. Ian once again deserves special mention for his outstanding work assembling and editing *Ordovician News*.

David A.T. Harper
Chair, Subcommittee on Ordovician Stratigraphy



**International Commission on Stratigraphy
Subcommission on Ordovician Stratigraphy**

ANNUAL REPORT 2014

1. Name of constituent body:

Subcommission on Ordovician Stratigraphy (SOS)

Submitted by:

David A.T. Harper
Chairman, SOS
Department of Earth Sciences
Durham University
Durham DH1 3LE
UK
Tel. 0044 1913347143
Fax 0044 1913345991
E mail: david.harper@durham.ac.uk

Andrei Dronov
Vice Chairman, SOS
Geological Institute
Russian Academy of Sciences
Pyzhevsky per.7
119017 Moscow
Russia
Tel.: +7 (495) 959-30-17
Fax: +7 (495) 959-07-60
E-mail: Dronov@ginras.ru

Ian G. Percival
Secretary, SOS
Geological Survey of NSW
W.B. Clarke Geoscience Centre
47-953 Londonderry Road
Londonderry
New South Wales 2753
Australia
E-mail: ian.percival@trade.nsw.gov.au

2. Overall objectives, and Fit within IUGS science policy:

The Subcommittee promotes international cooperation on all aspects of Ordovician geology, specifically stratigraphy. It has a global network involving both academia and industry.

Specific objectives are:

- a. To delimit and subdivide the Ordovician System (and Period) as a part of the overall ICS mission to elaborate the standard global stratigraphic scale. This work aims to establish the boundaries (GSSPs), the correlation of the subdivisions (Stages and Series), the nomenclature of the subdivisions and periodically review the effectiveness and utility of these decisions.
- b. To promote regular international meetings on all aspects of Ordovician geology, especially those devoted to clarifying stratigraphic procedures, nomenclature and methods for use in establishing a unified global time scale and to prepare correlation charts with explanatory notes (the main phase of this latter task is now completed).
- c. To encourage, promote, and support research on all aspects of Ordovician geology worldwide and to provide outlets, *Ordovician News*, international meetings, and a web page, for promoting discussions and reporting results of this research.
- d. To encourage, promote, and support interdisciplinary research on the Ordovician global Earth system, addressing topics that require high-resolution, global correlation.
- d. The ultimate goal of the Subcommittee is to provide a high-resolution geological time scale that will be a critical foundation for interdisciplinary research on the global Earth system during the Ordovician Period. The work is broad based and must include specialists in palaeontology, all subdisciplines of stratigraphy (bio-, litho-, chemo-, and magneto-), sedimentology, geochemistry, and tectonics. With a large network including active participants from more than 25 countries, the Subcommittee thus involves much of the global geological community.

3. Summary table of Ordovician subdivisions

SYSTEM	GLOBAL SERIES	GLOBAL STAGES	KEY GRAPTOLITE/ CONODONT(C) BIOHORIZONS
ORDOVICIAN	UPPER	HIRNANTIAN	← <i>A. ascensus</i> (GSSP-Dob's Linn)
		KATIAN	← <i>N. extraordinarius</i> (GSSP-Wangjiawan North)
		SANDBIAN	← <i>D. caudatus</i> (GSSP-Black Knob Ridge)
	MIDDLE	DARRIWILIAN	← <i>N. gracilis</i> (GSSP-Fågelsång)
		DAPINGIAN	← <i>U. austrodentatus</i> (GSSP-Huangnitang)
	LOWER	FLOIAN	← <i>B. triangularis</i> (C), (GSSP-Huanghuachang)
		TREMADOCIAN	← <i>T. approximatus</i> (GSSP-Diabasbrottet)
			← <i>I. fluctivagus</i> (C) (GSSP-Green Point)

4. Organization

a. Subcommittee Executive (from August 2012)

Chairman, David A.T. Harper (UK)
Vice Chairman, Andrei Dronov (Russia)
Secretary, Ian G. Percival (Australia)
16 other Voting Members
Over 100 Corresponding Members

The Subcommittee officers and voting members have been agreed for the next term from 2012-2016. Prior to the Subcommittee's business meeting during the Brisbane IGC (2012) a postal ballot confirmed the election of the new Subcommittee officers, and elected a new group of voting members. The new Subcommittee not only includes a broad national representation and coverage of key fossil groups but also specialists in interdisciplinary fields such as geochemistry and sedimentology.

F.G. Aceñolaza (Argentina)
G.L. Albanesi (Argentina)
A.V. Dronov (Russia)
O. Fatka (Czech Republic)
D. Goldman (USA)
M. Ghobadi Pour (Iran)
D.A.T. Harper (UK)
O. Hints (Estonia)
Li Jun (China)
S. Leslie (USA)
A.T. Nielsen (Denmark)
I.G. Percival (Australia)
M.R. Saltzman (USA)
A. Sa (Portugal)
T. Servais (France)
T. Tolmacheva (Russia)
T. Vandembroucke (Belgium)
M. Williams (UK)
Zhang Yuandong (China).

5. Interfaces with other international projects

IGCP Project 591: The early to middle Palaeozoic revolution. This new project involving some 400 participants from nearly 40 countries has a strong Ordovician component and is supported by the subcommittee. The project has already featured at international congresses in Spain, the UK and the USA. Last June over 200 colleagues gathered in Lund, Sweden for the first ever meeting of all three Lower Palaeozoic subcommittees under the organizational umbrella of IGCP 591. The thematic issue of GFF arising from the meeting was published in 2013. Two further volumes are planned in 2014-2015 associated with the project's 2014 meetings (see below).

6. Chief accomplishments and products in 2014 cycle

- a. **Ordovician News No. 31** was produced and posted on the Subcommittee website and is available for download.
- b. The Subcommittee participated in, and supported the annual meeting of IGCP 591 in Tartu, Estonia, June 2014 and has contributed to the conference proceedings published in the *Estonian Journal of Earth Sciences*.
- c. The Subcommittee participated in, and supported the annual field meeting of IGCP 591 in Kunming, China, August 2014 and is contributing to the conference proceedings to be published in *Palaeoworld*.
- d. The Subcommittee convened a thematic session on '*Ordovician biotas of Gondwana: responses to global climatic and eustatic events, and their biogeographic relationships within the Ordovician World*' at the 4th International Palaeontological Congress in Mendoza, Argentina, October 2014. Approximately 70 delegates attended the oral presentations and many more viewed the posters associated with the session.

7. Chief problems encountered in 2014

Critical to the development of the research on the system is the improvement of regional chronostratigraphies, isotope curves, palaeogeographies and zonal schemes. The coming years will see an emphasis on renewed data collection and its integration with the global standard. But this will require global participation of all our regional groups. It is also clear that the system has few reliable, absolute dates. This forms part of a new ISOS sponsored project with StarPlan in the University of Copenhagen.

8. Summary of expenditure for 2013-2014

TOTAL INCOME (from ICS): USD 2000

- a. Support for attendance of colleagues at the IGCP 591 Yunnan Field Meeting, China (supported by ISOS): 1400 USD.
- b. Meeting with colleagues in the StarPlan dating laboratory in Copenhagen to establish scope of Ordovician dating project: 600 USD.

TOTAL EXPENDITURE **USD 2000**

9. Work plan, critical milestones, anticipated results and communications to be achieved next year

- a. To design and execute a programme of radiogenic dating of key Ordovician horizons (using Pb-Pb isotopes) in collaboration with Dr James Connolly and the state-of-the-art StarPlan laboratory in the University of Copenhagen. **Work has already commenced on some key sections in Baltoscandia, Russia and Scotland.**

- b. Will stimulate where relevant the production of revised regional correlation charts on the basis of new regional stratigraphic data and their relationship to the newly-established international stages. In additional regional isotope and sea-level data will be added. **During the Prague meeting in May those present agreed to begin discussions in their own regions regarding the possibilities of providing simple correlation charts, linking regional chronostratigraphies to the global stages. Results were discussed in Brisbane (2012), Lund (2013), Kunming (2014); these will be progressed to publication as a Special Paper, Geological Society.**
- c. The subcommission participated in various meetings (and publications arising from these meetings) during 2014, notably in **Tartu** (June), **Kunming** (August) and **Mendoza** (October).

During the business meeting at the final meeting of IGCP 503 and at the ICS meeting in Prague together with the ISOS meeting in *Alcalá de Henares*, plans were formalized with the agreement of the subcommission to form a number of working groups in the following areas:

1. There may be a requirement to evaluate the efficacy and utility of our stages and stage boundaries. Where appropriate and/or necessary we will have to move to establish some small advisory groups. **One major boundary problem may need urgent attention and was raised at the congress in Madrid. A number of key papers have been published and position paper has been requested and is in preparation. This remains the case.**
2. Clearly the Subcommission can now move with some confidence towards confirming and establishing finer divisions of Ordovician time. In this respect Bergström et al. (2009: *Lethaia*) have divided our international stages into stage slices based mainly on existing biozones. Finer time slices were also proposed by Webby (2004: *The Great Ordovician Biodiversification Event*, Columbia University Press) and used effectively in developing data for the GOBE. As these time divisions are more widely adopted, it would be useful to confirm their definition and status. These time slices have been used in the recent *Palaeogeography, Palaeoclimatology, Palaeoecology* special issue on the palaeoecology of the GOBE edited by Servais and Owen (2010). **This was addressed at the Madrid and Brisbane meetings. There is been no strong commitment to take this forward to date. This remains the case.**
3. Over the last few years we have neglected somewhat the role of the regional groups and the many important regional and diverse stratigraphies that make our system so exciting. A number of the key regional successions were included in the correlation charts provided by Bergström et al. (2009), but there more that require calibration with our new stages. Moreover a few regions such as Baltoscandia and SE Asia were never formally published. This is a priority for our system and work that can involve all our colleagues. **This was fully addressed at the IGC in Brisbane and at subsequent meetings. Harper and Percival have drafted an outline for the Geol. Soc. London Special Paper on the topic and authors are now being approached.**

4. Work is now far advanced on a Carbon stable isotope curve for the Ordovician. Consistent results have been already achieved for parts of the column. There are of course other stable isotopes and it will be appropriate and useful to evaluate if we can help develop these curves not least as one of our nonbiologic means of correlation. There are other nonbiologic techniques that we could also consider. **These issues were addressed in a recent issue of *Palaeogeography, Palaeoclimatology, Palaeoecology* edited by Munnecke, Calner and Harper (2010). This has encouraged a number of other papers in this key area for Ordovician stratigraphy.**
5. A more difficult area is sea-level or water-depth curves for the period. There have been a number of curves for the Ordovician and many more for particular parts of the period. It would be useful to examine these curves more carefully and the criteria upon which they are based with a move towards developing more standardised curves for the Ordovician. **Some of these issues were addressed in the recent issue of *Palaeogeography, Palaeoclimatology, Palaeoecology* edited by Munnecke, Calner and Harper (2010) and were addressed further at the Brisbane IGC and in subsequent meetings. This area will be incorporated into the GSL Special Paper.**
6. We now have a number of accurate palaeogeographic maps for our period. Not everyone agrees with all the reconstructions and perhaps they never will. But it is possible to engage in cooperation with some of the groups to develop a more standard set of base maps for the period. **This is now an active area research with the wide availability of Trond Torsvik's BugPlates program has formed the basis for many chapters in the recently published *GSL Memoir on Early Palaeozoic biogeography and geography* edited by Harper and Servais (2013).**
7. We already have a number of robust absolute dates for parts of the system but it would be useful to develop more, not least to be able to calibrate the true rates of biological and geological process occurring during the period. **Discussions are now ongoing with a number of geochronology laboratories, for example the StarPlan group in Copenhagen, whose terrestrial dating facility is headed up by Dr Jim Connelly. These discussions are ongoing.**
8. We have tended as a group to ignore the economic potential of our system. But, for example in New South Wales, nearly all the gold and copper mines are hosted in Ordovician volcanics of the Macquarie Arc and in China considerable funding is being made available through SINOPEC (the Chinese petroleum company) to support research into Ordovician biostratigraphy. **A strategy is still under discussion.**

10. Budget and ICS component requested for 2014-2015

1. Attendance and participation of subcommission officers at STRATI 2015, Graz, Austria: 2500 USD
2. Continued support for the ISOS-StarPlan terrestrial dating project on the Ordovician System: 1000 USD
3. Support for attendance and participation of subcommission officers at the ISOS meeting: 3000 USD

As in previous years it is envisaged that officers will supplement any aid from the ICS with their own research funds. I have not quantified this support.

TOTAL 2014-2015 BUDGET: 6500 USD
REQUESTED FROM ICS: **6500 USD**

Potential funding sources outside IUGS

The Subcommission officers are mainly supported by their research projects for most of their activities.

11. Review chief accomplishments over last 14 years (2001-2014)

- a. Approval, ratification, and dedication of the Green Point GSSP for the base of the Ordovician System.
- b. Approval, ratification, and dedication of the Diabasbrottet and Fågelsång GSSPs for the bases of the upper stage of the Lower Ordovician Series and the Upper Ordovician Series, respectively.
- c. Approval, ratification, and dedication of the Black Knob Ridge section, Oklahoma, USA and the Wangjiawan North, Yichang, China GSSPs for the bases of the Katian and Hirnantian stages, respectively.
- d. Approval, ratification, and dedication of the Huanghuachang section, Yichang, China for the base of the Dapingian Stage, which coincides with the base of the Middle Ordovician.
- e. With publication in 2000 of *A Revised Correlation of Ordovician Rocks in the British Isles*, correlation charts have been completed for Ordovician rocks on virtually all continents.
- f. The 9th International Symposium on the Ordovician System held in San Juan, Argentina, in August 2003, in conjunction with the 7th International Graptolite Conference and a Field Meeting of the Subcommission on Silurian Stratigraphy and publication of 556 page proceedings, 130 participants represented 18 countries, 124 papers were presented in technical sessions.
- g. Publication of *Ordovician News* nos. 17-27 and their posting on the Subcommission's web site.
- h. Development of the web site "Ordovician Stratigraphy Discussion Group" to facilitate discussions on selection of the GSSPs. This site has evolved into the Subcommission's web site and also includes postings of *Ordovician News*.
- i. Sponsorship of a technical session and field excursion on the GSSP for the base of the Middle Ordovician Series at the Annual Meeting of the Geological Society of America in November 2000.

j. Sponsorship at the 31st International Geological Congress, Rio de Janeiro, Brazil, 2000, of the symposium “Paleontological, stratigraphical, and paleogeographical relations among South America, Laurentia, Avalonia, and Baltica during the Ordovician.”

k. Sponsorship at the 32nd International Geological Congress, Florence, Italy, 2004, of the symposium “The global Ordovician Earth system”.

l. Launched GOES (Global Ordovician Earth System) Program to stimulate integrated multi-disciplinary studies of global events (mass extinction, sea-level changes, greenhouse conditions, tectonics) during the Ordovician Period.

m. Sponsorship of a special symposium on the Ordovician System at the Geological Society of America Annual Meeting in 2000, of WOGOGO 2001 in Copenhagen, and the meeting and field excursion “The Gondwanan Platform in Ordovician times: Climatic, eustatic and geodynamic evolution”, in Morocco in February 2001.

o. Selection of names for 2nd, 3rd, 5th, 6th and 7th stages of the Ordovician System.

p. Sponsorship of the 2006 IGCP 503 Glasgow meeting on “Changing palaeogeographical and palaeobiogeographical patterns in the Ordovician and Silurian”.

q. Sponsorship of the 2007 Yangtze Conference (the 10th Ordovician Conference) that was combined with the 3rd Silurian Conference and the IGCP 503 annual meeting in Nanjing. The combined conference was attended by 140 scientists from 24 countries; 66 papers and 22 posters were presented, with publication of these in a Proceedings volume of 566 pages. Two field guides were also printed.

r. Publication of ‘The new chronostratigraphic classification of the Ordovician System and its relations to major series and stages and to $\delta^{13}\text{C}$ chemostratigraphy’ *Lethaia* 2008.

s. Support and participation in the following major conferences during 2008: 7th Baltic Stratigraphic Conference, Tallinn, and associated field excursions, May 2008 and ‘Development of Early Paleozoic Biodiversity: The role of biotic and abiotic factors, and event correlation’ Moscow, June 2008 and the subsequent field excursion to the Altai Mountains; 33rd IGC in Oslo during August 2008 and the IGCP 503 ‘International Congress on Palaeozoic Climates’ in Lille, France during August, 2008.

t. Support, participation and sponsorship of the following major conferences during 2009. NAPC Cincinnati 21-26 June and IGCP 503 Copenhagen 31 August – 4 September.

u. Agreement in principle to establish a new range of working groups tackling a wide spectrum of areas of Ordovician with a view to developing new products for the community.

v. Support, participation and sponsorship of Ordovician session at IPC3 in London, June 2010.

w. Publication of a *Special Paper, Geological Society of America* (2010) on Ordovician research (edited by Finney and Berry).

x. Publication of two volumes of *Palaeogeography, Palaeoclimatology, Palaeoecology* (2010) on Ordovician research (edited by Servais and Owen together with Munnecke, Calnar and Harper).

z. Sponsorship of the 2011 Madrid Conference (the 11th Ordovician Congress), held in the spectacular surroundings of Alcalá de Henares, with field excursions to Portugal and central and northern Spain. The proceedings ‘Ordovician of the World’ was sponsored by the Subcommittee on Ordovician Stratigraphy. It contains 100 contributions, most of which are in the form of short papers, which were delivered as oral presentations or posters at the symposium. This volume represents a wealth of cutting-edge research on Ordovician rocks from

around the world, and includes contributions from 228 authors and coauthors from 23 countries on four continents. Three field guides were also printed.

aa. Launch of IGCP 591: The early to middle Palaeozoic revolution. This new project involving some 400 participants from nearly 40 countries will have a strong Ordovician component and is supported by the subcommission.

bb. Support and attendance at a thematic symposium on Ordovician research during IGC 34 in Brisbane: **35.4 International Subcommission on Ordovician stratigraphy: Ordovician intercontinental correlations: developing global and regional chronostratigraphy. This was well attended and will act as a catalyst for a publication in 2014 on Ordovician chronostratigraphies in the regions.**

cc. **Publication of the Geological Society, London Memoir 38, 'Early Palaeozoic biogeography and palaeogeography'**. This Memoir, edited by Harper and Servais, first introduces the content, some of the concepts involved in describing and interpreting palaeobiogeography, and the changing Early Palaeozoic geography is illustrated through a series of time slices. The subsequent 26 chapters, compiled by some 130 authors from over 20 countries, describe and analyse distributional and in many cases diversity data for all the major biotic groups plotted on current palaeogeographic maps. Nearly a quarter of a century after the publication of the 'Green Book' (Geological Society, London, Memoir 12, edited by McKerrow and Scotese), improved chronostratigraphic and taxonomic data together with more accurate, digitized palaeogeographic maps, have confirmed the central role of palaeobiogeography in understanding the evolution of Early Palaeozoic ecosystems and their biotas. All the articles are now available online through the Geological Society's 'Lyell Collection'.

dd. Support and attendance at the 2nd Annual Meeting of ICGP 591, supported for the first time by all three Lower Palaeozoic subcommissions. A substantial GFF special issue, edited by Calner, Lehnert, Albanesi, Babcock, Harper & Melchin: Early Palaeozoic Global Change, is near completion and many articles are already available online through the Taylor and Francis website.

ee. A thematic symposium at the 4th International Palaeontological Congress, Mendoza, Argentina will be sponsored by the Ordovician Subcommission **'Ordovician biotas of Gondwana: responses to global climatic and eustatic events, and their biogeographic relationships within the Ordovician world'**.

ff. The new website for the Ordovician Subcommission designed and edited by Olle Hints is now very much up and running at <http://ordovician.stratigraphy.org/>.

gg. The chairman recorded the palaeopodcast 'The Great Ordovician Biodiversification Event' at <http://www.palaeocast.com/episode-19-the-great-ordovician-biodiversification-event>.

hh. The Subcommission participated in, and supported the annual meeting of IGCP 591 in Tartu, Estonia, June 2014 and has contributed to the conference proceedings published in the *Estonian Journal of Earth Sciences*.

ii. The Subcommission participated in, and supported the annual field meeting of IGCP 591 in Kunming, China, August 2014 and is contributing to the conference proceedings to be published in *Palaeoworld*.

jj. The Subcommission convened a thematic session on *'Ordovician biotas of Gondwana: responses to global climatic and eustatic events, and their biogeographic relationships within the Ordovician World'* at the 4th International Palaeontological Congress in Mendoza, Argentina, October 2014.



12th International Symposium on the Ordovician System



June 3-17, 2015 at James Madison University
Harrisonburg, Virginia USA
Central Appalachian Mountains



THIRD CIRCULAR

The 12th International Symposium on the Ordovician System will be hosted on the campus of James Madison University in Harrisonburg, Virginia, June 8-11, 2015.

Over 80 delegates from 14 countries will participate in the scientific meeting and field excursions. Themes for the 12th ISOS include **Ordovician climate, isotope stratigraphy, biostratigraphy, regional stratigraphy, paleoecology and paleobiogeography**, and we welcome contributions on all aspects of Ordovician geology. A detailed presentation schedule will be posted on the 12th ISOS website (<http://www.jmu.edu/2015ISOS/index.shtml>)

The scientific sessions in Harrisonburg will be preceded and followed by geological excursions to study the Ordovician successions of the Appalachian Mountains of the Eastern US, with an off-site field excursion to the Ordovician carbonate and siliciclastic deposits of Oklahoma (site of the Katian GSSP), The 4 field excursions are described in more detail below.

We look forward to seeing you in Virginia in 2015!

Stephen A. Leslie, Daniel Goldman, and Randall Orndorff
On behalf of the organizing committee

Schedule and Deadlines

June 3-7, 2015	Pre-Meeting Field Trips
June 7, 2015	Registration and Ice Breaker in Harrisonburg
June 8, 9, 11, 2015	Technical Sessions
June 10, 2015	Conference Field Trip and BBQ (included in registration)
June 11, 2015	Conference Dinner (Included in registration)
June 12-17, 2015	Post-Meeting Field Trip
August 1, 2015	Deadline for short papers for the Special Issue of <i>Stratigraphy</i>

Organizing Committee

Stephen A. Leslie, James Madison University (Chair)
Daniel Goldman, University of Dayton (Co-Chair)
Randall Orndorff, United States Geological Survey (Co-Chair)

John T. Haynes, James Madison University

Matthew R. Saltzman, The Ohio State University
John F. Taylor, Indiana University Pennsylvania
Achim Herrmann, Louisiana State University
Charles E. Mitchell, University of Buffalo
John E. Repetski, United States Geological Survey
Stig M. Bergström, The Ohio State University
Jesse Carlucci, Midwestern State University
Stephen R. Westrop, University of Oklahoma
Carlton Brett, University of Cincinnati

Location

The meeting will be held on the campus of James Madison University (www.jmu.edu) in the City of Harrisonburg (<http://www.harrisonburgtourism.com>). We are located in the beautiful Shenandoah Valley of Virginia (<http://www.shenandoahvalleysbest.com/>). The town of Harrisonburg was officially chartered in the late 18th century, though its settlement began much earlier. Its population is just under 50,000 and growing. The weather in June is moderate, with average monthly temperatures ranging from an average low of about 15 °C (59°F) at night to an average high of 28°C (83°F) during the day.

Those who enjoy outdoor activities will find many opportunities nearby for getting out. JMU's location is between the Blue Ridge Mountains to the east and the Valley and Ridge to the west. Shenandoah National Park is 15 miles to the east and offers some of the best scenery in the eastern US along the scenic Skyline Drive.

Reaching Harrisonburg

Harrisonburg is close to major highways (Interstate 81 and Interstate 64) and serviced by Shenandoah Regional Airport (airport code SHD, <http://www.flyshd.com/>).

