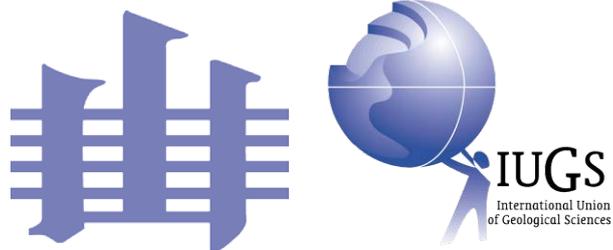


ORDOVICIAN NEWS

**SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY
INTERNATIONAL COMMISSION ON STRATIGRAPHY**

Number 33 (for 2015)

Edited by Ian G. Percival



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Cover photo

Professor David Harper, Chairman of the Subcommittee on Ordovician Stratigraphy, will retire after eight years in this role in September 2016 at the International Geological Congress in Cape Town. David is a world authority on the Great Ordovician Biodiversification Event and Ordovician brachiopods in particular, but seems to be quite happy here with some examples of the gigantic trilobites from the Valongo Formation (Darriwilian) of Portugal. The photograph was taken on the pre-conference field trip for the 11th International Symposium on the Ordovician System held in 2011. [Ian Percival]

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ORDOVICIAN NEWS Number 33 (for 2015)

Chairman's Message

This will be my last message as Chair of the Subcommittee on Ordovician Stratigraphy. In September I assume the role of Chair of the International Commission on Stratigraphy at the 35th International Geological Congress in Cape Town. It has been an exciting and fulfilling eight years, witnessing the development of the system as we built on the infrastructure of a robust and stable chronostratigraphical framework. This has permitted us to move forward and develop the palaeogeography and palaeobiogeography of the period, more accurately describe and understand key macroevolutionary events and be well positioned to integrate and interpret geochemical data. Our relationships with a number of highly relevant IGCP projects have been crucial in making these advances. I've quoted Google Scholar before as a proxy for activity in the Ordovician: there are over a quarter of a million references to Ordovician research and over 1000 just in the last few months. The dynamism of the Ordovician Period is more than matched by the endeavours of its researchers. The Great Ordovician Biodiversification Event (GOBE) and the end-Ordovician extinctions again continue to be foci for key research based on high-profile and highly-cited papers. Isotopes, particularly Carbon and Strontium, are becoming more significant as is a growing awareness in the community of the need for more and better absolute ages.

One key meeting is rapidly approaching: the closing meeting of International Geoscience Programme Project 591 *The Early to Mid Palaeozoic Revolution* in Ghent University, Belgium, 6-9 July 2016. Details are available elsewhere in this newsletter. This conference is supported by the SOS and I hope as many Ordovician researchers as possible will participate.

In June last year the 12th International Symposium on the Ordovician System was held on the campus of James Madison University in Harrisonburg, Virginia USA. Many Ordovician researchers attended and the presentations and conversations were lively and substantive. And we were privileged to celebrate the 80th birthday of one of the giants in our profession, Professor Stig Bergström. A special volume of papers given at the ISOS will appear shortly.

During this conference the Subcommittee held a business meeting at which a number of important matters were resolved, particularly regarding vacancies that will occur at the time of the 35th IGC. As mentioned above, I will then be standing down as chair, Andrei Dronov as vice-chair and the following members of the SOS will have served out their terms of office: F. Gilberto ACEÑOLAZA (Argentina) and Oldrich FATKA (Czech Republic). I thank them for their service to the Subcommittee. The voting members present at the meeting supported the nomination of Andrei DRONOV as incoming chair and Thomas SERVAIS as vice-chair. In addition two new members, one each from Argentina (Matilde BERESI) and central Europe (Petr KRAFT) were elected by the voting members in an electronic ballot. I'm delighted I leave the Subcommittee in such good shape.

Planning for the next ISOS to be held in Novosibirsk in 2019 is well advanced; it promises to be a real cracker. Details provided by Andrei Dronov and his team are given on pp.13-21 below.

I am also delighted to announce that a new IGCP project has just been approved in the last couple of weeks: IGCP 653 *The onset of the Great Ordovician Biodiversification* led by Thomas Servais was accepted by the IGCP Scientific Board during its 44th Session from 22 to 24 February 2016, in Paris. Further details are available on pp.11-12 in this newsletter. This will be a tremendous addition to an already formidable list of projects that have complemented and supported the work of the Subcommittee.

Finally once again I thank all of you, particularly Ian Percival (secretary) and Andrei Dronov (vice-chair), for your continued important input and support during the last eight years. It is your system and your webpages (maintained by Olle Hints – thanks Olle); we merely provide an infrastructure that we hope will stimulate and support your research. It seems to work!

David A.T. Harper

Chair, Subcommittee on Ordovician Stratigraphy



**International Commission on Stratigraphy
Subcommittee on Ordovician Stratigraphy**

ANNUAL REPORT 2015

1. Name of constituent body:

Subcommittee on Ordovician Stratigraphy (SOS)

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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-August 2016)
 - 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)
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. Vandenbroucke (Belgium)
M. Williams (UK)
Zhan Renbin (China)
Zhang Yuandong (China).

5. Interfaces with other international projects

IGCP Project 591: 'The early to middle Palaeozoic revolution'. This 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, China, Sweden, Canada and the USA. The final meeting will be held in Ghent during July 2016.

IGCP Successor project: An application has been made to the IGCP to support a new project entitled 'The onset of the Great Ordovician Biodiversification Event', led by Thomas Servais.

6. Chief accomplishments and products in 2015 cycle

a. Publication of *Ordovician News* **32**, distributed to all members of the subcommission by email and added to the subcommission's webpages (www.ordovician.stratigraphy.org).

b. Support for 12th ISOS, June 2015 on the James Madison Campus, Harrisonburg, Virginia; organised by Stephen Leslie and his colleagues. Over 80 delegates from some 15 different countries attended the four day meeting with field excursions, before, after and during the conference, focussed on key Ordovician in the region and beyond. A conference proceedings volume and fieldtrip guides are available electronically (<http://www.jmu.edu/2015ISOS/>).

c. Support for publication of ISOS thematic issue in *Stratigraphy*, to be available by the end of 2015.

d. Election of new officers: David Harper is standing down as chair, Andrei Dronov as vice-chair and the following have served out their terms of office or wish to stand down: F. Gilberto ACEÑOLAZA (Argentina) and Oldrich FATKA (Czech Republic). At the business meeting in Harrisonburg the voting members present supported the nomination of Andrei Dronov as chair and Thomas Servais as vice-chair. Two new members one from Argentina (Matilde Beresi) and one from central Europe (Petr Kraft) were elected by the voting members of the subcommission following an electronic ballot.

e. Book on the Global Ordovician System. The content, format and deadlines for a comprehensive, up-date-date on global Ordovician sections were the main topics for discussion at the business meeting.

f. Andrei Dronov's proposal to hold the 13th ISOS in Novosibirsk (2019) was favourably received by the Subcommission, and those members present voted unanimously to support the proposal.

7. Chief problems encountered in 2015

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 2014-2015

TOTAL INCOME (from ICS): USD 3000

- a. Support for attendance of colleagues at ISOS 2015 (Harrisonburg, VA) and STRATI (Graz): 1000 USD.
- b. Support of students, who presented, to attend ISOS 2015 (Harrisonburg, VA). 2000 USD

TOTAL EXPENDITURE **USD 3000**

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 Harrisonburg meeting a final line-up of chapters was discussed; 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 2015, notably in **Nanjing** (May), **Harrisonburg** (June), **Anticosti** (July) and **Graz** (August).