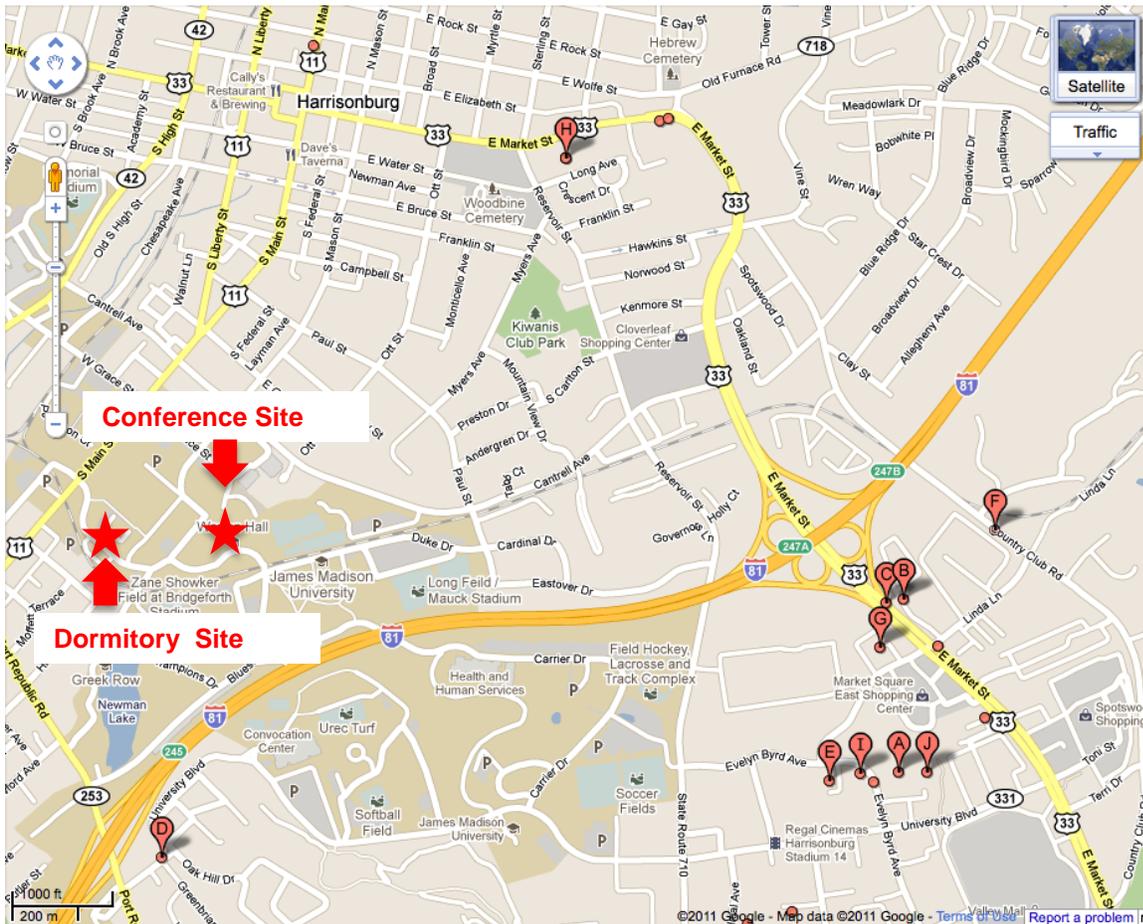
Both Richmond, Virginia (airport code RIC) and Washington, D.C. (airport code WAS) are approximately two hours away by car. Charlottesville (airport code CHO) is one hour away.

We will make arrangements for coaches to be available for transportation from Dulles International Airport (Airport Code IAD) to Harrisonburg at 12:30 PM and at 5:00 PM on June 7th. We will also provide a coach to Dulles on the morning of June 12th departing at 7:45 AM.

Conference Venue

The Ice Breaker and dormitory accommodations will be at Hoffman Hall. Technical sessions will be held at the Madison Union (<http://info.jmu.edu/madisonunion/warrendirectory.php>), and poster sessions will be in the same building in an adjacent room. Registration will be at Hoffman Hall on Sunday and at the Madison Union Monday and Tuesday.

The Department of Geology and Environmental Science at JMU (<http://www.jmu.edu/geology/index.shtml>) is one of the largest undergraduate-focused programs in the eastern US, with over 15 faculty and roughly 130 geology and Earth science majors. The resources of the department, e.g. lab spaces equipped with microscopes, will be available during the meeting. If there is a specific type of space that your research group needs for a meeting, please let us know and we will do all we can to arrange it for you.



Hotel Rates area subject to change based on hotel contract.

A Courtyard by Marriott
 1890 Evelyn Byrd Ave.
 ph 540.432.3031
 fx 540.432.3032
 res # same
 Conf Rate - \$79 + 11% tax
 Contact: Franita Coleman
 email: franita.coleman@marriot.com

B Comfort Inn
 1440 E. Market St.
 ph 540.433.6066
 fx 540.433.0793
 res # same
 Conf Rate - \$69 - \$89 + 11% tax
 Contact: Jenifer Jackson

C Holiday Inn
 1400 E. Market St., 22801
 ph 540.433.2521
 fx 540.434.7693
 res # 800.708.7037
 Contact: Brenda Zirkle

D Days Inn
 1131 Forest Hill Rd.
 ph 540.433.9353
 fx 540.433.5809
 res # 800.457.2792
 Conf Rate - \$55 + 11% tax
 Contact: Andy

E Quality Inn
 1881 Evelyn Byrd Ave.
 ph 540.442.1515
 fx 540.442.6655
 res # 800.526.3766
 Conf Rate - \$77 + 11% tax
 Contact: Christine Forehand
 harrisonburgva@cphosp.com

F Candlewood Suites Extended Stay
 ~\$65/night
 1560 Country Club Road, Harrisonburg,
 (540) 437-1400

G Best Western
 45 Burgess Rd., 22801
 ph 540.433.6089
 fx 540.433.6485
 Conf Rate - \$64 + 11% tax
 Contact: Gina Boyers/Janice Hartman

J Hampton Inn Harrisonburg
 85 University Blvd.
 ph 540.432.1111, 437-1402
 fx 540.432.0748
 res # same
 Conf Rate - \$84 + 11% tax
 Contact: karennesselrodt@hilton.com

H Stonewall Jackson Inn B & B
 ~\$149/night
 547 East Market Street, Harrisonburg, VA
 (800) 445-5330

Fairfield Inn & Suites
 1946 Medical Ave., 22801
 ph 540.433.9333
 fx 540.433.9332
 res # 800.228.2800
 Conf Rate - \$83 + 11% tax
 Contact: Richard Smith
 email: rsmith@pgmhotels.com

I Sleep Inn & Suites
 1891 Evelyn Byrd Ave., 22801
 ph 540.433.7100
 fx 540.437.2144
 res # same
 Conf Rate - \$72 + 11% tax
 Contact: Julie Spritzer
julie@beckcompanyhotels.com
dennis@beckcompanyhotels.com

Residence Inn
 1945 Deyerle Ave., 22801
 ph 540.437.7426
 fx 540.437.7425
 res # same
 Conf Rate - \$83-99 + 11% tax
 Contact: Jordan Cassell
jordan.cassell@marriott.com

Registration Fees

Conference Fee	\$375
Covers the costs of publication, Ice Breaker, coffee breaks, conference field trip, Conference Dinner, etc.	
Conference Fee for Students	\$150
Accompanying Person Fee	\$100
Breakfast ticket - Optional (June 8-12)	\$35
Lunch Tickets - Optional (June 8, 9, 11)	\$30
Lunch is included on the conference field trip	
Pre-conference excursion A (June 3-7)	
Southern Appalachians	\$650
Includes transportation, guidebook, meals and double occupancy lodging. Note that this trip begins in Birmingham, AL and ends in Harrisonburg, VA	
Pre-conference excursion B (June 3-7)	\$550
Oklahoma (begins and ends in Dallas, TX)	
Includes transportation in Texas/Oklahoma (<i>participants responsible for their own transportation to/From Dallas, TX</i>), guidebook, meals and double occupancy lodging.	
Post-conference Excursion A (June 12-17)	\$750
Central Appalachians	
Includes transportation, guidebook, meals and double occupancy lodging.	

Cancellation

Refunds of 50% of the conference and excursion fees will be paid if the cancellation is received before May 1st, 2015. No refunds are possible after this date.

Support

Limited support to young researchers is available. Please send a free form application alongside with registration form. Note that only participants with presentations will be considered for support.

Publication

A Short Papers/Abstracts volume and a Field Guidebook volume will be available at the meeting as a pdf and given out to participants in printed form.

The pdf Short Papers/Abstracts volume and Field Guidebook volume pdf will be available at the public access site for *Stratigraphy*, on the Ordovician Subcommittee website, and on the meeting website with free access.

A conference volume will be published as part of a theme issue for the journal *Stratigraphy*. The *Stratigraphy* theme issue will be published post meeting. Invitation for papers/call for papers for the Theme Issue of *Stratigraphy* is forthcoming.

Presentations

Oral Presentations will be 15 minutes each. Slides must be prepared in MS PowerPoint (.ppt, .ppx) or Portable Document Format (.pdf) and delivered to the organizers on June 7th.

Poster Presentations should be prepared in A0 format, preferably in portrait orientation.

Pre-meeting field trips

Southern Appalachians – Leaders: Achim Herrmann and John Haynes

This trip will begin in Birmingham, AL and travel northeast in the Valley and Ridge province through northeastern Alabama, northwestern Georgia, eastern Tennessee, and southwestern Virginia. We will examine exposures in both eastern and western facies of Ordovician strata. In eastern exposures we will see the carbonate to clastic transition, including the transition upsection from peritidal, shelf, and shelf margin carbonates (lower Chickamauga Group and equivalents) to basin margin and basinal graptolitic mudrocks (Sevier Shale and equivalents), which are the flysch deposits of the Blount foredeep of the Taconic foreland basin. Farther upsection is the succeeding transition into fluvial-deltaic and estuarine redbeds and quartz arenites (Bays Formation and equivalents) that comprise the molasse deposits of the Blount foredeep. In western exposures we will see shallow shelf carbonates of the Chickamauga Group and equivalents including the Tidwell Hollow section, where the first carbon isotope investigations of Ordovician strata in Alabama are being carried out. K-bentonites including the Deicke and Millbrig will be seen at several of these exposures as well, in both eastern and western facies belts. Traveling toward Chattanooga, Knoxville,

Roanoke, and Harrisonburg we will stop at exposures of the Ordovician carbonates and clastics that comprise the Taconic shelf to basin and basin fill sequences of the southern Appalachians. There will be opportunities to examine exposures of the Attalla Chert Conglomerate and equivalents above the regionally extensive Knox Unconformity, shelf edge and downslope buildups in the Holston, Rockdell, and Effna limestones, exposures of the Cambrian-Ordovician contact and the Ordovician-Silurian contact, and the transition from the Blount orogenic deposits into the younger Queenston deposits that include the clastics of the Sequatchie, Oswego, and Juniata Formations. From Alabama to Virginia, Sandbian and Katian K-bentonites provide a chronostratigraphic framework that, with the well-established biostratigraphic framework and the rapidly developing isotopic stratigraphic framework, collectively tie together the eastern and western facies that developed in response to uplift and volcanism in the Taconic orogen. Regional sea-level changes will be discussed as well. Discussions at most stops will include summary findings from conodont and graptolite biostratigraphic investigations, as well as the local and regional paleoecological, tectonic, and structural settings and interpretations. The trip will meet in Birmingham on June 3rd and will spend four days, June 4th-7th, visiting field sites. This trip will end at the conference site in Harrisonburg, VA. Lodging, food and transportation in the field are covered in the field trip registration. Registration is \$650 for a minimum of 8 and a maximum of 20 participants.

Oklahoma (Katian GSSP and Carbonates of the Arbuckle Group)

Leaders – Jesse Carlucci, Dan Goldman, Steven Westrop, and Carlton Brett

This trip will visit the Katian GSSP, where we will have a dedication ceremony, that exposes Womble Shale and Big Fork Chert at Black Knob Ridge, Oklahoma. We will also visit the Fittstown section that exposes the Bromide Formation and Viola Springs Fm., which is the auxiliary Katian GSSP section. This trip will then visit the extensive exposures of the upper Arbuckle Group (Early Ordovician), Simpson Group (Middle-Late Ordovician) and the Viola Springs Fm., Sylvan Shale, and Keel Limestone (Late Ordovician) along Interstate 35 through the Arbuckle Mountains. International participants are encouraged to fly in to Dallas on June 2 to allow for equilibration to the time change. This field excursion will meet on June 3rd at 12:00 PM the airport in Dallas, TX. We will spend June 4th - 6th visiting field sites, and return to Dallas the evening of June 6, and on June 7th participants will fly to Harrisonburg. Participants need to make their own flight arrangements. Lodging, food and transportation in the field are covered in the field trip registration. Registration is \$550 for a minimum of 8 and a maximum of 20 participants.

Conference Field Trip

Leaders: John Haynes, Keith Goggin, Randall Orndorff, and Rick Diecchio

The one-day conference field trip will be to Germany Valley, West Virginia, where the carbonate to clastic transition of the Queenston phase of the Taconic Orogeny is spectacularly exposed. There will be ample opportunity to see peritidal to shelf carbonates of the Sandbian age Benbolt, McGlone, McGraw and Nealmont limestones, and the Katian Dolly Ridge Formation. The Nealmont and Dolly Ridge are abundantly fossiliferous, as is the overlying Reedsville Formation that is the stratigraphic unit which marks the transition from carbonate to clastic sedimentation in the central Appalachian western facies. Above the Reedsville are the coarser lithic sandstones of the Oswego Sandstone, with the widespread *Orthorhynchula* zone separating the Reedsville and the overlying Oswego. Redbeds of the Juniata Formation, including some thin *Skolithos*-bearing sandstones, interbedded with more abundant red mudrocks and lithic sandstones, overlie the Oswego, and these stratigraphic units are all well-exposed in Germany Valley. At a very accessible exposure, we will also see and discuss the nature of

the Ordovician-Silurian boundary, which is placed at the transition from redbeds of the Juniata Formation upward into thick quartz arenites of the Tuscarora Sandstone.

Post-meeting field trip

Central Appalachians – Leaders: G. Robert Ganis, John F. Taylor, Charles E. Mitchell, and John E. Repetski

This trip, leaving Harrisonburg on the morning of June 12, will begin with two days in the thick succession of lower Paleozoic carbonates preserved in the Shenandoah Valley of Virginia and Cumberland Valley of Maryland. On Day 1 we will examine middle to outer shelf (bank-margin) deposits of the Conococheague Formation and overlying Beekmantown Group, uppermost Furongian to Tremadocian units famous for their well-developed sedimentary cycles and microbial reefs, in pasture exposures and in cliffs within the scenic Chesapeake and Ohio Canal National Historic Park along the Potomac River. We will also visit on Day 1 the well-known Tumbling Run and Strasburg sections, which present some of the finest exposures in the region of Middle and Upper Ordovician active margin carbonates and their gradational boundary with the overlying basal shales (Martinsburg Formation) that record onset of the Taconic Orogeny.

Days 3 and 4 will be spent in central Pennsylvania examining an even more stratigraphically expanded succession of Ordovician carbonates that was deposited closer to the basin depocenter, but in more proximal platform environments. The focus in the Lower Ordovician will be on refined correlations between distal and proximal carbonate platform successions, and recognition of the sedimentological signal in the inner platform stratigraphy of the major (third order) Tremadocian regressions and submergence events seen in the outer platform succession on Days 1 and 2, including the Stonehenge Transgression, and a significant regression recorded throughout Laurentian North America very near the top of the Skullrockian Stage. An exceptionally long and continuous exposure of Middle and Upper Ordovician carbonates known as the Union Furnace section, similar to (but much thicker than) that at Tumbling Run, exposes Sandbian to early Katian strata that includes the well-known Deicke and Millbrig super-ashfall deposits, and also spans the GICE interval and associated shift from clear-water tropical carbonates to mixed carbonate-siliclastic facies that contain the cool-water assemblages that inhabited Katian environments in this region. Another stop in central Pennsylvania will be at Reedsville, Pennsylvania, where recent road construction has exposed most of the graptolitic, basal shale package that filled the Taconic foredeep in that area, including its basal contact with the active margin carbonates and upper contact with the basal Silurian clastics of the Tuscarora Formation.

Day 5 will be dedicated to the complex stratigraphy of the Martinsburg Foreland near Harrisburg, Pennsylvania. Here the Foreland includes an interval with immense tectonically emplaced Darriwilian trench origin allochthons (Dauphin Formation). Olistoliths of older (Furongian – Floian), deep marine (abyssal) sediments from the floor of the Iapetus Ocean occur in the trench fill. Previously misinterpreted as the erosional remnant of a continuous, thrust-based sheet of allochthonous strata called the Hamburg Klippe, this interval has been shown through recent high-resolution graptolite and conodont biostratigraphic study and mapping to be a large-scale olistostromal package emplaced in the foreland basin and covered by the Martinsburg Formation (Sandbian-Katian). We will return to Harrisonburg on June 17th by way of Dulles International Airport. Lodging, most meals and transportation in the field are covered in the field trip registration. Registration is \$750 for a minimum of 8 and a maximum of 20 participants.

Social Program for Accompanying Partners

The Shenandoah Valley boasts many vineyards, historic sites, and spectacular natural scenery including public caverns (<http://www.shenandoahcaverns.com/>, <http://www.grandcaverns.com/v.php?pg=15>, <http://www.luraycaverns.com>), and Shenandoah National Park (<http://www.nps.gov/shen/index.htm>). These may be visited easily by accompanying persons and are most accessible via rental car. If there is sufficient interest trips may also be scheduled for Monticello, the home of Thomas Jefferson, author of the Declaration of Independence, third president of the United States (<http://www.monticello.org>) and Montpelier, the home of James Madison, father of the US Constitution, fourth President of the United States (<http://www.montpelier.org/>). In addition Harrisonburg is located 2 hours from the many attractions of Washington DC.

For Registration Form and methods of payment, and for updates on the program for the meeting, please visit:

<http://www.jmu.edu/2015ISOS>

CONFERENCE REPORTS

4th Annual Meeting of IGCP 591 in Tartu, Estonia June, 2014 (jointly with ISSS)

The 4th Annual Meeting of IGCP Project 591 “The Early to Middle Palaeozoic Revolution” took place in Estonia from June 10-19, 2014. The meeting was attended by 107 participants from 23 countries. Scientific sessions were held in the historical Hanseatic League city of Tartu, the second-largest city in Estonia, and were preceded by a field excursion examining key sections of latest Cambrian and Ordovician stratigraphy of northern Estonia. The meeting in Tartu was followed by an excursion complementing the pre-conference field trip in that it visited Silurian sections on the island of Saaremaa and on mainland Estonia, mainly in the southern and western regions.

The pre-conference excursion commenced in Tallinn, the capital city of Estonia, on June 10th and first visited the Pakerort Cliff on the Pakri Peninsula where the topmost second series of the Cambrian System and the topmost Furongian were overlain by the Lower Ordovician. The next stops introduced the Lower to Middle Ordovician transition (at the nearby Uuga Cliff), to the Upper Ordovician reef and flank facies limestones (Vasalemma Quarry), and to richly fossiliferous Upper Ordovician limestones with a K-bentonite (Ristna Cliff). The second day of the excursion started with a visit to an Upper Ordovician limestone section south of Tallinn (at Sutlema Quarry) and then proceeded to the east to the Middle and Upper Ordovician open shelf limestones (Väo Quarry, Aluverve Quarry). The lunch stop was organized in the Arbavere Field Station of the Geological Survey of Estonia where a number of core sections through Ordovician strata were available for examination. Following dinner at the Saka Cliff Spa hotel, participants took advantage of the extended daylight to walk along the coastline of the Baltic Sea, looking at the Cambrian-Ordovician transition in nearby sections. The third day brought us to the Põhja-Kiviõli kukersite open-pit mine, the Kohtla

underground mining museum and to the lowermost Hirnantian exposed in the Porkuni Quarry. The excursion arrived in Tartu that evening, in time for a welcoming party in the Art Museum of the University of Tartu.

The scientific sessions in Tartu took place from June 13-15th in the new building of the Estonian Biocentre, with 60 talks given together with 35 poster presentations. The talks and posters summarized recent advances in early to middle Palaeozoic geology, palaeontology, geochemistry, biogeography and palaeoecology. Three keynote lectures were offered. David Siveter presented an overview of the extraordinary soft-bodied fossils from the Silurian Herefordshire Lagerstätte. Brad Cramer with co-authors discussed the possibilities of resolving the stratigraphic record at the timescales comparable to changes in the ocean-atmosphere-biosphere system. Axel Munnecke offered a summary of recent developments in the field of Early Palaeozoic environments, considering oceanic circulation, latitudinal temperature gradients, migrating climatic belts and changes in atmospheric composition.

The conference dinner took place on June 14th in a private hall of the Dorpat Conference Centre in Tartu. Traditional Estonian folk music entertained the attendees.

The post-conference excursion to the Silurian sections departed from Tartu on June 16th. The first stops were made at the Llandoveryian algal *Lagerstätte* at Kalana Quarry and the Llandoveryian *Borealis* limestone deposit at Eivere Quarry. In the afternoon, the group took a ferry to Saaremaa Island where we spent three nights. A short sightseeing stop was made in the historical Koguva Village before lodging in Kuressaare. Stops on the second day included sections of lower to middle Wenlock, including the Pulli Cliff with reefs, the Panga Cliff with its magnificent view, the shoal and lagoonal units in the sections of Abula Cliff and grainstones of the Suuriku and Undva Cliffs, with an intermediate sightseeing stop in the Angla Windmill Park and the Heritage Culture Centre. The third day offered a succession of limestones and dolomites in the interval of topmost Wenlock to Pridoli (the Soeginina, Kaugatuma and Ohesaare cliffs), with an intermediate short stop at the Lümända lime kilns. This day terminated with a visit to the Historical Museum in the ancient Kuressaare Castle. On the final day of the excursion, participants looked at the Ludlovian lagoonal dolomites in the Kaarma Quarry, and visited the Kaali meteorite crater, before taking the short ferry trip back to the mainland. A late lunch stop was made in the Päre Quarry (upper Llandovery) on the way back to Tallinn.

The meeting was hosted by the Department of Geology of the University of Tartu and organized in cooperation with the Institute of Geology at Tallinn University of Technology. The conference volume prepared for the 4th Annual Meeting in Estonia can be downloaded from <http://www.igcp591.org/books.php>.

The organizing committee acknowledges financial support from the IGCP591 Project, the University of Tartu, the Estonian Environmental Investment Centre, the Tallinn University of Technology and the Estonian Geological Survey.

[*Editor's Note*: this report draws extensively on the article written by Tõnu Meidla and Leho Ainsaar that originally appeared in *Silurian Times* Number 22 (for 2014). Many thanks to both, and their colleagues in Tartu and Tallinn, for an excellent and extremely well-organised conference and field excursions].

IGCP 591 Field Workshop in Kunming, Yunnan Province, China, August, 2014 (held jointly with ISSS, ISOS and ISCS)

Co-organized by the Nanjing Institute of Geology and Palaeontology (Chinese Academy of Sciences) and Yunnan Key Laboratory of Palaeobiology (Yunnan University), the IGCP Project 591 Field Workshop was held during August 12-21, 2014, with scientific sessions on the campus of Yunnan University in Kunming, followed by a field excursion to northeastern and western Yunnan Province. The meeting took place in conjunction with the International Subcommission on Cambrian Stratigraphy (ISCS), the International Subcommission on Ordovician Stratigraphy (ISCS) and the International Subcommission on Silurian Stratigraphy (ISSS), serving as their annual meetings. The theme of the meeting was "the Early-Middle Paleozoic Events and their relationship".

The meeting attracted 111 registered delegates from 17 different countries, amongst which 43 were from outside China and 35 were graduate students. At the opening ceremony, Prof. Zhang Keqin (vice president of Yunnan University), Prof. Yang Qun (the director of the Nanjing Institute of Geology and Palaeontology), Dr. Liu Yu (representative of the National Natural Science Foundation of China), Prof. Peng Shanchi (the vice chair of International Commission on Stratigraphy), Prof. Jin Xiaochi (representative of the IGCP Academic Committee of UNESCO), and Dr. Brad Cramer (senior leader of IGCP Project 591) gave speeches. During the two-day academic sessions, all delegates exchanged their latest research achievements, ideas, and new technologies in the Science Hall of Yunnan University, discussing the future development of areas of common interest, and worked out potential collaborations on the Early-Middle Paleozoic geologic and biologic events and their relationships in the coming years. The meeting included 8 specific sessions, during which 42 oral presentations were given, including three invited plenary speeches by Prof. Loren Babcock (USA), chair of ISCS, Prof. David Harper (UK), chair of ISOS, and Prof. Mike Melchin (Canada), chair of ISSS. Most of the talks covered the latest achievements of the regional and international Cambrian, Ordovician and Silurian studies, such as stratigraphy, paleobiology, macroevolutionary events and their dynamics. Fossil Lagerstätten and GSSPs (particularly high resolution stratigraphy) were two hot topics of many talks. Outside the meeting hall, 35 posters were on display and provided many interesting topics for free communications during the coffee breaks of the meeting.

One of the outstanding features of this meeting was that more than 50% of the talks were given by graduate students and young researchers, indicating a promising future for the international Lower Paleozoic research. At the closing ceremony of the meeting, on behalf of the organizing committee, Dr. Brad Cramer announced awards for the best student oral presentations (Liang Yan from China and Lukas Laibl from Czech Republic) and the best student poster presentation (Jing Yuxuan from China).

All delegates took part in the mid-conference excursion to visit the original discovery site of the early Cambrian Chengjiang Biota, south of Kunming. About 60 delegates joined the six-day post-conference excursion to northeastern and western Yunnan Province, visiting the Lower Paleozoic geological sections and various fossil sites of South China, Indo-China and Sibumasu paleoplates respectively, as well as several famous scenery spots.

The formal publications of the meeting include: an Extended Summary volume comprising 66 short papers, published by Nanjing University Press (Nanjing) in July 2014, and a Field Guide published by Science Press (Beijing) just before the meeting. As well, a conference proceedings volume is being edited and will be published in 2015 as a normal issue in *Palaeoworld*, a SCI journal published by Elsevier.

Financial support for this meeting came from various sources: the State Key Laboratory of Palaeobiology and Stratigraphy, the National Natural Science Foundation of China, the IGCP Project 591, the Yunnan Key Laboratory on Palaeobiology (Yunnan University), and the Leica Kunming Company. The organizers would like to express our sincere thanks to all these institutions and relevant persons.

[*Editor's Note*: the above report is only slightly modified from the original written by Zhan Renbin and Huang Bing that was published in *Silurian Times* Number 22 (for 2014). Many thanks to both, and their colleagues from the Nanjing Institute of Geology and Palaeontology, and from Yunnan University, for organizing a most interesting and instructive conference and memorable field excursions to what was for many overseas delegates an exotic region, visiting sites that can be otherwise very difficult to access].



Middle to upper part of Laojianshan Formation (Dapingian) in the Laojianshan section, near Baoshan, Yunnan Province (Day 5, stop 1 of the post-conference field excursion).

NEW PUBLICATION OF INTEREST TO ORDOVICIAN RESEARCHERS

Zhou Zhiyi, Yin Gongzheng & Zhou Zhiqiang (2014). Ordovician (Darriwilian–early Katian) trilobite faunas of northwestern Tarim, Xinjiang, China. *Association of Australasian Palaeontologists Memoir* **46**, 142 pp.

Abstract

Seventy-one late Middle and Late Ordovician trilobite species belonging to 50 genera and subgenera, 24 families and 7 orders are described from northwestern Tarim, Xinjiang. Of these, 18 species and 2 genera (the nileid *Paraperaspis* and lichid *Tairongia*) are new. Much new morphological information is provided and ranges of variation are revealed for previously known forms on the basis of the new material. Ten trilobite biofacies developed during the Darriwilian–early Katian in relation to environmental gradients of the platform margin, shallow outer-shelf basin and outer-shelf slope are reviewed herein, taking account of the newly described and revised trilobite faunas. Eustatic changes that took place in the region, including a latest Darriwilian–Sandbian transgression and an early Katian regression, are suggested by the shoreward or seaward shifts and the vertical replacement of trilobite associations. Trilobites exhibit close biogeographic connections with the coeval faunas recorded in other terranes of peri-Gondwana, especially in South China, North China and Central Asia. The occurrence of some early Darriwilian genera that were previously considered as typical of either Laurentian (e.g. *Nanillaenus*, *Kawina* and *Xystocrania*) or Baltoscandian (*Parillaenus*, *Panderia* and *Hemisphaerocoryphe*) faunas indicate that faunal exchanges between peri-Gondwana, Laurentia and Baltoscandia may have begun much earlier than the late Katian when the Ordovician faunal provinces finally broke down.

[This and previously published *AAP Memoirs* are available from the **Geological Society of Australia, Inc.** See the GSA homepage: www.gsa.org.au for details of prices and postage].

RESEARCH REPORTS & Contact details (in alphabetical order)

Leho AINSAAR (Estonia) is working on carbonate sedimentology, sequence stratigraphy, stable isotope geochemistry and chemostratigraphy of Lower Palaeozoic successions in Baltoscandia and elsewhere.

Leho Ainsaar

Department of Geology, University of Tartu

Ravila 14a, EE50411 Tartu,

Estonia

Telephone: [+372 7376694](tel:+3727376694)

E-mail: Leho.Ainsaar@ut.ee

Guillermo L. ALBANESI (Argentina) is the director of the “Centro de Investigaciones Geológicas Aplicadas” (CIGEA, <http://www.efn.uncor.edu/investigacion/CIGEA>) at the Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, which includes a laboratory of micropaleontology especially equipped for conodont studies, in the campus installations of the Comisión Nacional de Energía Atómica (CNEA) at Córdoba. His current place of work and new office is in the CICTERRA (CONICET-UNC) at the university campus, and maintains a repository space for the conodont collections at the Museo de Paleontología, FCEFyN, UNC.

He is continuing studies on conodonts from the Lower Paleozoic of South America, including biostratigraphy, chemiostratigraphy, events, and paleothermometry. Diverse projects are carried out with Gladys Ortega and colleagues from Argentina and other countries. In particular, conodont researches from the Early Paleozoic of the Eastern Cordillera and Puna of northwestern Argentina; in association with graduate students on faunas from the Cambrian-Ordovician boundary interval, and with the young researcher G. Voldman on conodont paleothermometry. PhD students M.E. Giuliano, F. Serra, N. Feltes and M. Mango, are continuing their investigations on conodont biostratigraphy, paleoenvironments and evolution from carbonate and siliciclastic sequences of the Argentine Ordovician System under his direction by means of CONICET scholarships. He is completing a project on O isotopes from conodonts of the Argentine Precordillera regarding their paleobiogeographic implications, in collaboration with specialists from Australia, Canada and USA. An international project about Lower Paleozoic melanges and chronostratigraphic controls by conodont records is being carried out with colleagues from Spain and Italy. A new project on faunal relationships of the Precordillera from western Argentina with the Central Andean Basin will start up on current year.

Guillermo L. Albanesi

CICTERRA (CONICET-Universidad Nacional de Córdoba), FCEFyN, UNC.

Casilla de Correo 1598. Córdoba 5000. Argentina

Telephone: 54-351-5353800, int. 30207

Fax: 54-351-4332097.

E-mail: galbanes@com.uncor.edu

Anna ANTOSHKINA (Russia) continues to work on the Palaeozoic organic buildups and Lower Palaeozoic sedimentation of the Timan-Northern Ural region. Two of my graduate students, post-graduate student Luba Shmeleva, and two young scientists, Evgenij Ponomarenko and Nataliya Kaneva, have studied the Upper Ordovician succession (including the Bol'shaya Kos'yu reef) and the Lower Ludfordian reef Ilych in the Northern Urals. They have collected data on stratigraphy, biostratigraphy, and reef paleoecology of the studied outcrops.

Anna I. Antoshkina

Institute of Geology, Komi Science Centre, Ural Branch, RAS,
Syktyvkar, Pervomayskaya st., 54, 167982, Russia

antoshkina@geo.komisc.ru

Chris BARNES (Canada) is continuing Ordovician conodont paleontology/stratigraphy/isotope geochemistry research. The main current projects being: a) Ordovician and Silurian paleotemperature record determined from SHRIMP oxygen isotope measurements from conodonts (with Julie Trotter (UWA), Ian Williams (ANU) Guillermo Albanesi (CONICET, Cordoba) and Peep Männik (TUT)); and b) Ordovician and Silurian conodont biostratigraphy and paleoecology, Canadian Arctic Islands (with Zhang (GSC), Jowett and Carson (PetroCanada)).

Chris Barnes

School of Earth and Ocean Sciences
University of Victoria, P.O. Box 1700, STN CSC,
Victoria, BC V8W 2Y2, Canada

Telephone: +1-250-920-8382

Fax: +1-250-721-6200

E-mail: crbarnes@uvic.ca

Alain BLIECK (France) had no Ordovician activity in 2014. Mostly I have been working on history of geology (concerning our local Geological Society of northern France, the SGN) and on Early Devonian vertebrates from North France and Belgium.

Alain Blieck

Directeur de recherche émérite du CNRS / CNRS emeritus senior scientist

UMR 8198 « EvoEcoPaléo" du CNRS [NEW research unit]

c/o Université de Lille - Sciences et technologies

UFR Sciences de la Terre (SN5)

F-59655 Villeneuve d'Ascq cedex

France

National : tél. 0320434140 ; fax: 0320434910

International : tel. [+33 320434140](tel:+33320434140) ; fax: [+33 320434910](tel:+33320434910)

Email: alain.blieck@univ-lille1.fr

<http://univ-lille1.academia.edu/AlainBlieck>

https://www.researchgate.net/profile/Alain_Blieck/

Carlton BRETT (USA) during 2014 continued to work with Patrick McLaughlin (University of Wisconsin), Ben Dattilo (Indiana-Purdue University, Ft. Wayne), Rebecca Freeman (University of Kentucky), Steve Westrop (University of Oklahoma), Lisa Amati (SUNY at Potsdam), and University of Cincinnati students on a number of Ordovician projects in eastern North America. I attended outstanding field conferences of IGCP 591, on the Ordovician-Silurian of Estonia (together with graduate student Christopher Aucoin), Yunan Province, China and, the excellent trip with the International Palaeontological Congress in the Paleozoic of the Argentine Precordillera in Mendoza and San Juan areas. All of these experiences inspired further interests in comparative sequence stratigraphy and time-specific facies, and I hope to pursue further collaborative work in these areas in the near future.

Major research projects of my lab at University of Cincinnati are directed toward improving understanding of facies, faunas, sequence and chemostratigraphy and correlations of classic successions in the Cincinnati Arch. Taken together this work is leading to a substantially modified sequence stratigraphy for the Chatfieldian to Richmondian regional stages. This will also greatly refine understanding of physical and biotic events of the Katian Global Stage and aid in high-resolution correlations into other areas.

A) Integrated Stratigraphy of an early Katian Platform to Basin Transition in Kentucky and Ohio. Masters student, Allison Young, is working with me on correlation of the upper Sandbian-Katian (Chatfieldian-Edenian in North American terminology) Lexington Limestone and Kope Formation of the shallow water Lexington Platform into dark, shale-rich facies of the deeper water Sebree Trough. To this end we have initiated collaborations with Dr. Peter Holterhoff of the Hess Oil Corporation (Houston) to set up collaborative educational/ research ventures in two key oil and gas source rocks that my colleagues and I have studied for many years, the Ordovician Utica Shale and the so-called "Point Pleasant Formation". We have received funding for a pilot study dealing with linkage of gamma ray, chemo-, C-isotope, and sequence stratigraphy of outcrops of the Lexington Formation and subsurface cores from the "Point Pleasant-Utica" oil and gas field. In 2015 we will run a workshop at UC for researchers at the Hess Corporation. In addition, magnetic susceptibility profiles in the Sandbian-basal Katian interval produced as a part of the PhD dissertation of Thomas Schramm and carbon isotope results of Patrick McLaughlin, will aid in testing alternative sequence correlations of Cincinnati Arch successions with other critical sections such as the upper Mississippi Valley, Nashville Dome, and New York State.

B) Revised Correlations and Sequence Stratigraphy of the North American Cincinnati Series (upper Katian). We continued to work on microstratigraphy of the Upper Ordovician in the Cincinnati region. I am now working with graduate students Christopher Aucoin (Masters degree, 2014, PhD pre-candidate), Thomas J. Malgieri, and Cameron Schwalbach, as well as Dr. Pat McLaughlin (Wisconsin Geological Survey) and Dr. Ben Dattilo (Indiana Purdue University, Fort Wayne) on sequence and event stratigraphy of the Upper Ordovician Richmond Group.

1) Masters student Cameron Schwalbach is completing a thesis on sequence stratigraphic and paleoenvironmental of the middle Richmondian Stage (upper Katian) Rowland Member of the Cincinnati Arch in Kentucky. In particular, this research has shown that the Bull Fork Formation is a complex lithostratigraphic unit that actually encompasses at

least three regional disconformities. Major discoveries of this research include: a) the so-called lower Rowland Member of the western flank of the Cincinnati Arch, near Louisville, laterally equivalent to a distinctive interval in the as yet undifferentiated middle portion of the broadly defined Bull Fork Fm of the eastern side, now separated by up to 200 km by post-Paleozoic erosion of the arch. b) The base of this distinctive "lower Rowland" interval is equivalent to the base of the Waynesville Formation in more distal areas of Indiana and Ohio. c) This contact is locally at the base of a channeled, phosphatic grainstone that marks the base of the Fort Ancient Member (of Waynesville Formation), a minor erosion surface corresponding to Holland and Patzkowsky's (1996) C4-C5 sequence boundary; thus this boundary, though subtle may be recognized throughout the Cincinnati Arch, though not at precisely the position those authors had indicated. d) Two widespread distinctive shale-rich intervals separated by a thin, widespread coral-bryozoan biostrome (Fisherville bed) appear to represent the Fort Ancient Member and the major highstand through much of northern Kentucky on both east and west sides of the Cincinnati Arch. e) A more significant unconformity occurs below greenish, silty, calcareous rarely desiccation cracked shales and argillaceous carbonates of the Rowland member (Drakes Formation). f) The basal Rowland sequence boundary is a regionally angular unconformity, which truncates much of the Bull Fork (lower Waynesville and Arnheim equivalents) along the south sides of the Cincinnati Arch. This major unconformity was not previously identified as such but was predicted by Ross and Ross (2002). The further documentation of this regionally angular unconformity indicates that Holland and Patzkowsky's C5 is in need of subdivision. We have submitted a preliminary report of this angular unconformity to the special issue of *Paleoworld* for the IGCP 591 Kunming Meeting.

2) In a parallel study, UC PhD pre-candidate Christopher Aucoin completed an MS thesis on the sequence stratigraphy of the Richmondian strata along the northwest side of the Cincinnati Arch and links well with results from the east. A most important outcome of this research is documentation of a regionally angular discontinuity that occurs between the Clarksville and Blanchester Members of the Waynesville Formation. This surface appears to be confluent with the regionally angular unconformity of the lower Marble Hill Bed grainstones and, in turn, with the regionally angular unconformity at the base of the middle Rowland Member, discussed above under item 1.

This past summer, Christopher spent two months in Europe, working in collaboration with Professor Axel Muenecke, and graduate student Emilia Jarochowska at Universität Erlangen-Nürnberg, Germany. He studied the local Ordovician of Estonia and Poland in an attempt to correlate strata contemporaneous with Richmondian rocks in the Cincinnati region. A further purpose of this project was to examine strata of similar biostratigraphic positions for common patterns of sequence stratigraphy and carbon isotopic signatures. This work included studying outcrop and core from both countries with sample collection of carbon isotopes, chemical analyses through x-ray fluorescence, microfacies analyses through thin sections, and fossil content. This work is ongoing, but preliminary data are promising for Christopher's attempt at global correlation.

In addition, Aucoin is developing a depositional model for the occurrence of widespread trilobite-rich "butter shales"; these appear to be associated with pulses of mud deposition during late highstands of small-scale depositional sequences. He is also working again with Muenecke's lab on disaggregating samples of the mudstone to extract contained fossil biotas. Again, these samples have yielded a diversity of microfossils, scoleconts starfish remains and other previously unnoticed fossils.

3) Research presently being completed by MS student reported in last year's newsletter has also demonstrated an older regionally angular, southerly opening unconformity at the base of the Mount Auburn Member and laterally equivalent Terrill Member. This unconformity, also previously unnoted can be used to modify the base of Holland and Patzkowsky's (1996) C4 sequence such that its boundary is lowered from the upper contact of the Mt. Auburn (a probable flooding surface) to the erosional base of that unit.

4) Continued research with former MS student Thomas Schramm (presently a doctoral candidate at Louisiana State University) is focused on detailed microstratigraphic and magnetic susceptibility study of a single very well correlated interval (Z-bed and "Two-foot" shale) at the base of the Maysvillian Stage in Ohio, Kentucky, and Indiana. The premise of this study is to test the notion that there are systematic changes in magnetic susceptibility along a proximal-distal gradient with overall higher values in upramp sections near to areas of influx of detrital sediment. This hypothesis appears to be corroborated by preliminary results.

C) Katian Stratotype Successions in Oklahoma. During summer 2014 I also spent some time finalizing fieldwork on sequence stratigraphy and sampling sections for magnetic susceptibility and carbon isotope stratigraphy in the Late Ordovician Katian Stage stratotype and auxiliary sections in central Oklahoma in conjunction with Steve Westrop (University of Oklahoma), Dan Goldman (University of Dayton) and Thomas Schramm (PhD student and former UC Masters student). We are in the process of preparing a field guide and paper on these results, which suggest rather different correlations than those previously inferred.

Carlton E. Brett

Department of Geology, University of Cincinnati,
Cincinnati, OH 45221-0013 USA

Telephone number (including international code): 001 513 556-4556

Fax number: 001 513 556-6931

E-mail address: carlton.brett@uc.edu

Yves CANDELA (Scotland) is working with David Harper and Renbin Zhan on a project destined to review relationships within the Plectambonitoidea superfamily. I am also currently working on the description of brachiopod faunas (linguliforms) from the Glenkiln Shales (Sandbian) and the Raven Gill Formation (Floian), along the Wandel Burn and its attributes, SE Scotland. I am also working on brachiopod faunas from the Silurian of western Ireland and sponges from the Silurian of the Pentland Hills.

Yves Candela

Department of Natural Sciences
National Museums Scotland
Chambers Street
EDINBURGH EH1 1JF Scotland UK
Tel +44 (0)131 247 4280
e-mail: y.candela@nms.ac.uk

Marcelo G. CARRERA (Argentina) is actively working on the evolutionary history of lower Paleozoic sponges and the taxonomy, paleoecology and paleobiogeographic significance of the bryozoan fauna of the Argentine Precordillera. Also I'm devoted now to the study of a recent discovery of a lowermost Ordovician tabulate coral included in a biostrome limestone facies.

Marcelo G. Carrera

CICTERRA-CONICET Facultad Ciencias Exactas Físicas y Naturales,
Universidad Nacional de Córdoba
Av. Velez Sarsfield 299 (5000) Córdoba, Argentina
Telephone number (IP phone): 5353800 (office code 30222)
Fax: =54-351-4332097
E-mail: mcarrera@efn.uncor.edu

Duck K. CHOI (Republic of Korea) has been mainly working on the Cambrian-Ordovician trilobites of Korea over the years. Last August, I retired from Seoul National University, but am still doing research on the early Paleozoic trilobites of Korea. During the last several years, I am doing more geology than paleontology, focused on the Paleozoic paleogeography and tectonic evolution of the Korea Peninsula.

Duck K. Choi

School of Earth and Environmental Sciences,
College of Natural Sciences, Seoul National University
Seoul 151-747, Republic of Korea.
Telephone: +82-2-880-6737
E-mail: dkchoi@snu.ac.kr

Robin COCKS (UK): The year was spent largely in the initial work for a book with Trond Torsvik (Oslo) on Phanerozoic palaeogeography, and a contract has been signed with Cambridge University Press for that manuscript to be delivered in January 2016. Thus there have been three visits to Oslo, as well as much library work in London. Seeing the Late Ordovician from Pembrokeshire and the Late Ordovician of the Chingiz Terrane of Kazakhstan (with Leonid Popov, Cardiff) brachiopod papers through the press also took time; as well as the preparation, submission and acceptance of a paper for a Geological Society Memoir on the Cambrian to Devonian of Burma with Aye Ko Aung (University of Malaya). Acceptance in title of a Palaeontographical Society Monograph on the Middle and Late Llandovery brachiopods of England and Wales has necessitated visits to museums at Oxford, Birmingham, and the British Geological Survey at Keyworth, prior to getting specimens photographed, a task which is now over halfway done. A paper on Ordovician to Devonian palaeogeography was delivered at the Gondwana Symposium at Madrid in July.

L. Robin M. Cocks

Department of Earth Sciences, The Natural History Museum,
Cromwell Road, London SW7 5BD, U.K.
Tel. +44-20 7942 5140
E- mail: r.cocks@nhm.ac.uk.

Helena COUTO (Portugal) is working on the study of Palaeozoic stratigraphy, palaeontology and gold-antimony mineralization in the area of Valongo Anticline (North Portugal). These studies aim contributing for a better knowledge of the Palaeozoic stratigraphy and to define prospecting guides for gold and antimony. Geological mapping, petrographic, mineralogical, geochemical and stratigraphic studies go on being developed on the Cambrian-Ordovician transition (including evidences of rifting), Lower Ordovician oolitic ironstones bearing volcanogenic prints with organic matter, hydrocarbons, fossil algæ and bryozoa (that exert a control of gold mineralization), on the Upper Ordovician deposits related to the Late Ordovician glaciation and on Silurian-Devonian transition.

Helena Couto

Department of Geosciences Environment and Management, Faculty of Sciences,
Geology Centre, University of Porto
Rua do Campo Alegre 687
4169-007 Porto
Portugal
tel +351 22 0402489/69
hcouto@fc.up.pt

Andrei DRONOV (Russia) continued his work on facies, sea-level changes and biotic events on the Russian and Siberian platforms during the Ordovician. We are currently working on a 3- year project “Influence of eustatic sea-level changes on dynamics of biodiversification in the Ordovician paleobasins (comparative analysis of data from the Siberian and Russian platforms)”, started in 2013. The project’s team includes Alexander Kanygin, Taras Gonta, Alexander Timokhin, Anastasia Yadrenkina, Olga Maslova, Veronica Kushlina, Alexey Zaitsev, Elena Raevskaya and Tatiana Tolmacheva. I am also involved into investigation of the Ordovician trace fossils in cooperation with Radek Mikuláš and Dirk Knaust. Together with Birger Schmitz, we study distribution of extraterrestrial chromites in the Darriwilian sections of St. Petersburg region and Siberia. The studies of K-bentonite beds from the Upper Ordovician of Siberian platform conducted in collaboration with Warren Huff, Bryan Sell, Christian Rasmussen and David Harper. In the year 2014 together with David Harper, we performed a fieldwork on the uppermost Ordovician sections of the Tungus basin (Dolborian, Nirundian and Burian stages). We are also studying carbon isotope chemostratigraphy of the Ordovician of Tungus basin in cooperation with Leho Ainsaar, Peep Männik and Tõnu Meidla.

Andrei V. Dronov

Geological Institute
Russian Academy of Sciences
Pyzhevsky per.7
119017 Moscow
Russia
Tel.: +7 (495) 959-30-17
Fax: +7 (495) 959-07-60
E-mail: dronov@ginras.ru

Jerzy DZIK (Poland) published recently three papers about Ordovician fossils from China.