10. Budget and ICS component requested for 2015-2016

1. Attendance and participation of subcommission officers at IGC, Cape Town, South Africa (2016): 3000 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/IGCP Ghent meeting (2016): 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 2015-2016 BUDGET: 7000 USD

REQUESTED FROM ICS: **7000 USD**

Potential funding sources outside IUGS

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



International Geoscience Programme Project 591 - Closing Meeting 'The Early to Mid Palaeozoic Revolution' Ghent University

jointly with: The International Subcommittee on Cambrian Stratigraphy (ISCS)
The International Subcommittee on Ordovician Stratigraphy (ISOS)
The International Subcommittee on Silurian Stratigraphy (ISSS)
The International Subcommittee on Devonian Stratigraphy (ISDS)

Ghent, Belgium, 6-9 July 2016

This multidisciplinary meeting aims at bringing together specialists from the data-community, including but not exclusively, sedimentology, physical stratigraphy, (micro)palaeontology, geochemistry, geochronology and palaeogeography with specialists from the numerical modelling community who focus on, e.g., climate, ice-sheet, geochemical, palaeo-ecological or sedimento-logical modelling. Using data-model comparison methods, we aspire to obtain a better understanding of the complex processes that shaped the Earth during the IGCP 591 'time window', and, by extension, the whole Palaeozoic. As such, we will construct a synthesis of the advances made during the whole IGCP 591 programme and associated projects, and help set the agenda for continued community-driven initiatives for the future. Given that deep-time data-model comparison requires a profound understanding of the stratigraphy, this will be a joint meeting with the Cambrian, Ordovician, Silurian and Devonian commissions on stratigraphy. Break-out sessions for each of the sub-commissions' specific research and business will be organized as part of the meeting. The ISDS session will be co-sponsored by our friends of IGCP 596.

Registration is open: you can now register online, consult the programme (with short courses, workshops and key note lectures), and find all other details & updates on our website:

www.IGCP591.ugent.be

Summary schedule

12 February 2016	Registration opens
16 March 2016	Early bird registration closes
15 April 2016	Abstract submission deadline
5 July 2016	GCM modelling workshop, Dept. of Geology, UGent (included in registration)
6-9 July 2016	Closing meeting IGCP591 scientific sessions at 'het Pand', UGent
8 July 2016	Mid-meeting workshops at 'het Pand', UGent (included in registration)
10-15 July 2016	Welsh Basin (UK) Field Trip " <i>Revolutions that made the Palaeozoic world - Revealed in the ancient strata of Wales</i> " (to be booked separately)

IGCP n° 653 *The onset of the Great Ordovician Biodiversification*

The new project IGCP 653, which has now been formally accepted by the IGCP Scientific Board, can be considered to be a direct successor project of IGCP n° 410 *The Great Ordovician Biodiversification Event* and IGCP n°503 *Ordovician Palaeogeography and Palaeoclimate* and also to some extent IGCP n°591 *The Early to Middle Palaeozoic Revolution*. As the title indicates, the main objective of our new project is to find the triggers of the different biodiversification events that together constitute the GOBE.

Short description of the project:

The ‘Great Ordovician Biodiversification Event’ (GOBE) comprises the rapid diversification of marine organisms during the Ordovician Period. It is now clear that this adaptive radiation started for some organisms already in the late Cambrian and continued for others beyond the end of the Ordovician, making the GOBE the sum of a number of diversifications that completely modified marine food webs and that, for the first time in geological times, established modern marine ecosystems. The project focuses on interdisciplinary investigations, including case studies from international sites, involving specialists from the fields of palaeontology, sedimentology, stratigraphy, geochemistry, palaeoceanography, palaeoclimatology, etc., in collaboration with the Subcommission on Ordovician Stratigraphy (SOS). The results of the project will contribute to the understanding of the triggering causes of the establishment of modern marine ecosystems, but also to the identification of the reasons of the first collapse of these environments during the Late Ordovician mass extinction. The project will involve scientists from all over the world, and through the organization of dedicated workshops, will integrate graduate and doctoral students, in particular from developing countries.

Leaders of the project:

[Thomas SERVAIS, UMR 8198 Evo-Eco-Paleo, CNRS-University of Lille, France. E-mail: \[thomas.servais@univ-lille1.fr\]\(mailto:thomas.servais@univ-lille1.fr\)](#)

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[ZHANG Yuandong, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, China. E-mail: \[ydzhang@nigpas.ac.cn\]\(mailto:ydzhang@nigpas.ac.cn\)](#)

Workplan:

It is planned to run the new IGCP project over a period of five years (2016-2020). The backbone of the project would be the five main annual meetings, that will all be organised independently from other congresses or conventions (except 2019: joint meeting with the International Symposium on the Ordovician System, 13th ISOS), and will be accompanied by field excursions and workshops, in particular as training platforms for graduate students.

The following main annual meetings are scheduled:

2016, Autumn: Opening Meeting. Durham University, **Durham, United Kingdom**. Indoor sessions and field excursions to the Lower Palaeozoic sessions of the United Kingdom.

2017, Summer: Main Annual Meeting of the IGCP. Nanjing Institute of Geology and Palaeontology, **Nanjing, China**. Indoor sessions and field excursions to the Lower Palaeozoic sessions of the South China Platform (Yangtze Platform).

2018, Summer: Main Annual Meeting of the IGCP. University of Ohio, **Athens, OH, USA**. Indoor sessions and field excursions to the Lower Palaeozoic sessions of the Mid-Continent section (Ohio, Indiana, Kentucky).

2019, August: Main Annual Meeting of the IGCP. Siberian Branch of the Russian Academy of Sciences, **Novosibirsk, Russia**. Meeting jointly held with the International Symposium on the Ordovician System (ISOS). Indoor sessions and field excursions to the Lower Palaeozoic sessions of the Altai Mountains, and northern (Arctic) Siberia.

2020, Summer: Closing Meeting of the IGCP. National History Museum of Denmark, University of Copenhagen, **Copenhagen, Denmark**. Indoor sessions and field excursions to the Lower Palaeozoic of Bornholm (Baltic Sea) and Southern Sweden (Scania, Öland, etc.)

At these annual meetings, **business meetings** will be organised to announce and discuss the future activities of the IGCP project. Such business meetings will also be held during other scientific congresses, in order to bring together, at a regional level, the participants of the project.

For the year 2016, business meetings of the new IGCP are planned at the following events:

- IGCP 591 closing meeting at **Ghent, Belgium**, July 2016
- Annual Meeting of The Micropalaeontological Society (TMS), **Lille, France**, November
- 60th Annual Meeting of the Palaeontological Association, **Lyon, France**, December.

Similarly, such business meetings will also be organised at other congresses and conventions during the year 2017 to 2020, if possible, with symposium organised by the co-leaders of the new IGCP. In this context, we plan to organise a dedicated scientific session at the next NAPC (North American Paleontological Convention), once the venue and the schedule are decided.

A scientific session dedicated to IGCP 653 will be organised during IPC5 (the 5th International Palaeontological Congress) that will be organised in July 2018 in Paris, France. A regional meeting at Lille University, with a field excursion to the Lower Palaeozoic sections of Belgium and France will be organised before or after the IPC5.

In addition to the main annual meetings, we plan to organise other **regional meetings**, mostly based on field excursions. Such field excursions will be held on different continents, and could include countries such as Morocco (field trip to the Anti-Atlas area, including visits of the Fezouata Lagerstätte, in collaboration with the University of Marrakech).

Other meetings will include **training workshops for students**, with seminar lectures given by the co-leaders to graduate and doctoral students. Such workshops could be organised in China (2017) and Russia (2019), and also in Morocco (University of Oujda, University of Marrakech).

Please contact the project leaders if you wish to be a member of the project, or organise a session, a regional meeting or a workshop!

Thomas Servais, Leader, IGCP 653

13th INTERNATIONAL SYMPOSIUM ON THE ORDOVICIAN SYSTEM Novosibirsk, Russia (July 12-17, 2019)

Preliminary Announcement

We are delighted to announce that the **Thirteenth International Symposium on the Ordovician System** will be held from July 12th to July 17th, 2019 in Novosibirsk (Russia). The Symposium will be hosted at a most extraordinary district of Novosibirsk located about 30 km to the south of the city center on the shore of an artificial “Ob’ Sea”. Officially, it is called the Novosibirsk Scientific Center, but people call it simply Academy Town (Akademgorodok). Akademgorodok began its history in 1958 and now it is a world-renowned scientific center. Its core constitutes buildings of Novosibirsk State University and scientific research institutes of the Siberian branch of the Russian Academy of Sciences. Akademgorodok is an isolated district of Novosibirsk, located in a natural forest in the outskirts of the city. Scientific sessions will be organized in the conference hall of the House of Scientists (“Dom Uchenykh”) and the conference hall of the Trofimuk Institute of Petroleum Geology and Geophysics (Fig. 1). Hotel, conference halls, cafes, restaurants, and shore of the Ob’ Sea are all within walking distance from any point of the Akademgorodok.