Prof. Jerzy Dzik

Dyrektor

Instytut Paleobiologii PAN

Twarda 51/55

00-818 Warszawa, POLAND

http://www.paleo.pan.pl/pracownicy/dzik/jerzy_dzik.html

e-mail: dzik@twarda.pan.pl

&

Uniwersytet Warszawski

Zakład Paleobiologii i Ewolucji

Centrum BiolChem, Żwirki i Wigury 101

02-089 Warszawa, POLAND

e-mail: dzik@biol.uw.edu.pl

Cole EDWARDS (USA) is working on Ordovician stable and radiogenic isotope stratigraphy. I am currently working as a post-doc with David Fike at Washington University in St. Louis on a project involving sulfur isotope stratigraphy of the Lower-Middle Ordovician and testing the effect that different methods can affect a seawater signal. This is a continuation of project published in *Palaeo3* on the Early-Middle Ordovician carbon isotope record in the Shingle Pass and Ibex areas of Utah and Nevada (USA) where we continue to explore the link between oxygen levels and onset of the Great Ordovician Biodiversification Event. I am continuing collaborative work with Matt Saltzman, Stig Bergström, Steve Leslie, and Walt Sweet on conodont apatite geochemistry, where we have a paper in press in *GSA Bulletin* comparing strontium isotopes in paired bulk carbonate and a conodont apatite-based seawater curve. Current and future projects include using the Cameca 7f/geo Secondary Ion Mass Spectrometer (SIMS) here at Washington University to analyze high-resolution, in situ isotopic measurements in Ordovician conodonts.

Cole Edwards

Department of Earth and Planetary Sciences, CB1169

Washington University in St. Louis

St. Louis, MO 63130 USA

Phone: [314-935-9088](tel:314-935-9088)

E-mail: cole.edwards@wustl.edu

Bob ELIAS (Canada), together with students and colleagues, is continuing to study the Upper Ordovician and Ordovician-Silurian boundary interval in the Williston and Hudson Bay basins. A paper is being published in *Canadian Journal of Earth Sciences*, titled "Hirnantian strata identified in major intracratonic basins of central North America: implications for uppermost Ordovician stratigraphy".

Papers on various Ordovician corals and coral-like fossils from China and Korea are in preparation with Dong-Jin Lee and Mirinae Lee (Andong National University, Korea), Kun Liang (Nanjing Institute of Geology and Palaeontology), and Ning Sun (China University of Geosciences).

Bob Elias

Department of Geological Sciences, University of Manitoba,
Winnipeg, Manitoba, Canada R3T 2N2
Telephone: 204-474-8862
E-mail: eliasrj@cc.umanitoba.ca

Annalisa FERRETTI (Italy) is working on Ordovician conodont faunas from Europe and elsewhere, conducting cooperative research with Stig Bergström on conodonts from different localities in UK, the Carnic Alps (with Hans Peter Schönlaub) and the United Arab Emirates (with Giles Miller). A study on new conodont material from the Late Ordovician Kalkbank unit (Germany) with Peter Königshof and Ulf Linnemann is currently going on.

A study on well preserved conodont material from the Keisley Limestone (England) has been recently published (Bergström & Ferretti) and it is proposed that *Birksfeldia* is a senior synonym of *Gamachignathus* and *Notiodella* a junior synonym of *Icriodella*. A rich Katian conodont fauna from the Shoeshook Limestone Formation (Wales) has been described providing new information on the *Amorphognathus* evolution (Ferretti, Bergström & Barnes). Samples from the Portrane Limestone (Ireland), which has long been famous for its diverse silicified shelly fauna, have produced a biostratigraphically diagnostic conodont fauna of Late Ordovician age (Ferretti, Bergström & Sevastopulo). The study of new material from the same unit is currently going on (with Stig Bergström and George Sevastopulo).

Study of new conodont collections from the Vaux Limestone, the conodont fauna of which was previously described in a preliminary way by Weyant et al. (1977), has provided significant new information about Late Ordovician conodonts from Normandy (Ferretti, Messori & Bergström).

The application of the Baltic isotope zones to a composite North American Darriwilian through Hirnantian succession has revealed a good trans-Atlantic agreement, suggesting that this isotope zonation is a useful tool for improving previously uncertain long-distance correlations (Bergström, Saltzman, Leslie, Ferretti & Young).

Formal lithostratigraphic units have been proposed for the Ordovician of the Carnic Alps by a team-group coordinated by Hans Peter Schönlaub. Results will be published in a 2015 issue of the "*Abhandlungen der Geologischen Bundesanstalt*".

The session "The contribution of fossils to chronostratigraphy, 150 years after Albert Oppel" (with M. Balini, S. Finney and S. Monechi) has been proposed at the 2nd International Congress on Stratigraphy-STRATI 2015 (Graz, Austria). The 150th anniversary of the death of A. Oppel provides the opportunity to celebrate this outstanding stratigrapher with a session dedicated on fossils in the modern chronostratigraphy. Our session is devoted to discussing contributions on: history of bio- and chronostratigraphy; definition of zones; from FO to FAD: time calibration of bioevents; evolutionary rates and power of resolution of the fossil tools; fossils and long

distance correlations; facies-controlled and time-controlled taxa. A thematic set of papers arising from the STRATI-2015 Symposium will follow as a Special Issue of a peer-reviewed journal. Ordovician papers are very welcome!

Please note my new contact details (below).

Annalisa Ferretti

Dipartimento di Scienze Chimiche e Geologiche
Università degli Studi di Modena e Reggio Emilia
via Campi 103
41125 MODENA
ITALY
E-mail: ferretti@unimore.it

Mansoureh GHOBADI POUR (Iran) is currently working on the Cambrian – Silurian of Iran and Central Asia, as well as general trilobite taxonomy, biostratigraphy, paleobiogeography, paleoclimate and biofacies. Revision of the Late Ordovician faunas of High Zagros that I am carrying out together with Leonid Popov, Javier Alvaro and a research team from Iran is in good progress and three more publications are currently in press. Current work also includes series of papers on faunas and stratigraphy of the Cambrian – Ordovician beds in Iran, some of them in advanced stage of preparation and on the Mid to Late Ordovician brachiopods and trilobites of the Anarak Region in Central Iran. I also continue my work on the trilobites and brachiopods from the Zerafshan Range, Uzbekistan.

Mansoureh Ghobadi Pour

Geology Department, Faculty of Sciences,
Golestan University, Gorgan 49138-15739, Iran.
Mobile: [+98 913 2654300](tel:+989132654300)
E-mail: mghobadipour@yahoo.co.uk & m.ghobadipour@gu.ac.ir

Daniel GOLDMAN (USA) has been working with Chuck Mitchell, Dave Sheets, Wu Shuang-Ye, Mike Melchin, and Fan Junxuan on a National Science Foundation funded project to study the relationship between graptolite biogeography and species longevity in the Ordovician and Early Silurian. Our research involves building a biogeographic database that includes detailed taxonomic, stratigraphic, geographic, and ecological information for Ordovician and Silurian graptolites. We intend to employ this database to test hypotheses regarding the relationship between graptolite species geographic ranges and their evolutionary dynamics (species longevity, speciation and extinction rate) including consequences for latitudinal gradients in species richness and macroevolutionary response to paleoenvironmental change.

I have also been working with Chen Xu, Zhang Yuandong, and Fan Junxuan of the Nanjing Institute of Geology and Palaeontology on a monograph of Darriwilian and Sandbian graptolites from Northwest China.

Daniel Goldman

Department of Geology

University of Dayton OH, USA
937-229-5637 (Office)
937-229-4820 (Lab)
E-mail: dgoldman1@udayton.edu

Juan Carlos GUTIÉRREZ-MARCO (Spain) continues to work in Ordovician stratigraphy and fossils from the high palaeolatitudinal Gondwanan settings of SW Europe, North Africa and northern South America. I have a Spanish-funded project on the Iberian Ordovician chronostratigraphy and its correlation with the global scale, which integrates researchers from several universities of Spain and Portugal. In 2014, I was one of the organisers of the *15 Gondwana Symposium* held in Madrid; its abstract book is available at the following open access website: <http://eprints.ucm.es/26351/>. I am also engaged in the French Research Agency's 'RALI' project (headed by Vannier and Servais), studying Lower Ordovician graptolites from Morocco, and I maintain active collaboration with non-Iberian researchers such as Guillermo F. Aceñolaza (Argentina), Diego García-Bellido (Australia), Valeri Sachanski (Bulgaria), Mario Moreno (Colombia), Peter Storch (Czech Republic), Bertrand Lefebvre (France), Gian Luigi Pillola (Italy), César Chacaltana (Peru), Jan-Ove Ebbestad (Sweden), Stan Finney (USA) and Jaime Reyes (Venezuela), among others.

Juan Carlos Gutiérrez-Marco
Instituto de Geociencias (CSIC-UCM)
Facultad de Ciencias Geológicas
José Antonio Novais 12
E-28040 Madrid
Spain
Phone: +34 3944874
e-mail: jcgrapto@ucm.es

David A.T. HARPER (UK) continues research on Ordovician stratigraphy and faunas in Scotland (with Yves Candela, Euan Clarkson and Alan Owen; a paper revising the brachiopod identifications of the Barr and Lower Ardmillan faunas, led by Yves, has been published in 2014), Ireland (George Sevastopulo and Svend Stouge: a paper on the conodonts from the Rosroe Formation is online), and Greenland (with Jan Audun Rasmussen, Christian Mc Ørum Rasmussen, Jin Jisuo and Svend Stouge). Work continues on the Ordovician of southern Tibet and Xinjiang with Zhan Renbin (Nanjing), Liu Jianbo (Beijing), Lars Stemmerik and Svend Stouge (Copenhagen). Involvement with identification of the causes of the GOBE (with Christian Rasmussen) and the End Ordovician extinction (with Seth Finnegan and Christian Rasmussen) continues.

David A.T. Harper
Principal of Van Mildert College
Professor of Palaeontology
Department of Earth Sciences
Durham University
Durham DH1 3LE, UK

Tel. 0044 1913347143
Fax: 0044 1913345991
Mobile: 0044 7900607167
E mail: david.harper@durham.ac.uk

Susana HEREDIA (Argentina) is working on taxonomy and biofacies of Middle Ordovician conodonts (*Lenodus variabilis* to *Eoplacognathus suecicus* zones) in the Central Precordillera, especially the taxonomy of the genus *Eoplacognathus*. Lower and Upper Ordovician conodonts from Precordillera are still under study. PhD students Tatiana Soria and Cintia Kauffman are working on conodonts (T.S.) and graptolites (C.K.) under Dr. G. Ortega supervision in key sections of Precordillera. Research continues with Josefina Carlorosi on Lower-Middle Ordovician key conodonts from North Western Argentina.

Susana Heredia

Instituto de Investigaciones Mineras, Facultad de Ingenieria,
Universidad Nacional de San Juan. Av. Libertador 1109 (5400),
San Juan, Argentina
Telephone number (including international code): 542646719653
E-mail address: sheredia@unsj.edu.ar

Linda HINTS (Estonia) is working on Upper Ordovician brachiopods and stratigraphy from the East Baltic. Special attention is paid on the development and stratigraphy of the Katian reefs in Northern Estonia in collaboration with Björn Kröger, and incorporated bio- and chemostratigraphical study of the Sandbian-Katian boundary interval in Lithuania. Descriptions of two stops (Porkuni, Vasalemma) of the IGCP 591 excursion were compiled together with colleagues.

Linda Hints

Institute of geology at Tallinn University of Technology
Ehitajate tee 5, 19089, Tallinn
Estonia
linda.hints@ttu.ee

Olle HINTS (Estonia) is continuing studies on Ordovician-Silurian microfossils (scolecodonts, chitinozoans, conodonts), geochemistry and Baltic regional geology and stratigraphy. In collaboration with Petra Tonarova (Estonia/Czech Republic) and Mats E. Eriksson (Sweden) he is studying Ordovician and Silurian scolecodonts to provide new insights into paleobiogeography and diversification history of Paleozoic jaw-bearing polychaetes. Together with André Desrochers (Canada) the first report on Ordovician scolecodonts from Anticosti Island, Canada, will be presented at the 2015 Annual Meeting of IGCP 591 in Quebec in July. Together with Liina Paluveer, Jaak Nõlvak and Viuu Nestor (all from Estonia) he is working on compiling a distributional database of Baltoscandian microfossils and analysing it with quantitative stratigraphic tools, CONOP9 in particular. Results of the combined Ordovician-Silurian dataset will be

presented at the 12th ISOS in Virginia in June. Olle is also involved in a new joint project with Tõnu Martma (Estonia), which is focusing on carbon isotopic composition of Ordovician-Silurian organic matter and microfossils. This study involves other environmental proxy indicators (other stable isotope systems, biomarkers), biotic turnover data and a number of collaboration partners. The first results are expected in 2015–2016. Olle also continues development of Estonian national geocollections database, which contains growing information also on Ordovician fossils, localities, drill cores etc and is freely accessible at <http://geocollections.info>.

Olle Hints

Institute of Geology at Tallinn University of Technology
Ehitajate tee 5, 19086 Tallinn
ESTONIA
+372 513 01 57 (office and mobile)
olle.hints@ttu.ee

Warren HUFF (USA) is involved in several collaborative projects with European colleagues. With Andrei Dronov we are studying samples from the Dolborian Regional Stage (middle to upper Katian) from the outcrop on Bolshaya Nirunda River, the tributary of Podkamennaya Tunguska. It is about 300 km to the east from Yenisei River. The continental margin during the Ordovician was about 200 km to the west from the position of the Yenisei River and the volcanic arc was probably even further to the west. So we estimate the minimal distance from the source of volcanic ash was no less than 500-600 km. Zircon crystals from the uppermost K-bentonite bed within the Baksian regional stage provide a $^{206}\text{Pb}/^{238}\text{U}$ age of $450.58 \text{ Å} \pm 0.27 \text{ Ma}$. We suggest that the Taconic Yenisei volcanic arc was continuous along the western margin of Siberia. With Oliver Lehnert and Guido Meinhold we are studying Paleozoic K-bentonites in drill cores from the Siljan impact structure. This is the largest known impact structure in Europe and the relict of the late Devonian Siljan meteorite crater in central Sweden. Three cores, provided by the private Swedish company Igrene AB, include more than 1500 m of Proterozoic basement and strata ranging from the late Tremadocian to Wenlock in age. Our work is focused on the mineralogy and geochemistry of a number of Ordovician and Silurian K-bentonites with the intent to explore possible correlations with previously described K-bentonites throughout Baltoscandia. By comparison, the Middle Ordovician section at Röstånga in Scania contains eighteen K-bentonite beds ranging from 1-67 cm in thickness, and all occur within the *D. multidens* graptolite biozone. Several beds at Röstånga correlate equally well with the Kinnekulle bed and thus argue strongly for the composite nature of what is called the Kinnekulle K-bentonite. We suggest the same for the equivalent sequence in the Siljan cores. And I have collaborated with Norbert Clauer and colleagues on K-Ar dating of K-bentonites in the southern Appalachians. Our data show that we can document at least two thermal episodes in the history of the Appalachians, and possibly a third one.

Warren D. Huff

Department of Geology
University of Cincinnati
PO Box 210013

Cincinnati, OH 45221-0013
Voice: 513-556-3731
Fax: 513-556-6931
Email: warren.huff@uc.edu

Dimitri KALJO (Estonia) is continuing studies on the Ordovician and Silurian bio- and chemostratigraphy of Baltica as a part time emeritus member at our institute and as the editor-in-chief of our journal. This year was rather busy due to IGCP 591 annual meeting in Estonia. Many project members published their short papers (44) in the *Estonian Journal of Earth Sciences* (a special issue pt. 1 as No 4, 2014; pt. 2 will come as No 1, 2015 in March). All issues are already freely available online at <http://www.eap.ee/earthsciences>. I am glad to thank Guest Editors Kathleen Histon and Živile Žigaite for their huge contribution into these publications.

Dimitri Kaljo
Institute of Geology
Tallinn University of Technology
5 Ehitajate tee,
19086 Tallinn, Estonia
Tel. (m): 372 56485523
Fax: 372 6203011
E-mail: dimitri.kaljo@ttu.ee;

Marcus KEY (USA) has been working with Patrick Wyse Jackson (Ireland) on two projects: 1) using fossil bryozoans preserved in artifacts to source historic building stones and prehistoric artifacts, including European Ordovician bryozoans from stone pavers and tombstones in colonial American archeological sites; 2) describing the dynamics of epizoic bryozoans fouling Ordovician nautiloids.

Marcus M. Key, Jr.
Department of Earth Sciences
P.O. Box 1773
Dickinson College
Carlisle, PA 17013-2896
U.S.A.
Telephone: +1 (1) 717-245-1448
E-mail: key@dickinson.edu

Petr KRAFT (Czech Republic) is continuing studies in the Prague Basin, Czech Republic. In the Ordovician, extensive field works were made in the upper Dobrotivá Formation (early Sandbian) under the project of the West Bohemian Museum aimed at the research of paleontological localities in the Ordovician of the south-western Prague Basin. Those excavations were focused on graptolite-rich locality to collect material especially for stratigraphical purposes and graptolite study. I collaborate with Ian Percival on research of NSW graptolites, and with Chuck Mitchell on study of Berounian

(Sandbian to early Katian) graptolites. Together with my student Karolína Lajblová we continue to study ostracods from the Prague Basin, in co-operation with Tonu Meidla.

Petr Kraft

Charles University in Prague
Faculty of Science, Institute of Geology and Palaeontology
Albertov 6
128 43 Praha 2
Czech Republic
tel.: +420 22195 1459
e-mail: kraft@natur.cuni.cz

Alain LE HERISSE (France) continues on several projects related to organic-walled microfossils (acritarchs and associated microalgae) from the Paleozoic, with emphasis on biostratigraphy and evolution of biodiversity in response to climatic and oceanographic changes. Current activities include : 1. Study of acritarchs and other microalgae in the Middle Ordovician of Saudi Arabia, in collaboration with Marco Vecoli, Aramco; 2. Paleozoic, Ordovician to upper Devonian microphytoplanktonic associations from northern Brazilian Basins, in collaboration with José Henrique Melo, Petrobras; 3. Microfossil associations from the early Devonian of Uruguay, in collaboration with Gloria Daners, University of Montevideo; 4. Early Devonian microfossils from the Rhynie chert, Scotland, in collaboration with Christine Strullu, British Museum; 4. Phytoplanktonic associations from Paleozoic of North Africa (Morocco, Algeria, Libya, Tunisia) mainly on subsurface material.

Alain Le Hérisse

Université de Bretagne Occidentale
UMR 6538 CNRS « Domaines Océaniques »
CS93837 – 6 Avenue Le Gorgeu
29238 BREST Cedex – France
Phone : 0033(0)298016187
Fax : 0033298016620
alain.le.herisse@univ-brest.fr

LI Jun (China) continues work on Ordovician acritarchs from China. In August I went to Padova, Italy, for EPPC9 and visited Thomas Servais in Lille after the conference.

LI Jun

Nanjing Institute of Geology and Palaeontology
Chinese Academy of Sciences
Nanjing 210008, China
Tel.: 86-25-83282153
Fax: 86-25-83357026
Email: junli@nigpas.ac.cn

Lixia LI (China) is working on the Ordovician sponges from China. My research is mainly focused on taxonomy, palaeoecology and taphonomy of sponges. I cooperate with Prof. Joachim Reitner from Göttingen University to figure out the macroevolutionary pattern of Ordovician sponges in South China. We also do some comparison between fossils and living sponges. Currently, I am a postdoctor in NIGPAS, Nanjing, China.

Lixia LI

State Key Laboratory of Palaeobiology and Stratigraphy
Nanjing Institute of Geology and Palaeontology,
Chinese Academy of Sciences
39 East Beijing Road, Nanjing 210008, China
Telephone: +86-25-83282147
E-mail: lilixia1015@gmail.com

Jörg MALETZ (Germany) is working on a number of projects, including the ‘Graptolite Treatise Project’ for which a number of chapters have been submitted to the Treatise editors in 2014. The work on a book on Graptolites for the ‘Topics on Palaeobiology’ Series (Ed. Michael J. Benton) is nearly finished and the manuscript will be submitted in early 2015. Research on Cambrian and Ordovician pterobranchs is in progress in the Project ‘Caught in the Cambrian Explosion: The mystery of the early evolution of the Pterobranchs (Hemichordata, incl. Graptolithina) and their evolutionary innovations’ supported by the German Science Foundation (DFG). Work on the sedimentology and palaeontology of the Lower to Middle Ordovician successions of Scandinavia (Sweden, Norway) is in progress with Sven Egenhoff (Colorado State University, Fort Collins, CO) and Per Ahlberg (Lund, Sweden).

Jörg Maletz

Freie Universität Berlin
Institut für Geologische Wissenschaften
Malteserstr. 74-100 Haus B, Raum 322
D-12249 Berlin
Germany
Phone: +49 30 838 70678
e-mail: yorge@zedat.fu-berlin.de

Peep MÄNNIK (Estonia) is working on evolution, taxonomy and palaeoecology of conodonts, conodont-based high-resolution stratigraphy, bioevents and palaeogeography. He is also interested in sequence stratigraphy and evolution of sedimentary basins. His studies continue under project “Environmental and faunal changes in the pre-Hirnantian Late Ordovician: a prelude to the end-Ordovician mass extinction? A Baltoscandian perspective”. Also, joint studies with colleagues from Estonia, Germany, Iran, Russia, Sweden, U.K. and USA on evolution and high-resolution stratigraphy of the Early Palaeozoic faunas and sedimentary basins on different palaeocontinents are ongoing.

Peep Männik

Institute of Geology at Tallinn University of Technology

Ehitajate tee 5

19086 Tallinn

Estonia

e-Mail: peep.mannik@ttu.ee

tel.: + 372 58845082

fax: + 372 6203011

Alexander (Sandy) D. McCracken (Canada) continues to work on Middle to Upper Ordovician, Silurian and Devonian and conodonts from various locations in Canada. He is concentrating on good collections from Hudson Bay and Moose River basins, Ontario and Manitoba.

Alexander (Sandy) D. McCracken

Geological Survey of Canada

3303-33rd St. NW, Calgary, Alberta T2L 2A7

Telephone 1-403-292-7130

E-mail samccrac@NRCan.gc.ca

Michal MERGL (Czech Republic) is currently working on Ordovician trilobites near the Katian/Hirnantian boundary and revision of the enigmatic illaenimorph trilobite *Svobodapeltis*. In cooperation with Petr Kraft (Prague, Czech Republic) I work on publications focused on review of the Ordovician localities of the Prague Basin. Over the last few years my research funding has been directed more towards studies of Devonian brachiopods than Ordovician ones.

Michal Mergl

Centre of Biology and Geosciences

University of West Bohemia

Klatovská 51

306 19 Plzeň

Czech Republic

Telephone +420 606 665 122

E-mail address: mmergl@cbg.zcu.cz

Tatiana L. MODZALEVSKAYA (Russia) last year worked on Silurian-Devonian brachiopods from eastern Central Pamir in collaboration with Leonid Popov (UK) and M.S. Dufour (St.Petersburg University). A low diversity brachiopod association has been documented for the first time. It shows great similarity in composition with the brachiopod fauna of the beginning of the Early Devonian, which was widespread in Old World Realm, North America, southern Siberia (Altai-Sayan area) and southern China (Sichuan). I'm keeping on working on new material of Upper Ordovician-Silurian brachiopods from Kotel'ny Island (Novosibirsk Islands, Arctic Russia). In the Upper Ordovician brachiopod association is dominated by *Tcherskidium*

unicum A. Nikolaev, well known from the Tirektykhian regional stage of North-East of Russia where it is found in the *Climacograptus supernus* graptolite Zone (Katian). The Silurian brachiopod association includes species of very widely distributed genera known in North Atlantic, Novaya Zemlya-Urals and Siberian paleobiogeographical brachiopod provinces.

Tatiana L. Modzalevskaya

All-Russian Geological Research Institute (VSEGEI)
Department of Stratigraphy and Palaeontology
Sredny pr. 74, St.Petersburg, 199106, Russia
E-mail address: TModzalevskaya@vsegei.ru (office);
modz@IB2567.spb.edu (home)

Godfrey NOWLAN (Canada) retired from the GSC in July 2013 and unfortunately I suffered a stroke in May 2014 that took away a part of my sight. This is not recoverable but I am undergoing rehabilitation to help me deal with the loss of vision. This has meant little or no research in 2014. Through collaboration with colleagues in Manitoba, I have one publication to report. I continue to lead Canada's program in Global Geoparks.

Godfrey S. Nowlan

c/o Geological Survey of Canada
3303 – 33rd Street NW
Calgary, Alberta, Canada
T2L 2A7
Phone: [1-403-292-7079](tel:1-403-292-7079)
Email: gnowlan@NRCan.gc.ca

Ian PERCIVAL (Australia) strayed from the true Ordovician path last year, becoming involved in several studies on Cambrian and Silurian faunas. However, he maintained an Ordovician focus by contributing the biostratigraphic context for a paper on geochemistry of Ordovician cherts in the Lachlan Orogen (with Michael Bruce, a geochemist from the Geological Survey of New South Wales, as senior author). Work continues on three manuscripts on Ordovician brachiopods from NSW, with one on linguliformeans about to be submitted to *Memoirs of the Association of Australasian Palaeontologists*. A collaborative study with Petr Kraft, Yuandong Zhang and Lawrence Sherwin involving revision of several Ordovician graptolite faunas from NSW is now well advanced. Ordovician conodont studies continue with Yong Yi Zhen, with a manuscript in revision (Quinton et al.) on isotopic analyses of conodont apatite using specimens from Ordovician limestones throughout NSW. Ian was pleased to host Guangxu Wang from Nanjing for several weeks in October-November, during which a couple of manuscripts were completed and fieldwork was undertaken on the Late Ordovician Angullong Formation in central NSW to collect corals and conodont samples.

Ian Percival

Geological Survey of New South Wales
WB Clarke Geoscience Centre
947-953 Londonderry Road, Londonderry.

New South Wales 2753
T: 02 4777 0315
F: 02 4777 4397
E: ian.percival@trade.nsw.gov.au

Leonid POPOV (United Kingdom) is presently working on the brachiopods and associated faunas from the Ordovician of Kazakhstan, Iran and Upper Ordovician of the Zerafshan Range in Uzbekistan. Three papers on brachiopods, trilobites and some other groups from the Upper Ordovician of High Zagros co-authored with Mansoureh Ghobadi Pour, Javier Alvaro, Mohammad Ghavidel Syoki and David Evans are currently in press. I am also working on the project on the Mid Cambrian – Mid Ordovician palaeontology and stratigraphy of Alborz in cooperation with Mansoureh Ghobadi Pour, Javier Alvaro, Mohammad-Reza Kebria-ee Zadeh and Vachik Hairapetian. First outcomes of that work dedicated to the earliest Tremadocian trilobites and brachiopods will be published later this year. A palaeogeographical survey of the Mid to Late Ordovician brachiopod faunas from Kazakh terranes in cooperation with Robin Cocks is ongoing. Current work includes the start of a monograph on the late Darriwilian to early Katian brachiopods of South Kazakhstan, also with Robin Cocks.

Leonid E. Popov

Department of Geology, National Museum of Wales,
Cardiff CF10 3NP, United Kingdom.
E-mail address: leonid.popov@museumwales.ac.uk; lepbarry@yahoo.co.uk

Page QUINTON (USA) is a Ph.D student at the University of Missouri working with Kenneth MacLeod on the evolution of the Late Ordovician climate as inferred from stable carbon and oxygen isotopes. Her current projects include (1) collaborative research with Achim Herrmann (Louisiana State University) and Stephen Leslie (James Madison University) addressing the paleoclimatic significance of environmental changes at the Sandbian-Katian boundary, and (2) a project with Ian Percival and Yong Yi Zhen (Geological Survey of New South Wales) to construct the first Ordovician sea surface temperature record from New South Wales, Australia using conodont apatite.

Page C. Quinton

Department of Geologic Sciences
University of Missouri
101 Geological Sciences Bldg
Columbia, MO 65211
Phone: [1 \(573\)-882-0787](tel:15738820787)
e-mail: pcq6y5@mail.missouri.edu

John E. REPETSKI (USA) continues to work on Cambrian, Ordovician, and Middle Devonian conodonts and biostratigraphy of various regions, mostly in Laurentia, including the Appalachians, Midcontinent North America, Great Basin, and Alaska.

My USGS work supports geologic mapping and CAI-based thermal maturation maps. I also am working on several regional stratigraphic and faunal studies, mostly with several good colleagues. Collaborative work continues also on phosphatized larval arthropods, embryos, and paleobiology of the paraconodont-euconodont transition interval. Considerable effort recently is aimed at the 2015 International Symposium on the Ordovician System and its field trips, as well as a pre-meeting field trip associated with the end-October 2015 annual Geological Society of America conference in Baltimore, Maryland.

John E. Repetski

U.S. Geological Survey

MS 926A National Center

Reston, Virginia 20192, U.S.A.

Telephone number: [1-703-648-5486](tel:1-703-648-5486)

Fax number: [1-703-648-6953](tel:1-703-648-6953)

E-mail addresses: jrepetski@usgs.gov (work), or jrepetski@cox.net (home)

RONG Jiayu (China) with many Chinese colleagues, has been working on a comprehensive book of “The Brachiopod Genera of China” dealing with all genera established based on the type species from China” (in English). It includes all Chinese genera from Cambrian, Ordovician, Silurian, Devonian, Carboniferous, Permian, Triassic, Jurassic and Cretaceous. This book will be completed this year and published next year.

Rong Jiayu

Nanjing Institute of Geology and Palaeontology

39 East Beijing Road, Nanjing 210008

China

Tel/fax: 0086-25-83282169

E-mail: jyrong@nigpas.ac.cn

Artur Abreu Sá (Portugal) is working on Ordovician stratigraphy and paleontology of the Central-Iberian Zone in Portugal and Spain, in collaboration with Juan Carlos Gutiérrez-Marco, Isabel Rábano, Carlos Meireles, Diego García-Bellido, Jorge Pamplona and Nuno Vaz. His work is also focused in the Ordovician Geological Heritage of Portugal (Arouca Global Geopark, Terras de Cavaleiros Global Geopark and Ordovician of Central-Iberian Zone Framework) and Spain [Molina y Alto Tajo Global Geopark and IBEROR Project (GL2012-39471, 2013-2016)]. He is directing one Ph.D. student in Upper Ordovician trilobites of Portugal, which is expected to be finished her thesis in 2015. Artur is still working as Scientific Coordinator of the Arouca Global Geopark (GGN), and as President of the Portuguese National Committee for the International Geoscience Programme (IGCP).

Artur Abreu Sá

Departamento de Geologia

Universidade de Trás-os-Montes e Alto Douro

Quinta de Prados
5000-801 Vila Real - Portugal
Phone: (+351) 259350218
Fax: (+351) 259350480
E-mail: asa@utad.pt

Matthew SALTZMAN (USA) continues working on Ordovician stable and radiogenic isotope stratigraphy. Former PhD student Cole Edwards (now a postdoc at Washington Univ in St Louis with Dave Fike) published a paper in *Palaeo3* on Early-Middle Ordovician C isotopes and has a 2nd paper in press at *GSA Bulletin* on Sr isotopes in Ordovician bulk rock that will come out in 2015. This Sr isotope work on bulk rock presents comparisons with the seawater curve using conodont apatite that we also published in *GSA Bulletin* in 2014 (see references). Cole and I were helped in these Sr isotope studies by Steve Leslie, Gary Dwyer, Stig Bergström, John Repetski, Jeff Bauer, Walt Sweet, Alexa Sedlacek and Seth Young. An abstract was presented at the annual GSA meeting on a collaborative project with Steve Westrop, Jonathan Adrain and Cole Edwards to look at the base Stairsian (Tremadocian) biomere boundary and carbon isotope excursion. In addition, collaborative efforts with Ben Gill and Sarah Pruss are planned on coupled carbon-sulfur studies and petrography in the Early Ordovician, and a new project is underway with Alycia Stigall on Middle Ordovician brachiopod evolution in North America and comparisons to Baltoscandia. We hope to continue collaborations with Olle Hints and colleagues in Estonia to use Sr isotope stratigraphy on conodont apatite to correlate between the USA and Estonia. Lastly, work continues with a co-edited Special Volume of *Palaeo3* together with Tom Algeo and Pedro Marenco. This Special Volume is based on the GSA session we ran at the annual meeting in Vancouver this year and we hope it will be published at the end of 2015.

Matthew R. Saltzman
School of Earth Sciences
125 South Oval Mall
Ohio State University
Columbus OH 43210-1398
phone: [614-292-0481](tel:614-292-0481)
email: saltzman.11@osu.edu

Thomas SERVAIS (France) is a research director of the French CNRS, based at the University of Lille. Specialist of the acritarchs, he uses this fossil group for biostratigraphical, palaeoecological and palaeogeographical purposes. In the last years, he mainly discussed the importance of the group as an essential part of the marine phytoplankton, triggering probably the Cambrian-Ordovician radiation, and in particular the ‘Ordovician plankton revolution.’ In the two last years, his publications on acritarchs included several papers with the PhD student Yong Lei (Wuhan, China and Lille, France) on Permian phytoplankton, and further work with Wang Wenhui (Nanjing University and Lille, France), Yan Kui and Li Jun (Nanjing Institute of Geology and Palaeontology, China) about the Early-Middle Ordovician, including the revision of the taxa *Rhopaliophora* and *Dactylofusa velifera*, and the palaeobiogeography

of *Veryhachium*. Additional work, also with Stewart Molyneux, is in preparation. Hendrik Nowak (PhD student) will finishing his work on the Fezouata Lagerstätte (Lower Ordovician of Morocco) later this year. Thomas is currently a vice-president of the International Paleontological Association (IPA) and past-president of the International Federation of Palynological Societies (IFPS).

Thomas Servais

UMR 8217 Géosystèmes
Bâtiment SN5
Université Lille1
F-59655 Villeneuve d'Ascq (France)
Phone: 0033(0)320337220
Fax: 0033(0)320434910
thomas.servais@univ-lille1.fr

Lawrence SHERWIN (Australia) has retired but remains affiliated with the Geological Survey of New South Wales as an Honorary Research Associate. He is involved in a project (with B. Erdtmann, P. Kraft, and I. Percival) to document Early Ordovician graptolites from central and northern New South Wales, and another paper, with Y.D. Zhang, P. Kraft, I. Percival and the late T. Koren', on Late Ordovician graptolites from Canobolas Forest, is in preparation. Two other papers, on Late Ordovician (Bolindian/Katian) graptolites from the Cotton Formation near Forbes and Late Ordovician (Eastonian/Katian) graptolites from Gunningbland in the central west of the state, are in progress.

Lawrence Sherwin

Geological Survey of New South Wales
Locked Bag 21, Orange
New South Wales 2800 Australia.
Tel. 61 (0)2 63605349
Email: lawrence.sherwin@trade.nsw.gov.au

Tatiana TOLMACHEVA (Russia) with Kirill Degtyarev and Alexey Ryazantsev (Geological Institute, Moscow) continues to work on stratigraphy and conodonts of the Ordovician of Kazakhstan and Ural Mountains, and with Alexander Kusmichev and Maria Danukalova (Geological Institute, Moscow) on Ordovician conodonts from Novosibirsk islands. Research on Kazakhstania conodonts were summarized in a book "Biostratigraphy and biogeography of the Ordovician conodonts of the western part of Central-Asian Fold Belt" that has been published in December 2014. My ongoing research project is on Cambrian and Ordovician paleoecology from siliceous rocks of Central Kazakhstan. A revision of several Ordovician conodont taxa from Siberia is in progress.

Tatiana Tolmacheva

A.P. Karpinsky Russian Geological Research Institute
Sredny pr. 74, 199106 Saint Petersburg, Russia

Telephone: 8 (812) 321 30 22

E-mail: tatiana_tolmacheva@vsegei.ru

Thijs VANDENBROUCKE (France) remains interested in reconstructing the Ordovician palaeoclimate and palaeo-environment. Two research students currently work with Thijs in Lille on these topics: Chloé Amberg's project concentrates on identifying and documenting Pre-Hirnantian glaciations. Lorena Tessitore's project is part of the ANR research grant "SeqStrat-Ice: Lessons from our Ancient Frozen Planet" (Project coordinator: J.F. Ghienne, University of Strasbourg/CNRS, 2013-2017: <http://seqstrat-ice.unistra.fr>). This ANR grant focuses on the glacial deposits of the Upper Ordovician, and our first results are now published (Ghienne et al. 2014: [doi:10.1038/ncomms5485](https://doi.org/10.1038/ncomms5485)). Thijs also co-supervises Hendrik Nowak (see Report by Thomas Servais) and Matthias Sinnesael, who has recently started a PhD project with Philippe Claeys at the VUB (Belgium) on astronomical forcing during the Late Ordovician.

Thijs also remains active as one of the coordinators of the IGCP 591 project. All information can be found on our website www.igcp591.org. The group is looking forward to seeing you at one of their next meetings, this year in Quebec (our main Annual meeting, together with ISSS), Harrisonburg (together with ISOS) and Marrakesh (with RALI). Please also note the dates for the final meeting of this project: 6-9 July 2016 in Ghent, Belgium (formal announcement soon).

Thijs Vandenbroucke

Université Lille 1 - Sciences et Technologies

UMR 8217 du CNRS: Géosystèmes

Avenue Paul Langevin- bâtiment SN5

59655 Villeneuve d'Ascq cedex

France

(T) + 33 (0)3 20 43 69 00

(E) Thijs.Vandenbroucke@univ-lille1.fr

(W) <http://geosystemes.univ-lille1.fr/geosystemes/spip.php?rubrique94>

Marco VECOLI (Saudi Arabia) is a biostratigrapher (palynologist) at Saudi Aramco Oil Company, Dhahran, Saudi Arabia. My activity focuses mostly on Cambrian to Permian palynomorphs (acritarchs, chitinozoans, miospores, pollen) in application to high resolution biostratigraphy, and palaeoenvironmental - sequence stratigraphic reconstructions for hydrocarbon exploration. I am working on several regional projects in the Ordovician and Silurian in the NW of Saudi Arabia, as well as on providing real time, on-site and remote assistance to exploration drilling operations (identification of drilled formation, determination of coring point, formation at TD, etc).

My continued exposure to the study of many new stratigraphic sections on a daily basis reinforce my idea that there is still much to do in order to fully unlock the potential of Ordovician (and more in general Palaeozoic) organic walled microfossils for biostratigraphic and palaeoenvironmental analyses, and this "much to do" certainly includes detailed taxonomic work to decipher the stunning diversity of Palaeozoic palynomorphs. Being actively involved in the Saudi Aramco – CIMP joint project gives me the opportunity of keeping in touch with academic research into the origin and early

evolution of land plants (“terrestrialization”), evolution of oceanic microphytoplankton during the Palaeozoic, and the effects of these evolutionary events of the Earth System.

Marco Vecoli

Biostratigraphy Group
Geological Technical Services Division
Saudi Aramco
E-4000-B Engineering Building
DHAHRAN, 31311, Saudi Arabia
ph: +966 38732898; fax: +966 38731009

Olev VINN (Estonia) is working on the palaeontology of problematic calcareous tubeworms from the Palaeozoic (e.g. cornulitids, tentaculitids, microconchids etc.) and evolution of tubeworm biomineralization. My second research interest is trace fossils in the Ordovician, especially bioclastrations. I am currently also working on the evolution of bioerosion and biofouling of hard substrates in the Ordovician of Baltica. In 2014 I received a Palaeontological Association (UK) Research Grant to study bioerosion and encrustation of hard substrates in the Ordovician of Baltica.

Olev Vinn

Department of Geology, University of Tartu,
Ravila 14A, 50411 Tartu, Estonia
Telephone number (including international code):+372-7376692
E-mail address: olev.vinn@ut.ee

Viive VIIRA (Estonia) continues working on Ordovician conodonts of Estonia.

Viive Viira

Institute of Geology at Tallinn Technical University
Ehitajate tee 5
19086 Tallinn, Estonia
tel. 372 58846899
Viive.viira@ttu.ee

WANG Guangxu (China) finished his PhD at NIGPAS in July, 2014, and is currently working as a research assistant there. My PhD thesis focussed on the Ordovician-Silurian boundary stratigraphy and corals in South China. Our investigations reveal the complete coral sequence across the Ordovician and Silurian transition, which contributes to the new understanding of the bio-events during this critical time interval. Some of these results have already been published or are in press. I will be continuing my research on the O-S boundary corals in South China. In addition, I will also work on Upper Ordovician corals from the Angullong Formation of central New South Wales, Australia, in collaboration with Ian Percival and Yong Yi Zhen (Geological Survey of NSW).

WANG Guangxu

State Key Laboratory of Palaeobiology and Stratigraphy,
Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (CAS),
39 East Beijing Road, Nanjing 210008, PR China
Tel: +86-25-83282129
E-mail: gxwang@nigpas.ac.cn

Barry WEBBY (Australia) reports that the *Treatise on Invertebrate Paleontology*, Part E, Porifera (Revised) Volumes 4 & 5 (Hypercalcified Porifera), edited by Paul A Selden, and Barry Webby, as coordinating author, leading a team of 14 international specialists, has now been published by the University of Kansas, Paleontological Institute, Lawrence, Kansas [liii + 1223 p., 665 fig., 42 tables]. The volumes are now printed and bound, and will be distributed worldwide (March 2015). The appearance of these last two volumes completes a long, sustained program of extensive revisions of Part E, Porifera, across all spiculate and non-spiculate fossil sponge groups of classes Demospongiae (with inclusion of chaetetid, sphinctozoan and inozoan-type morphologies), Calcarea, Hexactinellida, Heteractinida, and mainly non-spiculate Stromatoporoidea, and the Archaeocyatha. The content of Volume 4 includes a Coordinating Author's Preface, an Outline Classification with Stratigraphic Ranges of All Taxa, and sections on Systematic Descriptions of Chaetetid and post-Devonian Stromatoporoid-type Demosponges, a review of the distribution of Sphinctozoans and Inozoans and, as well, a comprehensive Glossary. Volume 5 contains mainly multi-authored sections on the two major, non-spiculate groups, the Palaeozoic Stromatoporoidea and the Cambrian Archaeocyatha. A comprehensive bibliography, and combined index for the two volumes, is also included.

Continuation of work on a number of small projects has been much hampered by the many years of *Treatise* work. Some preliminary work has been done on the small collections of Ordovician sphinctozoans and other sponges collected originally by Leonid Popov and others from Kazakhstan, and on a few remaining taxa in the original Ordovician trilobite collections from central New South Wales. I expect these studies will now finally proceed more rapidly to completion during the coming year with the help of Zhen Yong Yi and Ian Percival (Geological Survey of NSW). As well there will be a resumption of work on the extensive Mid-Palaeozoic stromatoporoid faunas from NSW and North Queensland, also in conjunction with Zhen Yong Yi.

Barry D. Webby

School of Geosciences
University of Sydney, NSW 2006
AUSTRALIA
Tel. +61-2-9816-4020
E-mail: bwebby25@gmail.com
Home address: 77 Woolwich Road, Hunters Hill, N.S.W., 2110, Australia

Charles WELLMAN (UK) continues his work on early land plant spores and other remains, including those from the Ordovician. He continues with his work on Ordovician spore assemblages from Saudi Arabia (in conjunction with Philippe Steemans) and Oman.

Charles Wellman

Dept. of Animal & Plant Sciences
University of Sheffield
Alfred Denny Building
Western Bank
Sheffield S10 2TN
UK
Tel: 0114 222 3689
E-mail: c.wellman@sheffield.ac.uk

Rongchang WU (China) is working on the Ordovician and Silurian (bio-, litho-, and chemo-) stratigraphy and conodonts. Currently, my research is focused on the Ordovician and Silurian conodonts from China, and fluctuations in palaeoclimate and palaeoenvironments during this period by use of stable isotopes (O, C, and S etc.) and microfacies analysis. I will be back to NIGPAS (Nanjing) from Lund (Sweden) in April 2015 and will continue my research on Ordovician and Silurian stratigraphy there.

Rongchang WU

Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences,
39 East Beijing Road, Nanjing, 210008, China.
Telephone number: +862583282235
E-mail address: rcwu@nigpas.ac.cn

YAN Kui (China) worked on Ordovician and Silurian acritarchs this year. In August, I attended the IGCP 591 Regional Field Meeting in Kunming, China. In September-October, I attended 4th International Palaeontological Congress in Mendoza, Argentina and visited Palaeozoic strata through the Argentine Precordillera. I went to Guizhou, Shaanxi, and Yunnan for a field trip this year. I also worked on the acritarch biostratigraphy in eastern Yunnan.

Yan Kui

Nanjing Institute of Geology and Paleontology, Chinese Academy of Sciences
39 East Beijing Road, Nanjing
CHINA
Tel: 86-25-83282214
E-mail: kuiyan@nigpas.ac.cn

Graham YOUNG (Canada) is continuing to work on Palaeozoic palaeoecology and on the diversity of Ordovician cnidarians and arthropods. In 2014 I carried out collaborative fieldwork at Ordovician type sections along the Churchill River in northern Manitoba, with Michelle Nicolas of the Manitoba Geological Survey; a return visit is planned for 2015. Detailed studies of the varied fossils at the William Lake site in central Manitoba are under way, in collaboration with Dave Rudkin, Michael Cuggy, and others. Our

current focus is on completing the description of a large number of well-preserved eurypterid specimens.

Graham Young

The Manitoba Museum
190 Rupert Avenue
Winnipeg, MB, R3B 0N2
CANADA
Phone: 1-204-988-0648
Fax: 1-204-942-3679
gyoung@manitobamuseum.ca

ZHAN Renbin (China): As usual, in 2014 I was working mainly on the Ordovician brachiopods, stratigraphy and some related problems. The major research grants supporting my research include: 1) The Innovative Research Team Fund; 2) The Major Basic Research Project, both of which are from the National Natural Science Foundation of China (NSFC), and both are dealing with the major events and their dynamics during the Early-Middle Palaeozoic. These projects need multidisciplinary collaborations, but I am in charge of the palaeontological and stratigraphical parts, and have various collaborations with my colleagues both domestic and abroad. My research area is mainly in South China, but also dealing with materials from North China, Tarim, Tibet, and even some parts of eastern North America.

In 2014, I chaired an international workshop for IGCP Project 591 which was held in the Yunnan University (Kunming China) from August 12-15, followed by a 6-day field excursion visiting the Lower Palaeozoic of South China, Indo-China and Sibumasu palaeoplates. Delegates at the meeting include 47 experts from 17 western countries, and altogether 128 attendees with domestic representatives included.

Zhan Renbin

State Key Laboratory of Palaeobiology and Stratigraphy
Nanjing Institute of Geology and Palaeontology (NIGP)
Chinese Academy of Sciences
39 East Beijing Road
Nanjing 210008, China
Tel./Fax: +86-25-83282132, 83282196;
E-mail: rbzhan@nigpas.ac.cn

Shunxin ZHANG (Canada) has focused her research on Late Ordovician and Early Silurian biostratigraphy and petroleum potential in Hudson Bay, Foxe Basin, Ungava Bay and Devon and Ellesmere islands in the Arctic area. She has also worked on the Late Ordovician and Early Silurian conodonts (taxonomy and CAI) from limestone xenoliths on Hall Peninsula, Baffin Island where is no Phanerozoic cover nowadays. She used the conodont data to estimate the thickness of eroded Paleozoic strata and erosion rate, as well as the kimberlite temperatures.

Shunxin Zhang

Canada-Nunavut Geoscience Office
PO Box 2319, 1106 Inuksugait IV, 1st floor
Iqaluit, Nunavut X0A 0H0
Canada
Telephone number: 1-867-975-4579
Fax number: 1-867-979-0708
E-mail address: Shunxin.Zhang@NRCan-RNCan.gc.ca

Yuandong ZHANG (China) continues working on:

- (1) Integrated stratigraphy of graptolite, conodont, chitinozoan, acritarch, radiolarians, and carbon isotope chemostratigraphy, and cyclostratigraphy of the Ordovician in China. This work aims at a refined stratigraphic correlation of two critical transitions (late Darriwilian to early Sandbian, and late Katian to Hirnantian) in South China and Tarim blocks. The integrated graptolite and conodont biostratigraphy has been based on an international cooperation with Zhen Yongyi (Australia) and Stig Bergström (USA), while the chemostratigraphic work has been conducted with Axel Munnecke (Germany) and the cyclostratigraphy with specialists from University of Geosciences in Beijing. This work has been supported by a grant from the Natural Science Foundation of China (2012-2015) and a grant from the Ministry of Science and Technology of China (2011-2015).
- (2) Systematics of the graptolites from the Ningkuo and Hulo Formations (Floian to Sandbian, Ordovician) in SE China, which is envisaged as a monograph with some 50 plates of SEM and BSEM pictures showing the fine microstructures preserved in pyritic modes. This work has been slow due to frequent interruptions in the past years, but is expected to complete before the end of 2016.
- (3) Geological characteristics of representative black shales in China. This has been the main tasks of a recently launching project on shale gas exploration in China supported by the Chinese Academy of Sciences (2014-2018). As scheduled, many drills for the cores of the most potential gas shale in China, i.e. Early Cambrian, Darriwilian-Sandbian (Ordovician), Late Katian to Llandovery (Silurian), Lopingian (Late Permian), and Late Triassic (non-marine facies). In 2014, four wells have been finished in the Yichang and Shennongjia areas, Hubei Province, which drilled from the Llandovery down through to Upper Tremadocian. The obtained drill cores are now stored in Nanjing Institute of Geology and Palaeontology and are open to global scientists for study and appropriate sampling. Those having interests to be involved in this work or aim at some other related approaches, please contact the project leader (Zhang Yuandong).