Fig.1. Main building of the Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences

Significant and Important Dates:

- **March 2017:** First Circular appears in *Ordovician News*
- **March 2018:** Second Circular appears in *Ordovician News*
- **September 2018:** Registrations for the Symposium are expected to open
- **15 February 2019:** Deadline for submission of abstracts
- **March/April 2019:** Third Circular appears in *Ordovician News* with final Program and Arrival Instructions

Organizing Committee:

- NIKOLAY V. SENNIKOV, Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Novosibirsk. Co-Chairman.

- ANDREI V. DRONOV, Geological Institute of Russian Academy of Sciences, Moscow. Co-Chairman.
- ALEXANDR V. KANYGIN, Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Novosibirsk. Deputy Chairman.
TATIANA Yu. TOLMACHEVA, Russian Research Geological Institute (VSEGEI), St. Petersburg. Deputy Chairman.
- SERGEI V. ROZHNOV, Boryssiak Paleontological Institute of Russian Academy of Sciences, Moscow. Deputy Chairman.
- OLGA T. OBUT, Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Novosibirsk. Secretary.
- ALEXANDR V. TIMOKHIN, Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Novosibirsk.
- TARAS V. GONTA, Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Novosibirsk.
- ELENA G. RAEVSKAYA, FGUNPP “Geologorazvedka”, St. Petersburg.
- ELENA V. LYKOVA, Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Novosibirsk.

Accommodation:

Accommodation for all participants will be organized in the hotel “Zolotaya Dolina” (Golden Valley) in a walking distance (10 min) from the House of Scientists (“Dom Uchenykh”) and the main building of the Trofimuk Institute of Petroleum Geology and Geophysics where scientific sessions are to be held.

- Deluxe 130-100 Euro per night
- Single room 35-40 Euro
- Shared room 30-35 Euro
- Meals in Akademgorodok 30-50 Euro per day
- For students, rooms at the Novosibirsk State University hostel could be booked - price of single room (breakfast is not included): 15 Euro

Please note that costs for accommodation, excursions etc. are estimates only. They could change in the next 3 years with inflation and depend on the general economic and political situation. Final costs will be provided in the subsequent Circulars.

Travel:

Buses with departure every half an hour (100 min, 2 Euro) provide travel from Tolmachevo Airport (Tolmachevo-Novosibirsk city-Akademgorodok). Direct taxi from the Airport (50km) is the fastest way (45 min, about 30 Euro). A special minibus will also be organized from the Institute to meet participants of the Symposium.

Field Excursions:

Selection of Novosibirsk for the Symposium provides a good opportunity to learn more about the Ordovician geology of both the Siberian Platform and Altai Mountains. We also added to the program one pre-Symposium excursion to the St. Petersburg region. Therefore, those of the participants who attend both pre-Symposium and post-Symposium excursions on the platforms (Russian and Siberian respectively) will have a chance to compare sea-level story, long-term lithological changes and faunal differences in the two Ordovician palaeocontinents.

Pre-Symposium field trip 1. July 8-10, 2019 (3 days). **Ordovician of St. Petersburg region.**

Co-leaders: T.Yu. Tolmacheva and A.V. Dronov.

Excursion starts and ends in St. Petersburg. Participants will have an opportunity to examine classical Ordovician sections connected with names of R. Murchison, Ch. Pander, A.

Volborth and many other famous scientists. We will study Cambrian and basal Ordovician (Tremadocian) siliciclastics including traces of permafrost on the Middle/Upper Cambrian boundary. The cool-water carbonate succession (Floian –Lower Sandbian) and warm-water carbonates (Upper Sandbian –Katian) including supratidal sebkha dolomites, unusual for the other parts of the Ordovician basin of Baltoscandia, will be demonstrated and discussed.

Ordovician limestones of St. Petersburg region are extremely fossiliferous. Rich fauna include trilobites, brachiopods, cephalopods, gastropods, bryozoans etc. Discussions at most stops will include summary of conodont, trilobite, brachiopod and graptolite biostratigraphic investigations as well as palaeoclimatic, sequence stratigraphic, facial and palaeobathimetric interpretations. Special attention will be made to trace fossils distribution and their potential for regional high-resolution correlation. Unique cool-water Middle Ordovician reefs (Hecker-type mud mounds) will be demonstrated and studied in detail.

The first and second days will be devoted to the Cambrian, Lower and Middle Ordovician of the Eastern part of St. Petersburg Region. The localities to be visited during the first day include Tosna River and Sablinka River canyons, Sablino caves, “Pander’s anticline” (Popovka River canyon), Putilovo quarry and Lava River canyon. That night participants will spend in the town of Volkhov on the Volkhov River in the eastern part of St. Petersburg Region. The localities to be visited in the second day include Volkhov River valley, Babino quarry (Fig. 2), Lynna and Says River valleys (Fig. 3). Tourist stops during the excursion include Fortress in Old Ladoga (the first capital of Russia) and Viking burial mounds on the banks of Volkhov River. At the end of the day participants returns to St. Petersburg and spend a night there. The third day will be devoted to the Lower, Middle and Upper Ordovician of the western part of St. Petersburg Region. Localities to be visited include Kaskovo quarry, Elizavetiono quarry, Alekseevka quarry, Suma river canyon and Pechurki quarry. We return to St. Petersburg the evening of July 10, and on July 11th participants will fly to Novosibirsk. For the flight St. Petersburg – Novosibirsk participants need to make their own arrangements.

Field trip fee covers guidebook, transportation, all meals and accommodation in hotels during the excursion. Registration is 300 Euro for a minimum of 8 and maximum 40 participants. In July, the day temperature in St. Petersburg region is usually between +17°C and +27°C. Occasionally there could be rain.



Fig.2. Freshly exposed wall of the Dikari Limestone (Lower Dapingian) in the Babino quarry



Fig.3. Classical outcrop of the Middle Ordovician (Upper Dapingian-Lower Darriwilian) on Lynna River

Pre-Symposium field trip 2. July 4-11, 2019 (8 days). **Ordovician of the Altai Mountains.**

Co-leaders: N.V. Sennikov, O.T. Obut and E.V. Lykova.

The field trip is planned to demonstrate the most important Ordovician localities of the Gorny Altai Mountains. Excursion starts and ends in Novosibirsk (Akademgorodok). The first and last days are mainly driving. Distance from Novosibirsk to the first field camp in North-Western Altai is about 500 km. Transportation in the field will be by bus, 4WD tracks and jeeps. Altai is usually called the Siberian Switzerland for its beauty (Fig. 4) but it is not high mountains. Altitude on the route of the excursion will be between 500 m and 1500 m above sea level. Mountains are covered by taiga forest and mountain meadows. Exposures are mainly along the river banks, road cuts, on mountain slopes (fig. 5) and in active quarries. Participants of the excursion will have an opportunity to examine all the Ordovician succession of the Gorny Altai Mountains represented in different shallow to deep-water facies including: 1) delta front; 2) inner shelf (ramp); 3) inner slope of the carbonate platform (Fig. 5); 4) central part and outer slope of the carbonate platform; 5) deep-water shelf; 6) continental slope; 7) open ocean deposits and sea mounts. The fossils are represented by graptolites, conodonts, chitinozoans, radiolarians, trilobites, ostracods, brachiopods, gastropods, crinoids, scolecodonts, tabulate and rugose corals, bryozoans and algae.



Fig.4. Upper Ordovician reef limestones, Gorny Altai



Fig.5. Middle Ordovician succession of repetitive limestone and shale, Gorny Altai

Tourist sites on the route include:

- 1) Kolyvan' stone factory founded in 1802 which is famous for its giant jasper vases now stored in Paris and St. Petersburg (Hermitage).
- 2) Denisova Cave which represents one of the most ancient dwelling places of humans in Siberia (more than 200 000 years B.C.).
- 3) Scythian burial mounds (IV-II centuries B.C.).
- 4) Boat trip along Teletskoe Lake, which is known as "Altaian Baikal".