Yuandong Zhang

Nanjing Institute of Geology and Palaeontology
39 East Beijing Road, Nanjing 210008
China
Tel.: 0086-25-83282145
Fax: 0086-25-83357026, 83282140
E-mail: ydzhang@nigpas.ac.cn

Yong Yi ZHEN (Australia) continues research into lower Palaeozoic fossils (mainly conodonts) and their biostratigraphic applications, with a focus on Australian and Chinese faunas. A very large monograph revising the diverse conodont fauna of the Horn Valley Siltstone of the Amadeus Basin in central Australia is nearing completion. Also currently being studied are Late Ordovician conodonts from the Broken River Province in north Queensland. In April 2014 I visited the Nanjing Institute of Geology and Palaeontology while on annual leave, and finalized a manuscript with colleagues in Nanjing and Zhejiang, which is now published in *Alcheringa*. During late September and early October, I attended the 4th IPC in Mendoza, Argentina and delivered two oral presentations in Symposium 20, “Ordovician biotas of Gondwana: responses to global climatic and eustatic events, and their biogeographic relationships within the Ordovician world”, and also participated in the post-congress field trip in the Argentine Precordillera.

Yong Yi Zhen

Geological Survey of NSW,
WB Clarke Geoscience Centre,
947-953 Londonderry Rd,
Londonderry NSW 2753, Australia.
Telephone: 02 47770318
E-mail: yong-yi.zhen@trade.nsw.gov.au

ZHOU Zhiyi (China) continues his work on the Ordovician trilobites of the Yangtze, Tarim and Sibumasu blocks.

Zhiyi ZHOU

Nanjing Institute of Geology and Palaeontology
Chinese Academy of Sciences
39 East Beijing Road
Nanjing 210008
China
Tel.: [+86-25-83282187](tel:+86-25-83282187)
Fax: [+86-25-83357026](tel:+86-25-83357026)
E-mail: zyizhou@nigpas.ac.cn

ORDOVICIAN RESEARCH PUBLICATIONS 2014-2015

[note that while the following compilation predominantly lists papers concerned solely with Ordovician topics, for completeness and comparison it also includes some publications dealing with studies of Furonian and Llandovery biota and stratigraphy]

A

- Ainsaar, L., Männik, P., Dronov, A.V., Izokh, O.P., Meidla, T. & Tinn, O. 2014. Carbon isotope chemostratigraphy and conodonts of the Middle-Upper Ordovician succession in Tungus Basin, Siberian Craton. In: Zhan Renbin and Huang Bing (eds). *IGCP 591 Field Workshop 2014, Kunming, China, 12-21 August 2014. Extended Summary*. Nanjing University Press, Nanjing, 1-4.
- Albanesi, G.L., Barnes, C.R., Trotter, J.A., Williams, I.S. & Bergström, S.M. 2014. The Argentine Precordillera drift history from tropical latitudes as suggested by conodont $\delta^{18}\text{O}$ palaeothermometry. *4th International Palaeontological Congress, Mendoza, Argentina*, 28 September-3 October 2014, Program with Abstracts CD-ROM.
- Albanesi, G.L., Feltes, N.A. & Serra, F. 2014. Middle Darriwilian to Lower Sandbian conodont zones and global correlation of the Argentine Precordillera. *4th International Palaeontological Congress, Mendoza*, Abstracts CD-ROM.
- Albanesi, G.L., Ortega, G. & Monaldi, C.R. 2014. Precisiones sobre la edad de la Formación Cieneguillas (Ordovícico) en la cuesta de Lipán, Cordillera Oriental de Jujuy. *Actas XIX Congreso Geológico Argentino, Córdoba*. CD-ROM.
- Alonso, J.L., A.L. Banchig, G.G. Voldman, G.L. Albanesi, R. Cardó, L.P. Fernández, A. Festa, G. Martín, G. Ortega, L.R. Rodríguez Fernández, A. Suárez and V.A. Ramos. 2014. Extension and subsequent inversion tectonics in the Ratones section: The boundary between the Central and Western Argentine Precordillera. *Gondwana 15, Madrid*, Abstracts CD-ROM.
- Antoshkina A.I. 2014. *Palaeomicrocodium*: A New View on Its Origin. *Paleontological Journal* 2014, **48**(4), 353–368.
- Antoshkina A. 2014. Ooid-stromatolite association as a precursor of bioevents (Silurian, Timan–northern Ural Region). *Palaeoworld* (in press).
- Aucoin, C.A. 2014. Revised Correlations of the Ordovician (Katian, Richmondian) Waynesville Formation of Ohio, Indiana, and Kentucky. Unpublished MS Thesis, University of Cincinnati, Cincinnati, OH, 120 p.

B

- Baliński, A., Sun, Y. & Dzik, J. 2012. 470-million-year-old black corals from China. *Naturwissenschaften* **99**, 645-653.
- Baliński, A., Sun Y., & Dzik, J. 2013. Traces of marine nematodes from 470 million years old Early Ordovician rocks in China. *Nematology* **15**, 567-574.
- Baliński, A., Sun Y., & Dzik, J. 2014. Probable advanced hydroid from the Early Ordovician of China. *Paläontologische Zeitschrift* **88**, 1-10.
- Bauert, H., Ainsaar, L., Põldsaar, K. & Sepp, S. 2014. $\delta^{13}\text{C}$ chemostratigraphy of the Middle and Upper Ordovician succession in the Tartu-453 drillcore, southern Estonia, and the significance of the HICE. *Estonian Journal of Earth Sciences* **63**(4), 195-200.

- Bauert, H., Hints, O., Meidla, T. & Männik, P. (eds). *4th Annual Meeting of IGCP 591, Estonia, 10 - 19 June 2014. Abstracts and Field Guide*. University of Tartu, Tartu. 202 pp. http://igcp591.org/2014/IGCP591-2014_book.pdf
- Bergström, S.M. & Ferretti, A. 2014. Conodonts in the Upper Ordovician Keisley Limestone of northern England: taxonomy, biostratigraphical significance and biogeographical relationships. *Papers in Palaeontology* **93**, 32 pp. doi:10.1002/spp2.1003.
- Bergström, S.M., Saltzman, M.R., Leslie, S.A., Ferretti, A. & Young, S.A. 2015. Trans-Atlantic application of the Baltic Middle and Upper Ordovician carbon isotope zonation. *Estonian Journal of Earth Sciences* **64**(1), 8-12. doi:10.3176/earth.2015.02.
- Bernárdez, E., Colmenar, J., Gutiérrez-Marco, J.C., Rábano, I. & Zamora, S. 2014. New peri-Gondwanan records of the Hirnantia Fauna in the latest Ordovician of Spain. In: Pankhurst, R.J., Castiñeiras, P. & Sánchez Martínez, S. (eds.): *Gondwana 15 North meets South*, Abstracts Book. Instituto Geológico y Minero de España, Madrid, 15.
- Blieck, A. 2014. Les Vertébrés Ptéraspidomorphes (Ordovicien-Dévonien) et leur utilisation en sciences de la vie et de la Terre. In: *Les Fossiles : objets géologiques, objets biologiques* (Congrès annuel APF – Réunion spécialisée SGF, Paris, 14-17 mai 2014). Résumés: 7; APF et SGF. [In French]
- Boyle, J.T., Sheets, H.D., Wu, S-Y., Goldman, D., Melchin, M.J., Cooper, R.A., Sadler, P. & Mitchell, C.E. 2014. A re-examination of the contributions of biofacies and geographic range to extinction risk in Ordovician graptolites. In: M. Calner, O. Lehnert, G.L. Albanesi, L.E. Babcock, D.A.T. Harper, and M.J. Melchin, (eds.), *Early Palaeozoic Global Change. GFF*. DOI: 10.1080/11035897.2013.861864
- Boyle, J.T., Goldman, D., Wu, S-Y., Melchin, M.J., Sheets, H.D. & Mitchell, C.E. 2014. Distinguishing sampling and ecologic effects on geographic range and duration in graptolites. *Geological Society of America Abstracts with Programs*. Vancouver, B.C., Canada.
- Brett, C.E., Thomka, J. R., Sullivan, N.B. & McLaughlin, P.I., 2014. Anatomy of a sequence boundary: A basal Silurian karstic unconformity in the Cincinnati Arch Region. *Geologiska Föreningen (GFF)* **136**, 42-47.
- Bruce, M.C. & Percival, I.G. 2014. Geochemical evidence for provenance of Ordovician cherts in southeastern Australia. *Australian Journal of Earth Sciences* **61**, 927-950. doi.org/10.1080/08120099.2014.956792

C

- Calner, M., G.L. Albanesi, D.A.T. Harper, O. Lehnert, M. Melchin & L. Babcock (eds.) 2014. Early Palaeozoic Global Change (Special Issue for IGCP 591 annual meeting in Lund, Sweden). *GFF* **136**(1), 1-340. dx.doi.org/10.1080/1103897.2014.916475
- Candela, Y. 2015. Evolution of Laurentian brachiopod faunas during the Ordovician Phanerozoic sea level maximum. *Earth-Science Reviews* **141**, 27-44.
- Candela, Y., Cherns, L. & Troalen, L. 2014. First record of a polyplacophoran from the Southern Uplands of Scotland. *Scottish Journal of Geology* **50**(1), 87-91.
- Candela, Y. & Harper, D.A.T. 2014. Synoptic revision of the Ordovician brachiopods of the Barr and Lower Ardmillan groups of the Girvan area, Scotland. *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* **105**, 61-69.
- Candela, Y. & Harper, D.A.T. 2014. Synoptic revision of the Ordovician brachiopods of the Barr and Lower Ardmillan groups of the Girvan area, Scotland. *Earth and*

Environmental Science Transactions of the Royal Society of Edinburgh **105**, 61-69.
DOI:10.1017/S1755691014000140

- Carlorosi, J., Sarmiento, G.N., Gutiérrez-Marco, J.C., Chacaltana, C. & Carlotto, V. 2014. Conodontos ordovícicos del Perú. *In: Chacaltana, C., Tejada-Medina, L. & Morales, M.C. (eds.), I Simposio Internacional Paleontología del Perú. INGEMMET, Lima, 140-143.*
- Carlucci, J., Westrop, S. & Brett, C.E. 2014. Sequence stratigraphy and facies architecture of the Ordovician Bromide Formation (Oklahoma): a new perspective on a classic succession. *Facies* **60**, 987-1012.
- Carrera, M.G. & Astini, R.A. 2014. The oldest (lowermost Ordovician) tabulate coral, a distinctive sessile metazoan component of carbonate mounds from the Argentine Precordillera. *4th International Paleontological Congress (IPC4), Mendoza Abstracts* p.672.
- Carrera, M.G. & Maletz, J. 2014. Ordovician sponge spicules from Spitsbergen, Nevada and Newfoundland: new evidence for hexactinellid and demosponge early diversification. *Journal of Systematic Palaeontology* **12**(8), 961-981.
doi.org/10.1080/14772019.2013.846946
- Challands, T.J., Vandenbroucke T.R.A., Armstrong, H.A. & Davies, J. 2014. Chitinozoan biozonation in the upper Katian (Ashgill) and Hirnantian of the Welsh Basin, UK. *Review of Palaeobotany and Palynology* **210**, 1-21.
- Chen Xu, Bergström, S.M., Zhang Yuandong & Wang Zhihao. 2014. A Katian (Late Ordovician) Regional Tectonic Event in China. *Science China (Earth Sciences)* **59**(1), 59-65.
- Chen, X., Zhang, Y., Goldman, D., Fan, J., Bergström, S.M., Finney, S.C., Wang, Z., and Chen, Q. [submitted]. *Darriwilian to Katian (Ordovician) Graptolites from Northwest China*. Zhejiang University Press, Hangzhou, China.
- Cho, D.-L., Lee, S.R., Koh, H.J., Park, J.-B., Armstrong, R. & Choi, D.K.. 2014. Late Ordovician volcanism in Korea constrains the timing for breakup of Sino-Korean Craton from Gondwana. *Journal of Asian Earth Sciences* **96**, 279-286.
- Clauer, N., Fallick, A.E., Eberl, D.D., Honty, M., Huff, W.D. & Aubert, A. 2013. K-Ar dating and $\delta^{18}\text{O}$ - δD characterization of nanometric illite from Ordovician K-bentonites of the Appalachians: Illitization and the Acadian-Alleghenian tectonic activity. *American Mineralogist* **98**, 2144-2154.
- Cocks, L.R.M. 2014. The late Ordovician brachiopods of southern Pembrokeshire and adjacent south-western Wales. *Special Papers in Palaeontology* **91**, 1-89.
- Cocks, L.R.M. & Torsvik, T.H. 2014. The Palaeozoic geography of Gondwana. *Gondwana 15 Conference, Madrid, Abstracts*, 36.
- Colmenar, J., Harper, D.A.T. & Villas, E. 2014. Morphofunctional analysis of Svobodaina species (Brachiopoda, Heterorthidae) from South-Western Europe. *Palaeontology* **57**, 193-214.
- Colmenar, J., Sá, A.A. & Vaz, N. 2014. A draboviid brachiopod association from the Upper Ordovician of Portugal: palaeoecological and palaeogeographical significance. *GFF* **136**(1), 60-64. doi 10.1080/11035897.2013.848233
- Couto, H. 2014. Cathodoluminescence applied to the study of apatites related to gold and antimony deposits of northwestern Portugal. *International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM*. Volume 3, 831- 838.

- Couto, H. & Knight, J. 2014. The Montalto Formation: a pre- to basal Ordovician succession in the Dúrico-Beirã area (northern Portugal). In: Rocha, R., Pais, J., Kullberg, J.C., Finney, S. (Eds.) *STRATI 2013 - First International Congress on Stratigraphy. At the cutting edge of Stratigraphy*. Springer Geology XLV, 381-384. ISBN 978-3-319-04364-7
- Couto, H., Knight, J. & Lourenço, A. 2014. Rifting at the Cambrian–Ordovician transition in northwestern Portugal. Abstracts, *IX Congresso Nacional de Geologia / 2º Congresso de Geologia dos Países de Língua Portuguesa*. 70.
- Couto, H., Knight, J. & Pinto de Jesus, A. 2014. Paleozóico da Área Metropolitana do Porto: estratigrafia, paleontologia e mineralizações associadas. Desenvolvimento sustentável da terra: novas fronteiras. Helena Cristina Brites, Helena Sant’Ovaia, Isabel Fernandes, Maria dos Anjos Ribeiro, Deolinda Flores Eds. *IX Congresso Nacional de Geologia / 2º Congresso de Geologia dos Países de Língua Portuguesa. Faculdade de Ciências da Universidade do Porto. Memórias N°20*, 57-71.
- Couto, H. & Lourenço, A. 2014. Geoconservation in S. Pedro da Cova-Couce (north Portugal): an educational and scientific-touristic trail. *International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM*. Volume 1, 137-144.

D

- Degtyarev, K.E., Ryazantsev, F.V., Tretyakov, A.A., Tolmacheva, T.Yu., Yukobchuk, A.S., Kotov, A.B., Salnikova, E.B. & Kovach, V.P. 2014. Structure of Caledonides of the Kyrgyz Ridge and tectonic evolution of the North Tian-Shan in the Late Precambrian–Early Paleozoic. *Geotektonika* **6**, 3–38.
- Demski, M.W., Wheadon, B.J., Stewart, L.A., Elias, R.J., Young, G.A., Nowlan, G.S. and Dobrzanski, E.P. 2015. Hirnantian strata identified in major intracratonic basins of central North America: implications for uppermost Ordovician stratigraphy. *Canadian Journal of Earth Sciences* **52**, 68-76.
- Dronov, A. 2014. Sea-level curves and long-term lithological changes in the Ordovician of Baltoscandia and Siberia: comparative analysis. *Geologija* **56**, №1 (85), 12.
- Dronov, A.V. 2014. Ordovician trace fossils of Siberia: responses to climatic and eustatic events and connection with Gondwana, Baltica and Laurentia. *4th International Palaeontological Congress, Mendoza, Argentina*. September 28 – October 3, 2014. Abstract Volume, p. 337.
- Dumoulin, J.A., Harris, A.G. & Repetski, J.E., 2014. Carbonate rocks of the Seward Peninsula, Alaska: Their correlation and paleogeographic significance, p. 59-110, + 23 p. Appendix, In: Dumoulin, J.A. & Till, A.B. (eds.), *Reconstruction of a Late Proterozoic to Devonian continental margin sequence, northern Alaska, its paleogeographic significance, and contained base-metal sulfide deposits: Geological Society of America Special Paper* **506**.

E

- Ebbestad, J.O.R., Högström, A.E.S., Frisk, Å.M., Martma, T., Kaljo, D., Kröger, B. & Pärnaste, H. 2015. Terminal Ordovician stratigraphy of the Siljan district, Sweden. *GFF* **137**(1), 36-57. [Note that there is also a special tab given for supplementary material].

- Edwards, C.T. & Saltzman, M.R. 2014. Carbon isotope ($d^{13}C_{carb}$) stratigraphy of the Lower–Middle Ordovician (Tremadocian–Darriwilian) in the Great Basin, western United States: implications for global correlation. *Palaeogeography, Palaeoclimatology, Palaeoecology* **399**, 1-20.
- Ergaliev, G.Kh., Zhemchuzhnikov, V.G., Popov, L.E., Bassett, M.G. & Ergaliev, F.G. 2014. The Auxiliary boundary Stratotype Section and Point (ASSP) of the Jiangshanian Stage (Cambrian: Furongian Series) in the Kyrshabakty section. *Episodes* **37**(1), 41-47.

F

- Fang Xiang, Zhang Yunbai, Chen Ting'en & Zhang Yuandong. 2014. Taxonomy of Ordovician cephalopod *Sinoceras chinense* (Foord): A quantitative approach. In Zhan Renbin & Huang Bing (eds). *Extended Summary of the IGCP Project 591 Field Workshop 2014 in conjunction with International Subcommission on Silurian Stratigraphy (ISSS), International Subcommission on Ordovician Stratigraphy (ISOS) and International Subcommission on Cambrian Stratigraphy, Kunming, 2014*. 42-48. Nanjing: Nanjing University Press.
- Fatka, O., Mergl, M. & Budil, P. 2013. Preservation of the digestive structures in *Harpides* (Trilobita) from the Lower Ordovician of the Barrandian area (Czech Republic). *Neues Jahrbuch für Geologie und Paläontologie* **270**(1), 55-67.
- Feltes, N.A., Serra, F., Albanesi, G.L., Ortega, G. & Voldman, G.G. 2014. Las zonas de conodontes en el intervalo de contacto entre la Formación San Juan y unidades suprayacentes (Ordovícico Medio), Precordillera del oeste argentino. *Actas XIX Congreso Geológico Argentino, Córdoba*. CD-ROM.
- Ferretti, A., Bergström, S.M. & Barnes, C.R. 2014. Katian (Upper Ordovician) conodonts from Wales. *Palaeontology* **57**(4), 801-831.
- Ferretti, A., Bergström, S.M. & Sevastopulo, G.D. 2014. Katian conodonts from the Portrane Limestone: the first Ordovician conodont fauna described from Ireland. *Bollettino della Società Paleontologica Italiana* **53**(2), 105-119.
- Ferretti, A., Messori, A. & Bergström, S.M. 2014. Composition and significance of the Katian (Upper Ordovician) conodont fauna of the Vaux Limestone (“Calcaire des Vaux”) in Normandy, France. In: Histon K. (Ed.), *Evolutionary Paleogeology and Paleobiogeography, IGCP 591 Special Issue. Estonian Journal of Earth Sciences* **63**(4), 214-219.

G

- Ghavidel-Syooki, M., Popov, L.E., Álvaro, J.J., Ghobadi Pour, M., Tolmacheva, T.Yu. & Ehsani, M.-H. 2014. Dapingian–lower Darriwilian (Ordovician) stratigraphic gap in the Faraghan Mountains, Zagros Ranges, south-eastern Iran. *Bulletin of Geosciences* **89**(4), 679–706.
- Ghienne, J.-F., Desrochers, A., Vandenbroucke T.R.A., Paris, F., Achab, A., Asselin, A., Loi, A., Dabard, M-P., Farley, C., Wickson, S. & Veizer, J. 2014. A Cenozoic-style scenario for the end-Ordovician glaciation. *Nature Communications* **5**, 4485. doi:10.1038/ncomms5485.

- Goldman, D., Nõlvak, J. & Maletz, J. 2015. Mid to Late Ordovician Graptolite and Chitinozoan Biostratigraphy of the Kandava-25 Drill Core in Western Latvia. *GFF*. <http://dx.doi.org/10.1080/11035897.2015.1021375>
- Göncüoğlu, M.C., Sachanski, V., Gutiérrez-Marco, J.C. & Okuyucu, C. 2014. Ordovician graptolites from the basal part of the Palaeozoic transgressive sequence in Karadere area, Zonguldak Terrane, NW Turkey. *Estonian Journal of Earth Sciences* **63**(4), 227-232.
- Graham, L., Lewis, L., Taylor, W., Wellman, C. & Cook, M. 2014. Early terrestrialization: transition from algal to bryophyte grade. In: Hanson & Rice (eds) Photosynthesis of bryophytes and early land plants. *Advances in Photosynthesis and Respiration* **37**, 9-28.
- Gutiérrez-Marco, J.C. & García-Bellido, D.C. 2014. Micrometric detail in palaeoscolecoid worms from Late Ordovician sandstones of the Tafilalt Konservat-Lagerstätte, Morocco. *Gondwana Research*. doi: 10.1016/j.gr.2014.04.006.
- Gutiérrez-Marco, J.C. & Rábano, I. 2014. Hierros sedimentarios ordovícicos y patrimonio minero de Viveiro (Lugo). *De Re Metallica* **23**, 1-37.
- Gutiérrez-Marco, J.C., Rábano, I., Sá, A.A. & Carcavilla Urquí, L. 2013. Sedimentos glaciomarineros del Ordovícico terminal en el candidato a Geoparque de Molina-Alto Tajo (Guadalajara): protección y difusión de un LIG de rango internacional. In: Vegas, J., Salazar, A., Díaz-Martínez, E. & Marchán, C. (eds.), *Patrimonio geológico, un recurso para el desarrollo*. Cuadernos del Museo Geominero **15**, 241-250.
- Gutiérrez-Marco, J.C., Rábano, I., Sá, A.A., García-Bellido, D.C. & Sarmiento, G.N. 2013. Patrimonio paleontológico del Ordovícico Medio del Parque Nacional de Cabañeros (Castilla-La Mancha). In: Vegas, J., Salazar, A., Díaz-Martínez, E. & Marchán, C. (eds.), *Patrimonio geológico, un recurso para el desarrollo*. Cuadernos del Museo Geominero **15**, 591-599.
- Gutiérrez-Marco, J.C., Sá, A.A., García-Bellido, D.C. & Rábano, I. 2014. The extent of the Middle Ordovician Dapingian Stage in peri-Gondwanan Europe and North Africa. Stratigraphic record, biostratigraphic tools, and regional chronostratigraphy. *GFF* **136**(1), 90-94. doi: 10.1080/11035897.2013.865667.
- Gutiérrez-Marco, J.C., Sá, A.A. & Villas, E. 2014. Del “Siluriano Inferior” al Sistema Ordovícico: sus particularidades históricas en la geología ibérica. In: González Redondo, F.A. (coord.), *Libro de Resúmenes XII Congreso de la Sociedad Española de Historia de las Ciencias y de las Técnicas: Ciencia y Técnica entre la paz y la guerra*. Universidad Complutense de Madrid, Facultad de Educación, p. 183.
- Gutiérrez-Marco, J.C., Sarmiento, G.N. & Rábano, I. 2014. Un olistostroma con cantos y bloques del Paleozoico Inferior en la cuenca carbonífera del Guadalmellato (Córdoba). Parte 2: Bioestratigrafía y afinidades paleogeográficas. *Revista de la Sociedad Geológica de España*, **27**(1), 25-43.

H

- Halpern, K. & Carrera, M.G. 2014. Post-glacial Hirnantian (Upper Ordovician) bryozoans from Western Argentina: Implications for survival and extinctions patterns. *Ameghiniana* **51**(3), 243-253.

- Harper, D.A.T., Hammarlund, E.U. & Rasmussen, C.M.Ø. 2014. End Ordovician extinctions: A coincidence of causes. *Gondwana Research* **25**, 1294-1307. DOI: 10.1016/j.gr.2012.12.021
- Harper, D.A.T., Jin, J. & Rasmussen, C.M. Ø. 2014. Late Ordovician carbonate mounds from North Greenland: a peri-Laurentian dimension to the Boda Event? *GFF* **136**, 95-99. DOI:10.1080/11035897.2013.865669
- Harper, D.A.T., Rasmussen, C.M.O., Liljeroth, M., Blodgett, R.B., Candela, Y., Jin Jisuo, Percival, I.G., Rong Jiayu, Villas, E. & Zhan Renbin, 2013. Biodiversity, biogeography and phylogeography of Ordovician rhynchonelliform brachiopods. In Harper D.A.T. & Servais T. (eds.) *Early Palaeozoic Biogeography and Palaeogeography. Geological Society, London, Memoir* 38.
- Heredia, S., Carlorosi, J. & Sarmiento, S. 2014. Taxonomical review of the early species of the conodont genus *Baltoniodus* Lindström and its distribution in the Ordovician of Gondwana. IV International Paleontological Congress, Mendoza, Argentina. Symposium 20: Ordovician biotas of Gondwana: responses to global climatic and eustatic events, and their biogeographic relationships within the Ordovician world, p. 849. Poster presentation.
- Heredia, S., Mestre, A. & Soria, T. 2014. Taxonomical review of the conodont genus *Eoplacognathus* Bergström and its stratigraphical record in the Ordovician of Argentina. 4th International Paleontological Congress, Mendoza, Argentina. Symposium 20: Ordovician biotas of Gondwana: responses to global climatic and eustatic events, and their biogeographic relationships within the Ordovician world, p.850. Poster presentation.
- Hints, L. 2014. Revision of the concept of the orthide brachiopod *Cyrtonotella* in the Middle Ordovician of the east Baltic. *Estonian Journal of Earth Sciences* **63**(2), 63-70.
- Hints, L. & Männik, P. 2014. Stop A10: Porkuni quarry. In Bauert, H., Hints, O., Meidla, T. & Männik, P. (eds) *4th Annual Meeting of IGCP 591 - Tartu 2014. Abstracts and Field Guide*, 167–172.
- Hints, O., Martma, T., Männik, P., Nõlvak, J., Pöldvere, A., Shen, Y. & Viira, V. 2014. New data on Ordovician stable isotope record and conodont biostratigraphy from the Viki reference drill core, Saaremaa Island, western Estonia. *GFF* **136**, 100-104. <http://dx.doi.org/10.1080/11035897.2013.873989>
- Hints, O., Paris, F. & Al-Hajri, S. 2015. Late Ordovician scolecodonts from the Qusaiba-1 core hole, central Saudi Arabia, and their paleogeographical affinities. *Review of Palaeobotany and Palynology* **212**, 85-96. <http://dx.doi.org/10.1016/j.revpalbo.2014.08.013>
- Holmer, L.E., Popov, L.E. & Bassett, M.G. 2014. Ordovician–Silurian Chileida — first post-Cambrian records of an enigmatic group of Brachiopoda. *Journal of Paleontology* **88**(3), 488-496.
- Huang Bing, Harper, D.A.T. & Zhan Renbin 2014. Test of sampling sufficiency in palaeontology. *GFF* **136**, 105-109. DOI:10.1080/11035897.2014.882976
- Huang Bing, Rong Jiayu & Zhan Renbin. 2014. Essence of Lazarus taxa across mass extinction. *Acta Palaeontologica Sinica* **53**(2), 135–145 (in Chinese with English abstract).

- Huang Bing & Zhan Renbin. 2014. Species-abundance models for brachiopods across the Ordovician-Silurian boundary of South China. *Estonian Journal of Earth Sciences*, **63**(4), 240–243.
- Huang Bing, Zhan Renbin & Wang Guangxu. 2014. Brachiopod associations from late Rhuddanian in South China and their bathymetric significance. pp.57–60. *In*: Zhan Renbin & Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Huff, W.D., Dronov, A.V., Sell, B., Kanygin, A.V. & Gonta, T.V. 2014. Traces of explosive volcanic eruptions in the Upper Ordovician of the Siberian Platform. *Estonian Journal of Earth Sciences* **63**(4), 244-250.
- Huff, W.D. & Dronov, A.V. 2014. K-Bentonites. *In* The Upper Ordovician of the Siberian Platform. Abstracts volume, 51st Annual Meeting of The Clay Minerals Society, College Station, TX, 114.

J

- Jacinto, A., Gutiérrez-Marco, J.C., Silva, C.M. da & Sá, A. 2014. Nota preliminar sobre os equinodermes da Formação Cabeço do Peão (Ordovícico Superior) da região de Mação (Portugal). *Livro de Actas IV Congresso Jovens Investigadores em Geociências, LEG 2014*. Pólo de Estremoz da Universidade de Évora, 93-96.
- Jakobsen, K.G., Brock, G.A., Nielsen, A.T., Mathieson, D.K. & Harper, D.A.T. 2014. Brachiopods associated with stromatoporoid mounds from the Middle to Upper Ordovician Cashions Creek Limestone, Tasmania. *Memoirs of the Association of Australasian Palaeontologists* **45**, 249-265.
- Jakobsen, K.G., Brock, G.A., Nielsen, A.T., Topper, T.P. & Harper, D.A.T. 2014. Middle Ordovician brachiopods from the Stairway Sandstone, Amadeus Basin, central Australia. *Alcheringa* **38**, 190-208. DOI:10.1080/03115518.2013.858204
- Jakobsen, K.G., Nielsen, A.T., Harper, D.A.T. & Brock, G.A. 2014. Trilobites from the Middle Ordovician Stairway Sandstone, Amadeus Basin, central Australia. *Alcheringa* **38**, 70-96. DOI:10.1080/03115518.2013.828253
- Jiménez-Sánchez, A., Beresi, M., Mestre, A. & Heredia, S. 2014. Upper Ordovician cryptostomatid bryozoans and microfossils from the Don Braulio Formation, Eastern Precordillera, Argentina. *Serie Correlación Geológica* **30**(1), 25-33.

K

- Key, M.M. Jr., Wyse Jackson, P.N., Falvey, L.W. & Roth, B.J. 2014. Use of fossil bryozoans for sourcing lithic artifacts. *Geoarchaeology* **29**, 397-409.
- Key, M.M. Jr. & Wyse Jackson, P.N. 2014. Use of fossil bryozoans as provenance indicators for dimension stones. *Studi Tridentini di Scienze Naturali* **94**, 131-138.
- Koch, L., Servais, T., Maletz, J., Vandenbroucke, T.R.A. & Verniers, J. 2014. The Ordovician of the Ebbe Inlier (Rhenish Massif, western Germany). Revisited. *GFF* **136**(1), 142-146. DOI:10.1080/11035897.2013.876658
- Kraft, J., Mergl, M., Hroch, T. & Kraft, P. 2014. Index of fossiliferous localities of the Třenice Formation (Lower Ordovician of the Prague Basin, Czech Republic). *Folia Musei Rerum Naturalium Bohemiae Occidentalis, Geologica et Palaeobiologica* **47**(1-2), 33–64.

- Kraft, P., Štorch, P. & Mitchell, C.E. 2015. Graptolites of the Králův Dvůr Formation (mid Katian to earliest Hirnantian, Czech Republic). *Bulletin of Geosciences* **90**(1), 195–225.
- Kröger, B., Hints, L., Lehnert, O. & Männik, P. 2014. The early Katian (Late Ordovician) reefs near Saku, northern Estonia and the age of the Saku Member, Vasalemma Formation. *Estonian Journal of Earth Sciences*, **63** (4), 271-276.
- Kröger, B., Hints, L., Lehnert, O., Männik, P. & Joachimski, M. 2014. The early Katian (Late Ordovician) reefs near Saku, northern Estonia and the age of the Saku Member, Vasalemma Formation. *Estonian Journal of Earth Sciences* **63**(4), 271-276.

L

- Lajblová, K. & Kraft, P. 2014. The earliest ostracods from the Ordovician of the Prague Basin, Czech Republic. *Acta Geologica Polonica* **64**(4), 367–392.
- Lajblová, K., Kraft, P. & Meidla, T. 2014. Ontogeny of the ostracod *Conchoprimitia osekensis* (Příbyl, 1979) from the Darriwilian of the Prague Basin (Czech Republic). *Estonian Journal of Earth Sciences* **63**(3), 144–155.
- Le Hérisse, A., Molyneux, S. & Miller, M. 2014. Late Ordovician to early Silurian acritarchs from the Qusaiba-1 shallow core hole, central Saudi Arabia. *Review of Palaeobotany and Palynology* **212**(2015), 22-59.
- Le Hérisse, A., Steemans, P., Wellman, C.H. & Vecoli, M. 2014. Darriwilian (Middle Ordovician) elements of primitive vegetation, marine palynomorphs and problematic microfossils, from the Saq/Qasim transitional beds in core QSIM 801, central Saudi Arabia: discussion with eustatic and climatic events. 9th European Palaeobotany-Palynology Conference (EPPC), 26-31 August 2014, Padova, Italy, Abstract, 134-135.
- Lehnert, O., Meinhold, G., Arslan, A., Berner, U., Calner, M., Ebbestad, J.-O., Huff, W.D. & Joachimski, M.M. 2014. Early Palaeozoic evolution of the Caledonian foreland basin – new data from the sedimentary record in the Siljan impact structure (Central Sweden). Abstracts volume, *4th Annual Meeting of IGCP 591: The Early to Middle Paleozoic Revolution, Estonia*, 56.
- Leslie, S.A. & Goldman, D. 2014. Insights into *Amorphognathus* paleobiology and taxonomy from bedding plane occurrences of *A. tvaerensis*. Geological Society of America Abstracts with Programs. Vancouver, B.C., Canada.
- Li Jun, Servais, T. & Yan Kui 2014. The Ordovician acritarch genus *Rhopaliophora*: Biostratigraphy, palaeobiogeography and palaeoecology. *Review of Palaeobotany and Palynology* **208**, 1-24.
- Li Li-xia, Feng Hong-zhen, Wang Wen-hui & Chen Wen-jian 2012. Proximal development, systematic taxonomy, and dispersal pattern of the Early-Middle Ordovician graptolite *Acrograptus* from South China. *Science China: Earth Sciences* **55**(7), 1110-1122.
- Li Li-xia, Feng Hong-zhen, Wang Wen-hui & Chen Wen-jian 2014. A new graptolite genus *Norvegiograptus* from the Ningkuo Formation (Lower Ordovician) of Hunan Province, China. *Acta Palaeontologica Sinica* **53**(2), 172-179.
- Li Ming, Li Li-xia, Feng Hong-zhen & Wang Wen-hui 2013. Early Ordovician graptolites from South China. In: A. Lindskog & K. Mehlqvist eds. *Proceedings of the 3rd IGCP 591 Annual Meeting-Lund*, Sweden: Lund University.

- Liang Yan, Tang Peng & Zhan Renbin. 2014. Preliminary report on the chitinozoans from the Lower Ordovician Tungtzu and Hunghuayuan formations of Tongzi, northern Guizhou, southwest China. 75–79. In: Zhan Renbin & Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Liang Yan, Tang Peng, Zhan Renbin & Wu Rongchang. 2014. New data of early Late Ordovician chitinozoans from the Miaopo Formation at Jieling, Yichang, central China. *GFF* **136**(1), 162–166.
- Liang Yan, Zhan Renbin & Jin Jisuo 2014. The oldest known occurrence of the *Foliomena* fauna in the uppermost Darriwilian (Middle Ordovician) of South China. *Lethaia* **47**, 432–436.
- Luan Xiaocong, Liu Jianbo & Zhan Renbin. 2014. Microfacies of the Lower to Middle Ordovician Zitai Formation of southern Anhui and its implications. 80–84, In: Zhan Renbin & Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Luo Hui-lin, Zhou Zhi-yi, Hu Shi-xue, Zhan Dong-qin & Lu yu-xi, 2014a. Stratigraphical record of Ordovician trilobites in southeastern Yunnan. *Acta Palaeontologica Sinica* **53**(1), 33-51.
- Luo Hui-lin, Zhou Zhi-yi, Hu Shi-xue, Zhan Dong-qin & Lu yu-xi, 2014b. Faunal succession of Ordovician trilobites in eastern Yunnan. *Acta Palaeontologica Sinica* **53**(2), 146-171.

M

- Maletz, J. 2014. Fossil Hemichordata (Pterobranchia, Enteropneusta). *Palaeogeography, Palaeoclimatology, Palaeoecology* **398**, 16-27. DOI: 10.1016/j.palaeo.2013.06.010
- Maletz, J. 2014. The Classification of the Graptolithina Bronn, 1849. *Bulletin of Geosciences* **89**(3), 477-540. DOI 10.3140/bull.geosci.1465.
- Maletz, J. 2015. Graptolite reconstructions and interpretations. *Paläontologische Zeitschrift*. DOI 10.1007/s12542-014-0234-4.
- Maletz, J., Ahlberg, P., Suyarkova, A. & Loydell, D.K. 2014. Silurian graptolite biostratigraphy of the Röstånga-1 drill-core, Scania – a standard for southern Scandinavia. *GFF* **136**(1), 175-178. DOI:10.1080/11035897.2013.865665
- Maletz, J., Bates, D.E.B., Brussa, E.D., Cooper, R.A., Lenz, A.C., Riva, J.F., Toro, B.A. & Zhang, Y.D. 2014. *Treatise on Invertebrate Paleontology, Part V, revised, Chapter 12: Glossary of the Hemichordata. Treatise Online* **62**, 1-23, 6 figs. ISSN 2153-4012.
- Maletz, J., Steiner, M., Weber, B. & Zhu, M. 2014. The Cambrian Bioradiation Event: A Chinese Perspective. *Palaeogeography, Palaeoclimatology, Palaeoecology* **398**, 1-3. DOI: 10.1016/j.palaeo.2013.12.017
- Meidla, T., Ainsaar, L. & Hints, O. 2014. The Ordovician System in Estonia. In: Bauert, H., Hints, O., Meidla, T. and Männik, P. (eds). *4th Annual Meeting of IGCP 591, Estonia, 10-19 June 2014. Abstracts and Field Guide*. University of Tartu, Tartu, 116-122.
- Mergl, M. 2014. Odontopleurid trilobites of the Katian/Hirnantian boundary interval in the Prague Basin (Bohemia). *Bulletin of Geosciences* **89**(2), 401-412. DOI 10.3140/bull.geosci.1452

- Merrell, M., Breuer, P., Ertug, K., Vecoli, M. & Wood, G. 2014. Late Cambrian acritarchs from the subsurface Arabian Gulf, Saudi Arabia. GEO 2014, 11th Middle East Geosciences Conference and Exhibition, March 9-12, 2014, Manama, Bahrain.
- Mestre, A. & Heredia, S. 2014. El Paleozoico Inferior del borde oriental de la Sierra de Pedernal, Cienaguita, Precordillera Oriental. *Serie Correlación Geológica* **30**(1), 5-12.
- Miller, J.F., Evans, K.R., Kurtz, V.E. & Repetski, J.E., 2013. Biostratigraphy and sequence stratigraphy of Cambrian and lowest Ordovician strata in Missouri. In: Mulvany, P.S. & Thompson, T.L. (eds.), *Paleozoic succession in Missouri, Part 1, Cambrian System*. Missouri Department of Natural Resources, *Missouri Geological Survey Report of Investigations* **70**, Pt. 1, Chapter 2, p. 13–24.
- Miller, J.F., Repetski, J.E., Nicoll, R.S., Nowlan, G. & Ethington, R.L. 2014. The conodont *Iapetognathus* and its value for defining the base of the Ordovician System. *GFF* **136**(1), 185-188. dx.doi.org/10.1080/11035897.2013.862851.
- Molyneux, S.G., Delabroye, A., Wicander, R. & Servais, T. 2013. Biogeography of early to mid Palaeozoic (Cambrian–Devonian) marine phytoplankton. *Geological Society, London, Memoir* **38**, 365-397.
- Monaldi, C.R., Albanesi, G.L., Ortega, G., Salfity, J., Gorustovich, S., Voldman, G.G. & Giuliano, M.E. 2014. Los Colorados: un graben de edad cretácica en la Cordillera Oriental de Jujuy. *Actas XIX Congreso Geológico Argentino, Córdoba*. CD-ROM.
- Moreno-Sánchez, M., Gómez-Cruz, A.J. & Gutiérrez-Marco, J.C. 2014. New data on Lower Ordovician graptolites from Colombia and their correlation around the Gondwanan margin of South America. In: Pankhurst, R.J., Castiñeiras, P. & Sánchez Martínez, S. (eds.): *Gondwana 15 North meets South*, Abstracts Book. Instituto Geológico y Minero de España, Madrid, 112.
- Muir, L.A., Ng Tin-Wai, Li Xiangfeng, Zhang Yuandong & Lin Jinpai. 2014. Palaeoscolicidan and nematode worms from the Early Ordovician of South China. *Palaeoworld* **23**(1), 15-24.

N

- Nicolas, M.P.B. & Young, G.A. 2014. GS-13 Reconnaissance field mapping of Paleozoic rocks along the Churchill River and Churchill coastal area, northeastern Manitoba (parts of NTS 54E, L, K). *Report of Activities 2014, Manitoba Mineral Resources, Manitoba Geological Survey*, 148–160.

O

- Ortega, G.L., Albanesi, G.L., Zeballo, F.J., Voldman, G.G. & Giuliano, M.E. 2014. The conodont-graptolite biozonal scheme for the Lower Ordovician of Eastern Cordillera, NW Argentina. *4th International Palaeontological Congress, Mendoza*, Abstracts CD-ROM.
- Ortega, G., Banchig, A.L., Voldman, G.G., Albanesi, G.L., Alonso, J.L., Festa, A. & Cardó, R. 2014. Nuevos registros de graptolitos y conodontes en la Formación Los sombreros (Ordovícico), Sierra del Tontal, Precordillera de San Juan y su implicancia geológica. *Actas XIX Congreso Geológico Argentino, Córdoba*. CD-ROM.

P

- Paris, F., Verniers, J., Miller, M.A., Al-Hajri, S., Melvin, J. & Wellman, C.H. 2015. Late Ordovician – earliest Silurian chitinozoans from the Qusaiba-1 core hole (North Central Saudi Arabia) and their relation to the Hirnantian Glaciation. *Review of Palaeobotany and Palynology* **212**, 60-84.
- Paluweer, L., Nestor, V. & Hints, O. 2014. Chitinozoan diversity in the East Baltic Silurian: first results of a quantitative stratigraphic approach with CONOP. *GFF* **136**, 198-202. <http://dx.doi.org/10.1080/11035897.2013.873987>
- Pell, J., Russell, J.K. & Zhang Shunxin 2015. Kimberlite emplacement temperatures from conodont geothermometry. *Earth and Planetary Science Letters* **411**, 131-141.
- Põldsaar, K. & Ainsaar, L. 2014. Extensive soft-sediment deformation structures in the early Darriwilian (Middle Ordovician) shallow marine siliciclastic sediments formed on the Baltoscandian carbonate ramp, northwestern Estonia. *Marine Geology* **356**, 111-127.
- Põldsaar, K. & Ainsaar, L. 2014. Recognizing triggers for extensive liquefaction structures in two Early Paleozoic shallow-marine sandstones, NW Estonia: Earthquake shock vs. cyclic storm loading. In: Zhan Renbin and Huang Bing (eds). *IGCP 591 Field Workshop 2014, Kunming, China, 12-21 August 2014. Extended Summary*. Nanjing University Press, Nanjing, 117-119.
- Popov, L.E. & Cocks, L.R.M. 2014. Late Ordovician brachiopods from the Chingiz Terrane, Kazakhstan, and their palaeogeography. *Journal of Systematic Palaeontology* **12**, 687-758.
- Popov, L., Hairapetian, V., Ghobadi Pour, M., Buttler, C., Evans, D.H., Hejazi, S.H. & Jahangir, H. 2014. Llandovery fauna of Iran during the post-extinction recovery. *The Third International Symposium of the International Geosciences Programme Project 589 (IGCP- 589): Development of the Asian Tethyan Realm: genesis, process and outcomes. Tehran, 19-26 October, 2014, Abstract volume and proceedings*, 105-110.
- Pouille, L., Danelian, T. & Popov L.E. 2014. A diverse Upper Darriwilian radiolarian assemblage from the Shundy Formation of Kazakhstan: insights into late Middle Ordovician radiolarian biodiversity. *Journal of Micropalaeontology* **33**, 149-163.

Q

- Quinn, C.D., Percival, I.G., Glen, R.A. & Xiao, W.J. 2014. Ordovician marginal basin evolution near the palaeo-Pacific east Gondwana margin, Australia. *Geological Society of London, Journal* **171**, 723-736. DOI: 10.1144/jgs2012-034
- Quinton, P.C. & MacLeod, K.G. 2014. Oxygen isotopes from conodont apatite of the mid-continent, US: Implications for Late Ordovician climate evolution. *Palaeogeography, Palaeoclimatology, Palaeoecology* **404**, 57-66.

R

- Rábano, I., Gutiérrez-Marco, J.C. & García-Bellido, D.C. 2014. A remarkable illaenid trilobite from the Middle Ordovician of Morocco. *Bulletin of Geosciences* **89**(2), 365-374.
- Rábano, I., Gutiérrez-Marco, J.C. & Sá, A.A. 2014. Yacimientos excepcionales de trilobites del Ordovícico ibérico. In: Gámez Vintaned, J.A. (ed.), *Yacimientos*

- excepcionales de fósiles ibéricos. Libro Homenaje al Dr. Antonio Perejón Rincón. Memorias de la Real Sociedad Española de Historia Natural*, 2ª ép., **12**, 51-62.
- Raevskaya, E. & Dronov, A. 2014. New data on acritarchs from the Upper Ordovician of the Tungus basin, Siberian Platform. *Estonian Journal of Earth Sciences* **63**(4), 300-304.
- Reitner J., Luo Cui & Li Li-xia. 2013. Sudden sponge occurrences in the aftermath of severe extinction events in the Phanerozoic. *Abstract of 9th World Sponge Conference*.
- Repetski, J.E., Ryder, R.T., Weary, D.J., Harris, A.G. & Trippi, M.H. 2014. Appalachian basin thermal maturity patterns (CAI and %Ro) in Upper Ordovician and Lower-Middle Devonian rocks: A major revision of USGS Map I-917-E using new subsurface collections. *U.S. Geological Survey Professional Paper* **1708-F.1**, 131 ms p. + 11 figs.
- Reyes-Abril, J., Villas, E., Gutiérrez-Marco, J.C., Jiménez-Sánchez, A. & Colmenar, J. 2013. Middle Ordovician harknessellid brachiopods (Dalmanellidina) from the Mediterranean region of Gondwana. *Bulletin of Geosciences* **88**(4), 813-828.
- Rong Jiayu & Cocks, L.R.M. 2014. Global diversity and endemism in Early Silurian (Aeronian) brachiopods. *Lethaia* **44**(1), 77-106.
- Rong Jiayu & Huang Bing 2014. Study of Mass Extinction over the past thirty years: A synopsis. *Science China: Earth Sciences* **44**(3), 377-404 (in Chinese)
- Rong Jiayu, Huang Bing, Zhan Renbin & Harper, D.A.T. 2013. Latest Ordovician and earliest Silurian brachiopods succeeding the *Hirnantia* Fauna in south-east China. *Special Papers in Palaeontology* **90**, 1-142.
- Rong Jiayu, Zhan Renbin & Huang Bing. 2014. The pre-Hirnantian Late Ordovician shallow water brachiopod biogeography of Tarim, Qaidam, North and South China: A preliminary report. 120–125. In: Zhan Renbin and Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Ryder, R.T., Crangle, R.D., Jr., Repetski, J.E. & Harris, A.G., 2014. Stratigraphic framework of Cambrian and Ordovician rocks in the Appalachian basin from Sequatchie County, Tennessee, through eastern Kentucky, to Mingo County, West Virginia. *U.S. Geological Survey Professional Paper* **1708-E.2.5**, 1 oversize sheet with interpretive text.