Typical temperatures for July in Gorny Altai are about +20-25°C, rarely +30°C during the day and +5-15°C at night. Occasional rain is possible. Heavy dew is typical in the mornings. It is planned to stay in four field camps (tourist campings) during the excursion with a distances between camps of about 250-400 km. Participants are advised to bring field boots, warm sweaters, raincoats, umbrellas as well as caps and swimming suits. The tents, sleeping bags and other camp facilities will be provided by the organizers. Field trip fee (800 Euro) covers guidebook, all meals, accommodation in field camps and campings and transportation during the excursion. This field trip is restricted to minimum 8 and a maximum 25 participants.

Mid-Symposium field trip. July 14-15, 2019 (2 days). **Ordovician of the Salair Range.**

Co-leaders: N.V. Sennikov and O.T. Obut.

Beginning and end of the excursion is in Novosibirsk (Akademgorodok). The excursion will demonstrate Cambrian, Lower to Middle Ordovician (Tremadocian, Floian, Dapingian and Darriwilian) and Silurian successions of the Salair Range that is represented in shelf facies including terrigenous and carbonate including carbonate with reef buildups. Fossils include brachiopods, trilobites, archaeocyathids, graptolites and corals. Field guide, transportation and accommodation for one night (in a hotel in Gurievsk town or Belovo) are covered by registration fee. The weather and other natural conditions recall the pre-Symposium Altai excursion.

Post-Symposium field trip. July 17-24, 2019 (7-8 days). **Ordovician of the Siberian Platform: Podkamennaya Tunguska and Stolbovaya Rivers.** Co-leaders: A.V. Dronov, A.V. Timokhin and T.V. Gonta.

Excursion starts in Novosibirsk and ends in Krasnoyarsk. Late in the evening of July 17 we will take a night train Novosibirsk – Krasnoyarsk (800 km). On July 18, we will fly from Krasnoyarsk to the town of Bor (600 km) on the Yenisei River opposite to the mouth of Podkamennaya Tunguska River. The same day the flight by helicopter from Bor to the field camp (120 km) on the Stolbovaya River, tributary of Podkamennaya Tunguska will be organized. For transportation between the outcrops during the excursion, rubber boats and motorboats will be used. Accommodations are in field camps (Fig. 6). Motorboats will arrange the way back to Bor downstream to Podkamennaya Tunguska at the end of the excursion (July 23). Organizers will provide flight back from Bor to Krasnoyarsk (July 24), but for the hotel in Krasnoyarsk participants need to make their own arrangements.



Fig.6. Field camp. Tributary of Podkamennaya Tunguska River

Participants of the excursion will have an opportunity to visit important Ordovician localities of the Tungus Basin on the banks of Podkamennaya Tunguska and Stolbovaya Rivers. They will see the Lower Darriwilian tropical carbonates with stromatolite buildups and oolitic grainstone that represent the uppermost part of the “Great Siberian Carbonate Bank” analogue of the Great American Carbonate Bank. The Upper Darriwilian shallow water quartz sandstones of the Baykit formation with *Skolithos*, *Kouphihnum* and giant Siberian *Rusophycus* trace fossils will be examined in several outcrops. The Lower Sandbian phosphate conglomerates of Ust’Stolbovaya formation overlying Baykit sandstone and marking the beginning of the Upper Ordovician transgression associated with upwelling of the cool-water oceanic waters into the epicontinental Tungus Basin as well as the cool-water carbonate series (Sandbian –Katian) will be also examined in several localities. The Upper Ordovician K-bentonite layers within the cool-water tempestites of Mangazea and Dolbor formations will be traced and studied at several localities along the Podkamennaya Tunguska and Stolbovaya Rivers (Fig. 7). These deposits are also rich in body fossils, which include trilobites, brachiopods, bryozoans, crinoids, ostracods, corals and gastropods etc, as well as in trace fossils including *Rhizocorallium*, *Halopoa*, and *Balanoglossites* etc. At some of the outcrops, contact with the Lower Silurian deposits will be seen. Discussions at most stops will include summary on biostratigraphic investigations as well as palaeoclimatic, facial and palaeobathimetric interpretations. Sea-level changes and sequence stratigraphy will be discussed as well.



Fig.7. Upper Ordovician cool-water carbonates with K-bentonite beds. Stolbovaya River

In July, the day temperature in this part of Siberia is usually between +17°C and +25°C. Occasionally there could be rain. Participants are advised to bring field boots, warm sweaters, raincoats, umbrellas as well as caps and swimming suits. The tents, sleeping bags and other camp facilities including repellents against mosquitos will be provided by the organizers. Field trip fee (1500 Euro) covers guidebook, all meals, accommodation in field camps and transportation during the excursion. This field trip is restricted to minimum 10 and maximum 20 participants.

Additional Possibility:

Post-Symposium field trip 2. July 18-25, 2019 (8 days). **Ordovician of the Siberian Platform: Kulyumbe River section.**



Fig.8. Ordovician outcrops on the Kulyumbe River

Excursion starts and ends in Novosibirsk. It requires a flight to Norilsk and back and helicopter flight from Norilsk to Kulyumbe River (about 40 minutes) and back. The

Kulyumbe River section is one of the most complete and well exposed (however, rarely visited) Ordovician section in the entire Siberian Platform. It provides a good opportunity to study depositional cycles and facies of Upper Cambrian, Lower and Middle Ordovician and the lower part of the Upper Ordovician deposits (Fig. 8). The whole transition from the Lower and lower Middle Ordovician tropical carbonate platform to the upper Middle and Upper Ordovician cool-water carbonate ramp could be demonstrated. Special attention will be attributed to the position of the Cambrian/Ordovician boundary, sea-level story and distribution of trace fossils. Weather conditions in July are roughly the same as on Podkamennaya Tunguska and Stolbovaya Rivers.

Field trip fee is 2000 Euro for a minimum of 10 and maximum 15 participants. It covers all transportation, accommodation, meals and guidebook.

Expression of Interest:

Please indicate your interest in attending a particular field excursion, especially in the case of excursions to Kulyumbe River and to St. Petersburg region, as early as possible. It will help the organizing committee to decide if there is sufficient interest to run these excursions.

Please send your expression of interest to Andrei Dronov: dronov@ginras.ru

Social and Cultural Highlights:

For accompanying persons during the Symposium a boat trip on the Ob' River could be recommended. The other tourist attractions are listed in the outlines of the field trips.

Publication:

A proceedings volume of the Symposium and additional materials on the Ordovician Geology of Russia will be published in a monographic series of the Trofimuk Institute of Petroleum Geology and Geophysics, Russian Academy of Sciences. After the meeting, all the materials will be freely accessible through the web page.

Costing:

Registration fees:

- General participants: 350 Euro
- Student participant: 200 Euro

Registration fee covers costs of publication, conference bag, coffee breaks, symposium excursion (full accommodation and meals) and social activities.

Conference Dinner: 50 Euro

Pre-Symposium field trip 1. Ordovician of St. Petersburg region (3 days); 300 Euro (covers field guide, transportation, all meals and accommodation).

Pre-Symposium field trip 2. Ordovician of Gorny Altai (8 days); 800 Euro (covers field guide, transportation, all meals and 6 nights' accommodation).

Mid-Symposium field trip. Ordovician of Salair Range (2 days); included in the registration fee; 150 Euro for accompanying persons.

Post-Symposium field trip. Ordovician of the Siberian Platform: Podkamennaya Tunguska and Stolbovaya Rivers (8 days); 1500 Euro (covers field guide, transportation, all meals and accommodation).

Additional Post-Symposium field trip. Ordovician of the Siberian Platform: Kulyumbe River section. (8 days); 2000 Euro (covers field guide, transportation, all meals and accommodation).

Supporting organizations, Universities & Institutions:

- International Subcommittee on Ordovician Stratigraphy (ICS-IUGS)
- Interdepartmental Stratigraphic Committee of Russia
- Russian Academy of Sciences
- Russian Foundation for Basic Research
- Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Novosibirsk (Russia)
- Novosibirsk State University, Novosibirsk (Russia)
- Geological Institute of Russian Academy of Sciences, Moscow (Russia)
- Boryssiak Paleontological Institute of Russian Academy of Sciences, Moscow (Russia)
- Russian Research Geological Institute (VSEGEI), St. Petersburg (Russia)

Sponsorship:

- Russian Academy of Sciences
- Russian Foundation for Basic Research

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Andrei Dronov, Co-chair, 13th ISOS

Report on the The 12th International Symposium on the Ordovician System (12th ISOS) June, 2015

The 12th International Symposium on the Ordovician System was hosted on the campus of James Madison University in Harrisonburg, Virginia, June 8-11, 2015. Over 80 delegates from 14 countries participated in the scientific sessions and field trips. A total of 13 short papers and 68 abstracts were presented to the meeting, involving a full program of talks supplemented by poster sessions. A good number of these contributions will be published in a Theme Issue of *Stratigraphy* (in press, March 2016). Short Papers and Abstracts for the meeting as well as field guides from the field trips are freely available and archived on the *Stratigraphy* journal web site (<http://www.micropress.org/microaccess/stratigraphy>).

The JMU campus sits on top of a succession of Ordovician carbonate and siliciclastic rocks and many of the buildings on campus are built of the Sandbian Edinburg Limestone. After two days of scientific talks, we loaded on to coaches for a mid-conference field excursion to examine the Ordovician succession of Germany Valley, West Virginia led by John Haynes, Keith Goggin, Randall Orndorff, and Lisa Goggin. Germany Valley lies about 100 kilometers west of Harrisonburg, and there are exceptional exposures of Middle to Late Ordovician Carbonates as well as a siliciclastic Ordovician-Silurian boundary succession. The field excursion ended with a barbeque dinner at Melrose Caverns, where delegates were treated to authentic Shenandoah Valley bluegrass music performed by the New Dominion Express, followed by a private tour of the caverns. The technical sessions ended the following day with a symposium dinner that included a celebration of Stig Bergström's 80th birthday, complete with cupcakes decorated with *Amorphognathus tvaerensis*.

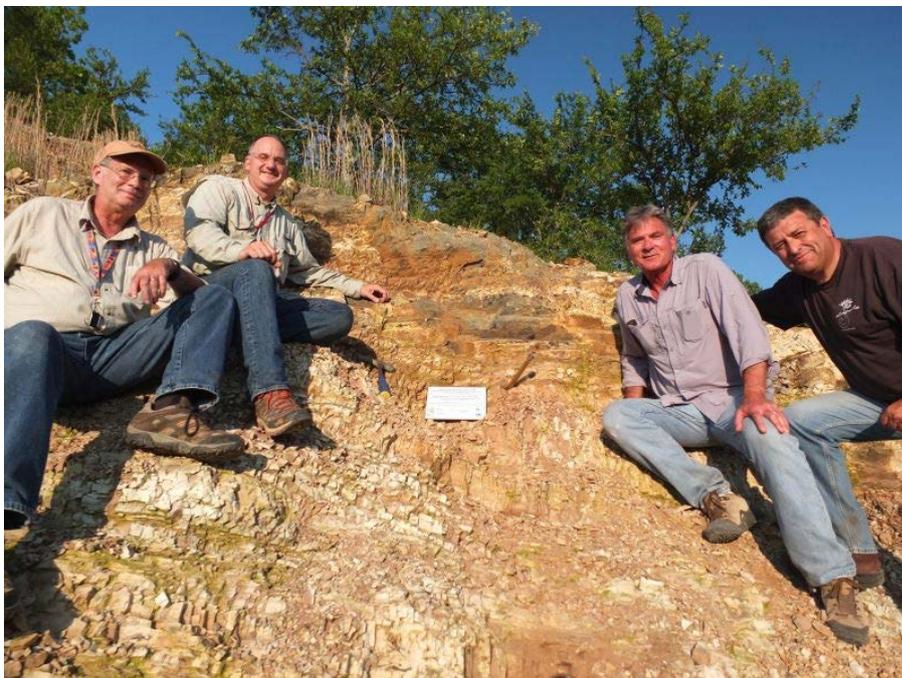


Delegates at the 12th ISOS standing on the Edinburg Limestone outcrop on the campus of James Madison University, Harrisonburg, Virginia, USA. [photo by Adrian Popp]



Mid-conference field excursion at the Ordovician-Silurian Boundary stop in shallow water siliciclastics of the Juniata – Tuscarora in near Germany Valley, West Virginia. [photo by Adrian Popp]

There were two pre-conference field excursions. Jesse Carlucci, Daniel Goldman, Carlton Brett, Stephen Westrop, and Stephen Leslie led a field trip focused on the exceptional exposures of the Ordovician in Oklahoma, including the carbonates of the Simpson and Arbuckle Groups. This trip culminated in a ceremony for the dedication of the Katian GSSP.



Dan Goldman, Steve Leslie, Stan Finney, and Juan Carlos Gutiérrez-Marco at the Katian GSSP site, Oklahoma. [photo by Adrian Popp]

The other pre-conference field excursion was ably led by Achim Hermann and John Haynes who provided an impressive tour of the Ordovician of the Southern Appalachians that began in Birmingham, Alabama and traversed sections through Alabama, Georgia, Tennessee, and southwest Virginia, ending at the site of the conference in Harrisonburg.



Southern Appalachians pre-conference field trip stop 2.1, Fort Payne, Alabama; Section through carbonates of the Chickamauga Group (Stones River Formation overlain by Nashville Formation) including exposures of the Millbrig and Deike K-bentonites. Field trip leaders John Haynes (centre) and Achim Herrmann (at right). [photo by Ian Percival]

The final event of the 12th ISOS was a 5-day post-meeting field trip of the Upper Cambrian through Upper Ordovician rocks in the central Appalachians of northern Virginia, Maryland, and central Pennsylvania led by John Taylor, James Loch, Bob Ganis, John Repetski, and Charles Mitchell, ably assisted by mappers from the Pennsylvania Geological Survey.



Post-conference field trip participants on the carbonate succession at the Chesapeake & Ohio Canal National Historic Park in the Cumberland Valley, Maryland. [photo by Adrian Popp]

Stephen A. Leslie, Chairman, 12th ISOS

PUBLICATION OF INTEREST TO ORDOVICIAN RESEARCHERS

A monograph to be published (in press, 2016) by Zhejiang University Press & Elsevier

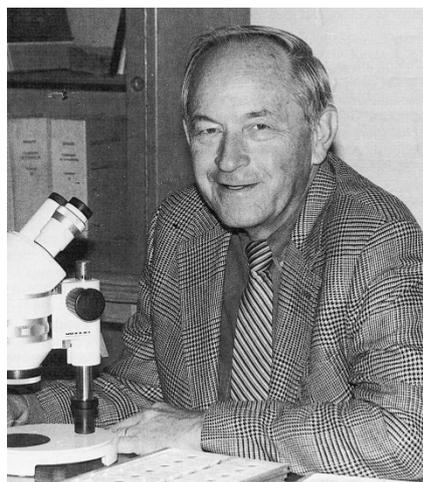
Darriwilian to Katian (Ordovician) Graptolites from Northwest China

CHEN Xu, ZHANG Yuandong, Daniel GOLDMAN, FAN Junxuan, Stig M. BERGSTRÖM, Stanley C. FINNEY, WANG Zhihao, CHEN Qing, MA Xuan

Synopsis

Graptolite faunas from 14 sections of upper Darriwilian to lower Katian in Northwest China are described in this monograph. In ascending order, these faunas can be assigned to the following graptolite biozones: *Cryptograptus gracilicornis* Beds, *Pterograptus elegans*, *Didymograptus murchisoni*, *Jiangxigraptus vagus*, *Nemagraptus gracilis*, *Climacograptus bicornis*, *Diplacanthograptus caudatus* and *Diplacanthograptus spiniferus* biozones. Some of the investigated sections in the studied regions represent a mixed biofacies and yield diverse faunas of both graptolites and conodonts. The unusual co-occurrence of biostratigraphically important representatives of these major index fossil groups allows for the recognition of many new ties between standard graptolite and conodont biozones. Hence, the study areas are of world-wide significance for constructing more precise correlations between Darriwilian through Sandbian graptolite and conodont biozonations. Comparison with Baltoscandic, North American, and Argentine key sections confirms the biozonal relations shown in the northwest China study sections. 131 species belonging 43 genera of graptolites are described and illustrated with taxonomic, stratigraphic, and biogeographic remarks in this monograph.