S

- Sá, A.A., Gutiérrez-Marco, J.C., García-Bellido, D.C. & Aceñolaza, G.F. 2014. The first Paleozoic record of the trace fossil *Rotundusichnium* (Middle Ordovician of Portugal): paleoenvironment and behavioural pattern of the trace maker. In: Pankhurst, R.J., Castiñeiras, P. & Sánchez Martínez, S. (eds.): *Gondwana 15 North meets South*, Abstracts Book. Instituto Geológico y Minero de España, Madrid, 154.
- Sá, A.A., Gutiérrez-Marco, J.C., Meireles, C.A., Garcia-Bellido, D.C. & Rábano, I. 2014. A revised correlation of Lower Ordovician sedimentary rocks in the Central Iberian Zone (Portugal and Spain). In: Rocha, R.B., Pais, J., Kulberg, C. & Finney, S. (eds.), *Strati 2013, at the cutting edge of Stratigraphy*, (ISBN 978-3-319-04364-7), Springer Geology Series, New York, 441-446.
- Sá, A.A., Meireles, C., Correia, P., Piçarra, J., Castro, P., Rocha, D., Ferreira, P.A. & Flores, D. 2014. A sequência paleozoica da região de Valongo-Arouca (N Portugal).

- Saída de campo 5. I: Brites, H., Sant’ovaia, H., Fernandes, I., Ribeiro, M.A., Flores, D. (Eds), *IX Congresso Nacional de Geologia / 2º Congresso de Geologia dos Países de Língua Portuguesa*, 73-95.
- Sales, R.K., Goldman, D., Paris, F. & Sheets, H.D. 2014. Chitinozoan biodiversity in the Ordovician of Gondwana: an interval-free approach using the quantitative stratigraphic correlation program CONOP9. Geological Society of America Abstracts with Programs. Vancouver, B.C., Canada.
- Saltzman, M.R., Edwards, C.T., Leslie, S.A., Dwyer, G. S., Bauer, J.A., Repetski, J.E., Harris, A.G., and Bergström, S.M. 2014. Calibration of a conodont apatite-based Ordovician $^{87}\text{Sr}/^{86}\text{Sr}$ curve to biostratigraphy and geochronology: Implications for stratigraphic resolution. *GSA Bulletin* **126**, 1551–1568.
- Sennikov, N.V., Tolmacheva, T.Yu., Izokh, N.G. & Obut, O.T. 2014. The Cambrian–Ordovician Boundary in Gornyi Altai. *Doklady Earth Sciences* **457**(1), 792–795.
- Serra, F., Albanesi, G.L., Ortega, G. & Bergström, S.M. 2015. Conodont-graptolite biostratigraphy and global correlation of the Mid-Late Ordovician in the Las Chacritas River Section, Precordillera of San Juan, Argentina. *Geological Magazine*.
- Servais, T., Danielian, T., Harper, D.A.T. & Munnecke, A. 2014. Possible oceanic circulation patterns, surface water currents and upwelling zones in the Early Palaeozoic. *GFF* **136**, 229-233. DOI:10.1080/11035897.2013.876659
- Servais, T., Li Jun, Molyneux, S.G., Rubinstein, C.V., Vecoli, M. & Yan Kui 2014. The palaeobiogeographical spread of the acritarch *Veryhachium* in the Early and Middle Ordovician and its impact on biostratigraphical applications. *GFF* **136**, 234-237.
- Smrecak, T. & Brett, C.E. 2014. Establishing patterns in sclerobiont distribution in a Late Ordovician (Cincinnatian) depth gradient: toward a sclerobiofacies model. *Palaios* **29**, 74-85.
- Song Yanyan & Zhang Yuandong. 2014. A preliminary study on the relationship of the early dicranograptids based on cladistic analysis. *GFF* **136**(1), 243-248.
- Song Yanyan, Zhang Yuandong, Goldman, D., Wang Zhihao, Fang Xiang & Ma Xuan. 2014. Latest Darriwilian to early Sandbian graptolite biostratigraphy in Chengkou, northern Chongqing, South China. 138-143, In: Zhan Renbin & Huang Bing (eds.) *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Sproat, C., Jin Jisuo, Zhan Renbin & Rudkin, D. 2014. Morphological variability in the Late Ordovician *Parastrophina* from eastern Canada and the Tarim Basin, northwestern China and its paleoecological implications. 144–147, In: Zhan Renbin & Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Strother, P.K., Taylor, W.A. & Vecoli, M. 2014. Sporoderm evolution in cryptospores from the Darriwilian of Saudi Arabia. Abstracts, *9th European Palaeobotany and Palynology Conference (EPPC)*, Padova, Italy, August 26-31, 2014, 1 p.
- Strother, P.K., Traverse, A. & Vecoli, M. 2015. Cryptospores from the Hanadir Shale Member of the Qasim Formation, Ordovician (Darriwilian) of Saudi Arabia: taxonomy and systematics. *Review of Palaeobotany and Palynology* **212**, 97-110.
- Strother, P.K., Vecoli, M. & Traverse, A. 2014. Cryptospores from the Hanadir Shale Member of the Qasim Formation of Saudi Arabia: a Darriwilian (Middle Ordovician) base for the land plant spore record. *GEO 2014, 11th Middle East Geosciences Conference and Exhibition*, March 9-12, 2014, Manama, Bahrain.

- Sumrall, C., Carrera, M.G. & Vaccari, N.E. 2014. New data on the early Ordovician stemmed echinoderm fauna from Argentina. *4th International Paleontological Congress (IPC4) Mendoza*, Abstracts p.624
- Sun, N., Elias, R.J. & Lee, D.-J. 2014. The biological affinity of *Amsassia*: new evidence from the Ordovician of North China. *Palaeontology* **57**, 1067-1089.
- Strullu-Derrien, C., Kenrick, P., Tafforeau, P., Cochard, H., Bonnemain, J-L., Le Hérisse, A., Lardeux, H. & Badel, E. 2014. The earliest wood ant, its hydraulic properties documented in c.497-million-years-old fossils using synchrotron microtomography. *Botanical Journal of the Linnean Society* **175**, 423-437.

T

- Tang Zengcai, Zhang Yuandong, Zhen Yongyi, Hu Wenjie, Yuan Qiang, Yu Guohua. 2014. New material of Early Ordovician conodonts from the Banqiao section, Lin'an, Zhejiang and their biostratigraphic significances. *Journal of Stratigraphy* **38**(4), 381-389.
- Tinn, O. & Ainsaar, L. 2014. Asterozoan pedicellariae and ossicles revealed from the Middle Ordovician of Baltica. *Acta Palaeontologica Polonica* **59**(2), 353–358.
- Tolmacheva, T.Yu. 2014. Biostratigraphy and biogeography of the Ordovician conodonts of the western part of Central-Asian Fold Belt. *Trudy VSEGEI, New Series* **356**, 1-264.
- Tolmacheva, T.Yu., Ryazantsev, A.A., Degtyarev, K.E. & Nikitina, O.I. 2014. Hydrothermal Barite Deposits in Upper Cambrian–Lower Ordovician Siliceous Successions of Southern Kazakhstan. *Doklady Earth Sciences* **458**(1), 1077–1081.
- Trotter, J.A., Barnes, C.R., Williams, I.S. & Männik, P. 2014. Ordovician and Silurian ocean and climate changes interpreted from Sr, Nd, and particularly O isotope analyses of conodonts. *Geological Society of America, Annual Meeting, Vancouver, 19-22 October 2014, Program with Abstracts*.

V

- Vecoli, M., Beck, J.H. & Strother, P.K., in press. Palynology of the Ordovician Kanosh Shale at Fossil Mountain, Utah. *Journal of Paleontology*.
- Vento, B., Toro, B.A. & Maletz, J. 2014. Paleoecological and paleobiogeographical considerations of Ordovician graptolites from the Cordillera Oriental, Jujuy Province, Argentina. *Historical Biology* **26**(6), 765-774.
doi.org/10.1080/08912963.2013.845881
- Villas, E., Reyes-Abril, J. & Gutiérrez-Marco, J.C. 2014. An early incursion of strophomenoid brachiopods onto the high latitude Gondwanan shelves (Middle Ordovician of Spain). In: Cerdeño, E. (compiler), *Abstract Volume, 4th International Palaeontological Congress. The history of life: a view from the southern hemisphere*. IANIGLA, Mendoza, 354.
- Vinn, O. & Toom, U. 2014. First record of the trace fossil *Oikobesalon* from the Ordovician (Darriwilian) of Baltica. *Estonian Journal of Earth Sciences* **63**, 118-121.
- Vinn, O., Wilson, M.A. & Mõtus, M.-A. 2014. The earliest giant *Osprioneides* borings from the Sandbian (Late Ordovician) of Estonia. *PLoS ONE* **9**(6), e99455.
- Vinn, O., Wilson, M.A. & Toom, U. 2014. Earliest rhynchonelliform brachiopod parasite from the Late Ordovician of northern Estonia (Baltica). *Palaeogeography*,

- Palaeoclimatology, Palaeoecology* **411**, 42-45.
- Vinn, O., Wilson, M.A., Mõtus, M.-A. & Toom, U. 2014. The earliest bryozoan parasite: Middle Ordovician (Darriwilian) of Osmussaar Island, Estonia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **414**, 129-132.
- Vinn, O., Wilson, M.A., Zatoń, M. & Toom, U. 2014. The trace fossil *Arachnostega* in the Ordovician of Estonia (Baltica). *Palaeontologia Electronica* **17.3.41A**, 1-9.
- Voldman, G.G., Alonso, J.L., Albanesi, G.L., Banchig, A.L., Ortega, G., Rodríguez Fernández, L.R. & Festa, A. 2014. New conodont records from the Los Sombreros Formation, an Ordovician mélange in the Argentine Precordillera. *Gondwana 15, Madrid*, Abstracts CD-ROM.
- Voldman, G.G., Ortega, G., Albanesi, G.L., Monaldi, C.R. & Giuliano, M.E. 2014. Advances in conodont biostratigraphy of the Santa Victoria Group (Cambro-Ordovician) in its type area, Cordillera Oriental, NW Argentina. *Gondwana 15, Madrid*, Abstracts CD-ROM.
- Voldman, G.G., Ortega, G., Albanesi, G.L., Monaldi, C.R. & Giuliano, M.E. 2014. Observaciones sobre la edad del grupo Santa Victoria (Ordovícico) en su área tipo, sierra de Santa Victoria, provincia de Salta. *Actas XIX Congreso Geológico Argentino, Córdoba*. CD-ROM.

W

- Wang Guangxu & Zhan Renbin. 2014. Chinese translations of the Phanerozoic geological periods (systems). *Journal of Stratigraphy* **38(2)**, 204–207 (in Chinese with English abstract).
- Wang Guangxu and Zhan Renbin. 2014. A new species of *Paramplexoides* (rugosans) from the Hirnantian Kuanyinchiao Formation of northern Guizhou, South China. 178–181. In: Zhan Renbin and Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Wang Guangxu, Zhan Renbin, Deng Zhanqiu & Yu Changmin. 2014. Latest Ordovician and earliest Silurian tabulate corals of South China. *GFF* **136(1)**, 290–293.
- Wang Yi, Rong Jiayu, Tang Peng & Wu Rongchang. 2013. New evidences of Early Silurian Tongzi Uplift from southern Upper Yangtze Sea. *Journal of Stratigraphy*, **37(2)**: 129-138 (in Chinese with English abstract).
- Wang Yi, Rong Jiayu, Zhan Renbin, Huang Bing, Wu Rongchang & Wang Guangxu. 2013. On the Ordovician-Silurian boundary strata in southwestern Hubei and the Yichang Uplift. *Journal of Stratigraphy*, **37(3)**: 129-138 (in Chinese with English abstract).
- Wang Yi, Jin Jisuo, Zhan Renbin and Copper, P. 2014. Early Silurian ‘algal meadows’ of Anticosti Island, eastern Canada: An analogue to modern sea grass meadows? *Geology Today*, **30(2)**, 67–70.
- Wang Yi, Jin Jisuo & Zhan Renbin. 2014. A new noncalcified thallophytic alga from the lower Silurian of Anticosti Island, eastern Canada. *International Journal of Plant Sciences*, **175(3)**, 359–368.
- Wang Yi, Rong Jiayu, Zhan Renbin, Huang Bing, Wu Rongchang & Luan Xiaocong. 2014. New study of the Silurian System in the Butuo district, southern Sichuan, SW China. *Journal of Stratigraphy*, **38(3)**, 257–267 (in Chinese with English abstract).
- Wang, Z.H., Bergström, S.M., Zhen, Y.Y., Zhang, Y.D. & Wu, R.C. 2014. A revision of the Darriwilian biostratigraphic conodont zonation in Tangshan, Hebei Province

- based on new conodont collections. *Acta Palaeontologica Sinica* **53**(1), 1-15 (in Chinese with English abstract).
- Weary, D.J., Harrison, R.W., Orndorff, R.C., Weems, R.E., Schindler, J.S., Repetski, J.E., and Pierce, H.A., 2014. Bedrock geologic map of the Spring Valley, West Plains, and parts of the Piedmont and Poplar Bluff 30'×60' quadrangles, Missouri, including the upper Current River and Eleven Point River drainage basins: U.S. Geological Survey Scientific Investigations Map 3280, 2 sheets, scale 1:100,000, and 55-p. pamphlet. <http://dx.doi.org/10.3133/sim3280>.
- Wellman C.H. 2014. The nature and evolutionary relationships of the earliest land plants. *New Phytologist* **202**, 1-3.
- Wellman, C.H., Breuer, P., Miller, M.A., Owens, B. & Al-Hajri, S. 2015. Editorial: Palaeozoic palynostratigraphy of the Arabian plate [a joint project between Saudi Aramco and the Commission Internationale de Microflore du Paleozoique (CIMP)]. *Review of Palaeobotany and Palynology* **212**, 1-2.
- Wellman, C.H., Steemans, P. & Miller, M.A. 2015. Spore assemblages from Upper Ordovician and lowermost Silurian sediments recovered from the Qusaiba-1 shallow core hole, Qasim region, central Saudi Arabia. *Review of Palaeobotany and Palynology* **212**, 111-126.
- Wenhui, W., Servais, T., Kui, Y., Vecoli, M., Jun, L., 2014. The Ordovician acritarch *Dactylofusa velifera* Cocchio 1982: a biostratigraphical and palaeogeographical index species. *Palynology* **39**, 125-141.
- Wenhui, W., Jun, L., Servais, T., Yan, K., Vecoli, M., 2014. *Dactylofusa velifera* Cocchio 1982: a biostratigraphical and palaeogeographical important Ordovician acritarch species. Abstracts, 9th European Palaeobotany and Palynology Conference (EPPC), Padova, Italy, August 26-31, 2014, 1 p.
- Wu, R.C., Calner, M., Lehnert, O., Peterffy, O. & Joachimski, M.M. 2015 (in press). Lower-Middle Ordovician $\delta^{13}\text{C}$ chemostratigraphy of western Baltica (Jämtland, Sweden). *Palaeoworld*. doi:10.1016/j.palwor.2015.01.003.
- Wu, R.C., Percival, I.G., Stouge, S. & Zhan, R.B. 2014. Conodont diversification during the Ordovician: A perspective from North China and Tarim (Northwestern China). *Science China: Earth Sciences* **57**(3), 397-407. doi:10.1007/s11430-013-4777-0.
- Wu, R.C., Stouge, S., Percival, I.G. & Zhan, R.B. 2014. Early-Middle Ordovician conodont biofacies on the Yangtze Platform margin, South China: Applications to palaeoenvironment and sea-level changes. *Journal of Asian Earth Sciences* **96**, 194–204. DOI: 10.1016/j.jseaes.2014.09.003
- Wu Rongchang, Zhan Renbin, Liu Jianbo, Joachimski, M., Chen Jun & Munnecke, A. 2014. Carbon and conodont apatite oxygen isotope records from the Floian to lower Darriwilian (upper Lower and Middle Ordovician) in South China, and their paleoenvironmental implications. 201–205. In: Zhan Renbin and Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Wyse Jackson, P.N. & Key, M.M. Jr., 2014. Epizoic bryozoans on cephalopods through the Phanerozoic: a review. *Studi Tridentini di Scienze Naturali* **94**, 283-291.
- Wyse Jackson, P.N., Key, M.M. Jr. & Coakley, S.P. 2014. Epizoozoan trepostome bryozoans on nautiloids from the Late Ordovician (Katian) of the Cincinnati Arch region, U.S.A.: An assessment of growth, form and water flow dynamics. *Journal of Paleontology* **88**, 475-487.

Y

- Yan Kui & Li Jun 2014. Acritarch and prasinophyte assemblage from the Qiaojia Formation in Luquan, Yunnan Province, South China. 206-209. In: Zhan Renbin and Huang Bing (eds.), *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press.
- Yan Kui & Li Jun 2014. A preliminary restudy on microplankton plant assemblages from the Lower-Middle Ordovician Luquan, Yunnan Province. *4th International Palaeontological Congress, The history of life: A view from the Southern Hemisphere*, September 28-October 3, 2014 Mendoza, Argentina. Abstract Volume, 356.
- Yan Kui, Li Jun & Meng Fan-wei 2014. An Early–Middle Ordovician acritarch and prasinophyte assemblage from the Meitan Formation in Qijiang, Chongqing, South China. *GFF* **136**, 298-302.

Z

- Zhan Renbin, Harper, D.A.T., Jin Jisuo, Liang Yan, Liu Jianbo, Stemmerik, L. & Stouge, S. 2014. Middle Ordovician *Apothophyla* brachiopod fauna from the roof of the World, Southern Tibet. *Palaeontology* **57**(1), 141-170.
- Zhan Renbin & Huang Bing (eds). 2014. *IGCP 591 Field Workshop 2014, Kunming China, 12-21 August 2014, Extended Summary*. Nanjing, Nanjing University Press. 246 pp.
- Zhan Renbin, Huang Bing, Wang Guangxu, Jin Jisuo, Liang Yan, Wang Yi, Zhang Yuandong, Li Rongyu, Liu Jianbo & Wu Rongchang. 2014. Discovery of the late Middle Ordovician *Saucrorthis* fauna (Brachiopoda) from the Sibumasu palaeoplate, western Yunnan, SW China. *GFF* **136**(1), 320-326.
- Zhan Renbin & Jin Jisuo. 2014. Early-Middle Ordovician brachiopod dispersal patterns in South China. *Integrative Zoology* **9**, 121–140.
- Zhan Renbin, Jin Jisuo, Rong Jiayu & Liang Yan, 2013. The earliest known strophomenoids (Brachiopoda) from Early Middle Ordovician rocks of South China. *Palaeontology* **56**(5), 1121-1148.
- Zhan Renbin, Luan Xiacong, Huang Bing, Liang Yan, Wang Guangxu & Wang Yi. 2014. Darriwilian *Saucrorthis* fauna: Implications for the great Ordovician biodiversification event (GOBE). *Estonian Journal of Earth Sciences* **63**(4), 323–328.
- Zhan Renbin, Rong Jiayu, Jin Jisuo, Liang Yan, Yuan Wenwei, Zhang Yuandong & Wang Yi. 2014. Discovery of a Late Ordovician *Foliomena* fauna in the Tarim desert, Northwest China. *Palaeoworld* **23**, 125–142.
- Zhang Ju & Zhang Yuandong. 2014. Graptolite fauna of the Hungshihyen Formation (Early Ordovician), eastern Yunnan, China. *Alcheringa* **38**(3), 434-449.
- Zhang, Shunxin, 2014. Rock-Eval⁶ data from the Premium Homestead Akpatok F-26 well on Akpatok Island, Nunavut. *Geological Survey of Canada, Open File* **7627**, 23 p.
- Zhang, Shunxin, Creaser, R.A. & Pell, J. 2014. Discovery of organic-rich black shale xenolith from kimberlite on the Hall Peninsula, Nunavut and its implication for petroleum potential in Cumberland Sound. *Bulletin of Canadian Petroleum Geology* **6**, 125-131.

- Zhang, Shunxin & Mate D.J. 2015. Geological reconnaissance for Ordovician stratigraphy and petroleum potential, Akpatok Island, Nunavut. Summary of Activities 2014, Canada-Nunavut Geoscience Office, p. 79–88.
- Zhang, Shunxin & Pell, J. 2014. Conodonts recovered from the carbonate xenoliths in the kimberlites confirm the Paleozoic cover on the Hall Peninsula, Nunavut. *Canadian Journal of Earth Sciences* **51**, 142–155.
- Zhang Yuandong, Wang Yi, Zhan Renbin, Fan Junxuan, Zhou Zhiqiang & Fang Xiang. 2014. *Ordovician and Silurian stratigraphy and palaeontology of Yunnan, southwest China*. Beijing, Science Press. 138 pp.
- Zhang, Y.D., Zhen, Y.Y., Munnecke, A. & Chen, X., 2014. Multidisciplinary approaches to the Ordovician stratigraphy in China and their implications. Abstract Volume, 4th International Palaeontological Congress, September 28 – October 3, 2014 Mendoza, Argentina, p.342.
- Zhen, Y.Y. & Percival, I.G. 2014. Floian (Early Ordovician) conodont biogeography, biofacies, and biostratigraphic correlation between Australia and South China. In Zhan Renbin & Huang Bing (eds), *Extended Summary of the International Geoscience Programme IGCP Project 591 Field Workshop, August 2014, Kunming*, 234-237. Nanjing University Press, Nanjing.
- Zhen, Y.Y. & Percival, I.G. 2014. Floian (Early Ordovician) conodont biogeography, biofacies, and biostratigraphy of the Australasian Superprovince. *4th International Palaeontological Congress, September 28 – October 3, 2014 Mendoza, Argentina*, Abstract Volume, p.343.
- Zhen, Y.Y., Percival, I.G. & Zhang, Y.D. 2014. Floian (Early Ordovician) conodont-based biostratigraphy and biogeography of the Australasian Superprovince. *Palaeoworld* **23**, doi.org/10.1016/j.palwor.2014.10.011
- Zhen, Y.Y. & Zhang, Y.D. 2014. Early Ordovician conodont biostratigraphy of the Jiangnan Slope, South China. In: Zhan Renbin & Huang Bing (eds), *Extended Summary of the International Geoscience Programme IGCP Project 591 Field Workshop, August 2014, Kunming*, 238-241. Nanjing University Press, Nanjing.
- Zhen, Y.Y., Zhang, Y.D., Tang, Z.C., Percival, I.G. & Yu, G.H. 2015. Early Ordovician conodonts from Zhejiang Province, southeast China, and their biostratigraphic and palaeobiogeographic implications. *Alcheringa* **39**, 109-141.
DOI:10.1080/03115518.2015.958295
- Zhou Zhi-yi, Luo Hui-lin, Yin Gongzheng, Hu Shi-xue & Zhan Dong-qin 2014. Stratigraphical occurrences of Ordovician trilobites in southeastern Yunnan. *Acta Palaeontologica Sinica* **53**(4), 420-442.
- Zhou Zhiyi, Yin Gongzheng & Zhou Zhiqiang, 2014. Ordovician (Darriwilian -early Katian) trilobite faunas of northwestern Tarim, Xinjiang, China. *Memoirs of the Association of Australasian Palaeontologists* **46**, 1-142.