OBITUARY - Professor Emeritus Walter C. Sweet (1927-2015)



One of the internationally most widely known Ordovician workers, Professor Emeritus Walter C. Sweet, passed away on December 4, 2015. He had suffered a heart attack a couple of weeks earlier and undergone a by-pass heart operation from which he never recovered.

Walt started his long career at the Ohio State University (OSU) as an instructor in 1954, was promoted to Assistant Professor in 1957, became Associate Professor in 1961, and Professor in 1966. He retired and became an Emeritus Professor in 1988. In retirement he lived in Columbus but spent parts of each year in Tucson, Arizona. In 2014 he and his wife moved permanently to Tucson, where he spent the last portion of his life.

During his many years at OSU, Walt was a very successful educator who received the Geology Department Distinguished Teaching Award twice (1971, 1982). He co-authored a textbook on Introductory Geology, which was published in two editions (1966, 1973) and used not only at OSU but also at several other universities. He served as thesis advisor for approximately 40 students, several of whom, such as T.J.M. Schopf and Anita Epstein (Harris), later became internationally prominent paleontologists.

Much of Walt's early research was on Ordovician cephalopods. For instance, in his monograph on nautiloids from the Oslo region, Norway, he described more than 20 new species and several years later, he produced extensive chapters on cephalopods in volume R of the *Treatise on Invertebrate Paleontology*. However, a major part of his research from the late 1950s on dealt with conodonts and conodont biostratigraphy, initially in the Ordovician but later in most of the Paleozoic and Triassic. This work resulted in more than 125 publications that made him an authority on virtually all aspects of conodonts. He cooperated with Stig Bergström in the development of multielement conodont taxonomy, that is, the classification of conodonts based on the element apparatus of the animal rather than on single isolated apparatus elements. His broad knowledge about conodonts was summarized in his 1988 book *The Conodonta. Morphology, Taxonomy, Paleoecology, and Evolutionary History of a long-extinct Animal Phylum* which has become an international classic that is still used worldwide as the best available overall summary of this widespread and important fossil group. Walt was also one of the principal authors of the revised conodont part (1981) of the *Treatise on Invertebrate Paleontology*. The wide appreciation of his paleontological work is shown also by the fact that international colleagues have named at least three fossil genera (*Sweetodus*, *Sweetina*, *Sweetocristatus*) and several new species (e.g. *Cahabagnathus sweeti*) for him. Much of his work in the Ordovician was basically of biostratigraphic nature, and he was one of the pioneers in using graphic correlation.

During his long research career, Walt received several major awards, including the Pander Gold Medal (1985), the highest award in conodont research, the Society of Sedimentary Geology's Moore Medal (1988) and the Paleontological Society's Medal (1994), the latter two awards being the two most prestigious ones in paleontology and soft rock geology in North America. Only one other person in the world has received all these three awards.

Walt was also quite active in professional service. For instance, he was Secretary (1976-1982) and later President (1983-1984) of the Paleontological Society and Chief Panderer (=President) of the Pander Society (1975-1985). He was also a Member or Corresponding Member for many years of the Ordovician, Permian, and Triassic Subcommissions of the International Commission of Stratigraphy.

Although he maintained a general interest in paleontology and biostratigraphy in his retirement years, and occasionally attended geology seminars, he published only a couple of papers during the last 10-15 years of his life. This was no doubt partly due to an eye problem that prevented him from using a microscope combined with the fact that during the last few years of his life, his wife required virtually constant supervision after a serious stroke.

Most of the time, Walt was helpful and friendly but demanding to students and co-workers. Especially in the company with old and foreign friends, Walt could be easy-going and very enjoyable but he had very firm opinions about a variety of matters and possessed a certain temper. When experiencing matters that he did not feel were correct, he did not hesitate to express his opinion, which was not always appreciated by everybody. However, his broad knowledge, sharp and critical mind, and his ability to think 'outside the box' will be greatly missed by many Ordovician paleontologists and stratigraphers around the world.

Stig M. Bergström

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.

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Guillermo L. ALBANESI (Argentina) is continuing studies on conodonts from the lower Paleozoic of South America, including biostratigraphy, chemiostratigraphy, events, and paleothermometry. Diverse projects from the Precordillera, Eastern Cordillera and Puna of northwestern Argentina are carried out with Gladys Ortega, Gustavo Voldman and colleagues from Argentina and other countries. In association with graduate students M.E. Giuliano, F. Serra, N. Feltes and M. Mango, are continuing 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. Other two students, Gisella della Costa and Florencia Moreno, will begin their PhD studies during current year. He is completing a project on oxygen 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.

He 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 he maintains a repository space for the conodont collections at the Museo de Paleontología, FCEFyN, UNC.

Guillermo L. Albanesi

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

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J. Javier ÁLVARO (Spain) is working in the Ordovician geodynamic evolution of SW Europe and NW Africa, including volcanic, stratigraphic and palaeontological aspects of the Cambro-Ordovician transition and the emplacement of the Hirnantian glaciation.

J. Javier Álvaro

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Anna ANTOSHKINA (Russia) continues to work in the Upper Ordovician-Lower Silurian successions exposed on the Northern Urals (the Ilych River region) with contribution from my postgraduate student Lyuba Shmeleva. Integration of sequence sedimentology with conodont species-based biostratigraphic packages (determined by Tanya Tolmacheva) has shown that the uppermost Katian Yaptikshor Formation includes a part of the Hirnantian deposits. The collected data on the Upper Katian Bol'shaya Kos'yu reef revealed specific sphinctozoan sponges bearing a striking resemblance to the same in Ordovician reefs in China. We plan to use carbon isotopic profiles for identification of the Hirnantian and Ordovician-Silurian boundaries in the Northern Urals, and we are working on a sequence stratigraphic correlation of two Hirnantian sections, one from the Subpolar Urals, the other from Northern Urals.

Anna Antoshkina

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Lucía ARÁOZ (Argentina) continues working on biostratigraphy and taxonomy of Lower and Middle Ordovician acritarchs from Northwestern of Argentina. Currently in collaboration with Dr. Sol Noetinger I conducted a research project subsidized by CONICET to study acritarchs and biostratigraphic correlations between the Eastern Cordillera and Sierras Subandinas in the Lower and Middle Ordovician. I am part of a working group focused on Paleozoic acritarchs and other fossils of Argentina comprising María del Milagro Vergel and Aceñolaza Guillermo. At the same time I am part of the INSUGEO staff, working at Facultad de Ciencias Naturales e I.M.L., Universidad Nacional de Tucumán, and carry out tasks such editorial coordinator of the journal *Geological Correlation Series*.

Lucía Aráoz

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William I. AUSICH (United States) is working on reconstructing the early (Ordovician) phylogeny of crinoids as part of the Assembling the Echinoderm Tree of Life project (Echinotol.org) and in 2015 published papers on systematics of new crinoids from Gondwana (Morocco and France) and Baltica (Estonia).

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Chris BARNES (Canada) continues 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, paleoecology, and thermal maturation studies, Canadian Arctic Islands (with Zhang (GSC), Jowett and Carson (Suncor)).

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Juan L. BENEDETTO (Argentina) is working on the taxonomy and phylogeny of Lower Ordovician brachiopods from the Central Andean basin of NW Argentina. Jointly with doctoral student Diego Muñoz he is studying the linguliformeans from the Santa Rosita and Acoite formations, and recently sent for publication a paper on the phylogeny of Lower Ordovician plectorthoideans from NW Argentina and the origin of the heterorthid *Tissintia*. Another work on the biogeography of the genus *Apheoorthina* in the light of the main factors influencing large-scale dispersal pathways around Gondwana, in particular larval capacity for dispersal and oceanic currents, was finished recently. Also he is writing a joint paper with D. Muñoz on taxonomy and stratigraphic distribution of the punctate orthide *Lipanorthis*, which is represented in the Andean region by several species and is one of the most conspicuous brachiopods of the basin. A second project, which is being carried out in collaboration with doctoral student Fernando Lavie, focused on the taxonomy, paleoecology and biogeography of organophosphatic and craniiform brachiopods from the San Juan Formation (upper Tremadocian-Darriwilian) and other Ordovician carbonate units of the central and northern Precordillera. A taxonomic paper dealing on obolids, trematids, siphonotretids, and craniids from the San Juan Formation (Darriwilian) is in the final stages of preparation.

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Matilde Sylvia BERESI (Argentina) is continuing her investigation on Ordovician stratigraphy, microfacies and biofacies of the western Argentine Precordillera. Two papers with colleagues of San Juan University and CONICET-Mendoza documenting the Mid-Ordovician carbonates and fauna of the Salagasta section, southern Precordillera, Province of Mendoza and Niquivil section in the Precordillera of San Juan, have been completed and sent for reviewing. An update of the Early-Middle Ordovician algae of the Precordillera with Veronica Luchinina (Siberian Branch of RAS) is nearing completion. Other studies in progress include sponge faunas from the Cambrian platforms of Argentine Precordillera and Sonora, Mexico, with Blanca Buitron (UNAM, Mexico) and collaborators of the University of Sonora.

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Stig M. BERGSTRÖM (United States), although long retired, continues working on a variety of projects around the world. Most deal with conodont and graptolite biostratigraphy, biogeography, and taxonomy, but I am also heavily involved in chemostratigraphy (^{13}C , Sr, ^{34}S) and ^{18}O studies using conodont apatite. Ordovician fieldwork in 2015 has been restricted to the U.S. Midcontinent, Sweden, and Norway. Of particular interest during 2015 has been the work on exceptionally preserved and morphologically remarkable conodont apparatuses from the Middle Ordovician Winneshiek Shale, two types of which are described in a paper now in revision. I was very pleased to have Prof. Annalisa Ferretti (Modena, Italy) here again for three months last Fall and we worked on five Ordovician projects, three of which have resulted in manuscripts. In terms of publications, 2015 has been a very good year with nine papers and four abstracts published. My attendance at the International Symposium in Harrisonburg, Virginia in June, 2015 was particularly memorable and I greatly enjoyed meeting again many old friends. There I was honored at the congress banquet by a special toast and the distribution to all the participants of a specially designed chocolate cookie decorated on top by an artistic illustration of the Upper Ordovician index conodont *Amorphognathus tvaerensis* Bergström, 1962. As usual, I spent six weeks in Sweden during the summer where geological activities included, among others, a few days of very enjoyable field work in Norway and a research visit to Lund University.

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Petr BUDIL (Czech Republic) currently co-operates with Oldřich Fatka on the topic of Ordovician trilobite digestive tract. Together with Michal Mergl and Daniel Smutek, a short description of the poorly known fossiliferous Tremadocian of the Železné hory area (East Bohemia) is submitted to *Geoscience Research Reports*. With Michal Mergl and Vladislav Kozák, a supplementary description of some Middle Ordovician nileid trilobites is planned; description of some new Ordovician localities of Prague and eastern part of the Barrandian area was partially done (with Martin David) or is under preparation (with Jan Peršín).

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Carlton E. BRETT (United States) was engaged during 2015 on several projects related to Ordovician stratigraphy and paleoecology with present and former students. We continued to work on high-resolution stratigraphy, depositional cycles and paleoenvironments of the Upper Ordovician in the Cincinnati region and elsewhere. Major research projects continued in two major areas as discussed below.

A) Integrated Stratigraphy of early Katian Platform to Basinal Sediments in Eastern North America.

In 2015 several different projects focused on the uppermost Sandbian-lower Katian interval. This is a critical interval because it includes the most widespread K-bentonite beds in the Ordovician, signaling the onset of the later tectophase of the Taconic Orogeny, a major eustatic? sequence boundary (M4/M5 boundary), biotic turnover and the best known C isotope excursion of the Ordovician.

1) In the first project, graduate student Allison Young is continuing to work 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 and its transition into dark, shale-rich facies of the "Point Pleasant" and "Utica" formations in the deeper water Sebree Trough. These are the most important source rocks for petroleum and natural gas in Ohio. The overall objective of this research is to develop better models of sequence stratigraphy for mixed siliciclastic-carbonate systems in epicratonic platforms and basins. Collaborations with Peter Holterhoff of the Hess Oil Corporation (Houston) included gamma ray profiling of key outcrops in the Lexington platform and drill cores from the Cincinnati area. Research with Thomas Algeo (University of Cincinnati) on C/S and C/P ratios on drill cores has led to recognition high TOC facies that yield a signature of at least temporary anoxia on the seafloor.

In addition, carbon isotope stratigraphy, improved biostratigraphy and magnetic susceptibility profiles in the Sandbian-basal Katian interval produced as a part of the PhD dissertation completed by 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.

2) During summer 2015 I extended research on sequence and event stratigraphy and carbon isotope profiles in the Late Ordovician Katian Stage stratotype and auxiliary sections in central Oklahoma. This work, in conjunction with Steve Westrop (University of Oklahoma), Dan Goldman (University of Dayton), and Jesse Carlucci (Midwestern State University,

Wichita Falls, Texas) will require substantial revisions to the correlation of the auxiliary stratotype section at Fittstown, OK and the I-35 section in the southern Arbuckle Mountains. Carlucci, Goldman, Westrop, Steve Leslie (James Madison University) and I, prepared a field guide and co-led a pre-meeting field trip in the Arbuckle Mountains and Katian stratotype for the International Subcommittee on Ordovician Stratigraphy (ISOS); a paper on these results is also in preparation.

3) A new initiative, with new UC masters student Tim Paton, involves documentation of spectacular hardgrounds (cemented sea floors) spectacularly encrusted by intact fossil communities. These extraordinary buried communities were discovered in a quarry by a Canadian researcher, George Kampouris and amateur paleontologist Jake Skabelund, who have invited us to work cooperatively with them on documenting the hardgrounds. They are divided into local hummocky mounds elevated as much as 20 cm above an otherwise flat pavement and up to 2 m across. The hardgrounds underwent multiple episodes of obrution (sediment smothering) that preserved intact and in situ remains of bryozoans and delicate echinoderms at the time of highest disparity of the class: asteroids (starfish), crinoids, rhombiferans (spectacular slabs covered with *Pleurocystites* on the flat hardgrounds), paracrinoids and edriasteroids, including the world's first abundant complete edrioblastoids. The elevated mounds show multiple episodes of colonization of the surfaces and possibly a faunal succession on individual mounds. The mounds also form an analog to island biogeography and thus provide a unique opportunity to test ideas on community patchiness and the relationship of per-mound biodiversity to mound size and topographic heterogeneity. Perhaps most important, the hardgrounds also appear to provide regional markers that we will integrate into a broader regional stratigraphic framework and the probably record key sequence stratigraphic surfaces. We intend to do a thorough stratigraphic survey of these among all available localities and also to use C isotope chemostratigraphy to document the occurrence of these encrusted surfaces in relation to the famed GICE (Guttenburg isotope) excursion. We are testing whether or not these skeletal colonization surfaces are related to events of bioherm development in the very earliest Katian in other parts of the world, including Estonia and Sweden.

4) Another, related, new project, initiated late in 2015, builds on work done by Robert Swisher (PhD 2015, University of Oklahoma), Steve Westrop (U. Oklahoma), and myself on sequence stratigraphy of the Decorah and Kimmswick formations in eastern Missouri. In the new study, in collaboration with Jacalyn Malinowski (University of Illinois) and Thomas Guensburg (Rock Valley College, Illinois) is documenting unusual stromatoporoid and microbial bioherms the Kimmswick Formation. These bioherms are unique in showing relatively large caves, the ceilings and sides of which are covered by encrusting crinoid holdfasts and cyathocystid edriasteroids, again, including edrioblastoids. This makes a very interesting comparison with the Ontario hardground communities of about the same age.

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. Thomas J. Malgieri completed his MS thesis on the Maysvillian-Richmondian boundary and an associated regional unconformity. I am now working with graduate students Christopher Aucoin (Masters degree, 2014, PhD pre-candidate) and Cameron Schwalbach, as well as Pat McLaughlin (Wisconsin Geological Survey) and Ben Dattilo (Indiana Purdue University, Fort Wayne) on sequence and event stratigraphy of the Upper Ordovician Richmond Group. In 2015, Christopher Aucoin continued study of the sequence stratigraphy and bioevents of the upper Katian (upper Cincinnati) Richmond Group and the so-called Richmondian invasion. As a part of a Fulbright Fellowship with André Desrochers at University of Ottawa, Chris is now extending this research into southern Ontario. He has been examining outcrop

sections and drill cores in the Ottawa basin. This work includes analysis of carbon isotopes in drill cores through the Upper Ordovician. He is making good progress in linking patterns unconformity bound sequences and biotic events seen in the Cincinnati Arch, with those of southern Ontario, a topic that has not been tackled since the classic work of Foerste about 100 years ago.

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.

The results of these major studies are being synthesized in a completely revised Upper Ordovician Cincinnati sequence stratigraphy, which builds on the seminal work of Holland and Patzkowsky and subdivides the Cincinnati into a number of new high-resolution sequences. I hope to have this synthesis completed in the next year.

Ben Dattilo, Rebecca Freeman (University of Kentucky) and I are investigating the hypothesis that phosphatic enrichment in the Cincinnati is the result of multiple episodes of storm reworking and enrichment of organic-derived phosphates rather than upwelling. We have found evidence that the proportion of phosphatic micro-steinkerns in relation to calcitic shells provides a useful tool for understanding the degree of time-averaging and possibly to quantify the temporal scale of skeletal accumulations.

Finally, graduate students, Christopher Aucoin and Allison Young and I attended the outstanding conference of the International Symposium on Ordovician Stratigraphy (ISOS) in Harrisonburg, VA, USA, and the very interesting mid-meeting field trip. I also co-led a pre-meeting field trip for ISOS, on the Ordovician in Oklahoma with Jesse Carlucci and others (see above).

Pat McLaughlin and I attended the Mid Paleozoic meeting of IGCP 591, on the Ordovician and Silurian in Quebec City and the spectacular mid-meeting trip on the Ordovician of Quebec area. The post-meeting field conference in Anticosti Island led by Andre Desrochers and Jin Jisuo was inspiring and provided a very intriguing look at the upper Katian-Hirnantian succession. I hope to continue research on extending correlations and evidence of bioevents from the Appalachian Basin and Cincinnati Arch into the Anticosti region. To that end, I am working with Pat and others on correlation and isotope stratigraphy of a long core section of the Katian drilled on Anticosti.

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Yves CANDELA (Scotland) is working with David Harper on the description of brachiopod (linguliforms) and associated faunas 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.

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Josefina M.T. CARLOROSI (Argentina) continues work on biostratigraphy and taxonomy of Lower and Middle Ordovician conodonts from Northwest of Argentina and Famatina Ranges. Currently in collaboration with Drs Ana Mestre and Susana Heredia, I am conducting a research project subsidized by CONICET to study conodont biostratigraphic correlations between the Eastern Cordillera and Precordillera for the Lower and Middle Ordovician. I am part of a working group focused on Ordovician conodonts of Argentina that includes Dr Heredia, Dr Mestre and Lic. Tatiana Soria. At the same time I am part of the INSUGEO staff and carry out tasks such as editorial coordinator of the journal *Geological Correlation Series*.

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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.

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Robin COCKS (United Kingdom) spent most of the year working on a book, *Earth History and Palaeogeography* with Trond Torsvik (Oslo), which was submitted to Cambridge University Press in February 2016, and will be published later this year or early next. In it there are many new global terrane reconstructions and more local maps showing the facies throughout the Phanerozoic, including the Ordovician, as well as thumbnail geological summaries of the 256 units into which we have divided the Earth. Thus I went to Oslo four times during the year. I also finished a review of Ordovician and Silurian chlidiospoid brachiopods for the *Journal of Systematic Palaeontology* which was published electronically in November and will be in the paper volume in 2016. Other papers neared completion on the Ordovician Kazakh terranes with Leonid Popov and on the Variscan Orogeny with Wolfgang Franke and Trond Torsvik. I attended the International Brachiopod Congress at Nanjing,

China in May and whilst there continued to work with Rong Jiayu on global Llandovery brachiopod distributions.

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Roger COOPER (New Zealand), with James Crampton, Peter Sadler and Michael Foote, has completed a project analysing survivorship patterns in the Graptoloidea, using the CONOP data set and composite sequence. In the Early and Middle Ordovician, when a greenhouse global climate prevailed, extinction rates were comparatively low (except for a spike in the mid Darriwilian) and extinction preferentially removed the newly evolved species. This is the 'background' extinction mode for graptolites. In the Late Ordovician and Silurian, the median extinction rate approximately doubled and there were 7 or 8 severe spikes when the intensity of extinction was extreme, including that of the Late Ordovician Mass Extinction. The spikes are linked with fluctuations in global climate. During these spikes, the survivorship mode switched from background mode to one where old species became increasingly vulnerable. The rate and mode of extinction is thus closely related to extrinsic environmental factors, and not to biotic interactions as proposed in the Red Queen model of evolution.

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Paul COPPER (Canada) and Jin Jisuo are in the final stages of revision of the athyridid brachiopods *Hindella*, *Koigia*, *Hyattidina* and *Cryptothyrella* and their evolution across the O/S boundary. Another large project in progress (covering ca. 65 spp. and spanning the Katian-Telychian interval) is a monographic study of Ordovician-Silurian Atrypida (Brachiopoda) from Anticosti Island in eastern Canada.

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Helena COUTO (Portugal) is working on the study of Palaeozoic stratigraphy, palaeontology and gold-antimony mineralizations in Baixo-Douro area (North Portugal). These studies aim contributing for a better knowledge of the Palaeozoic stratigraphy and to define prospecting guides for gold and antimony deposits. Geological mapping, petrographic, geochemical and stratigraphic studies go on being developed on the Cambrian-Ordovician transition (including rifting processes), 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.

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Andrei DRONOV (Russia) continued his work on facies, sea-level changes and biotic events on the Siberian and Russian platforms during the Ordovician. In the year 2016, we started a new 3- year project “Major biotic and abiotic events of regional and global scale in the Ordovician of Siberian and Russian platforms”. The project’s team includes Alexander Kanygin, Alexander Timokhin, Taras Gonta, Olga Maslova, Veronica Kushlina, Alexey Zaitsev, Elena Raevskaya and Tatiana Tolmacheva. Under umbrella of this new project, we continue our studies initiated earlier. We continue investigations of the Siberian K-bentonite beds conducted in collaboration with Warren Huff, Bryan Sell, Christian Rasmussen and David Harper and studies of carbon isotope chemostratigraphy of the Ordovician of Tungus basin in cooperation with Leho Ainsaar, Peep Männik and Tõnu Meidla. Studies of extraterrestrial chromates in the Darriwilian sections of St. Petersburg region and Siberia together with Birger Schmitz are also in the agenda as well as investigation of the Ordovician trace fossils in cooperation with Radek Mikuláš and Dirk Knaust. Together with Axel Munnecke, I am working on the unique Middle Ordovician Moyeronia-Angarella buildups from the Tungus basin. For the next year, we are planning an expedition to the Moyero River section a remote but most complete and well exposed Ordovician section in the entire Siberian platform. We are also starting preliminary preparations for the 13th International Symposium on the Ordovician System, to be held in July 2019 in Novosibirsk.

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Jan Ove R. EBBESTAD (Sweden) is involved in a number of studies of Ordovician gastropods and tergomyans from peri-Gondwana settings, collaborating mainly with Bertrand Lefebvre (Lyon) and Juan Carlos Gutierrez-Marco (Madrid). Work on the Ordovician Boda Limestone of the Siljan area has been done in collaboration with a number of colleagues, e.g. Björn Kröger (Helsinki), Anette Högström (Tromsø), Åsa Frisk (Uppsala), Tõnu Martma (Tallinn), Dimitri Kaljo (Tallinn), Helje Pärnaste (Tallinn), Yutaro Suzuki (Shizuoka) and Alexander Gubanov (Uppsala).

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Cole EDWARDS (USA) is working on Ordovician stable and radiogenic isotope stratigraphy. I am continuing a post-doc with David Fike at Washington University in St. Louis on high-resolution sulfur isotope stratigraphy of the Lower-Middle Ordovician. This is a continuation of our carbon isotope research of the Early-Middle Ordovician where we continue to explore the link between oxygen levels, the end of persistent ocean anoxia in shelf environments (published with Matt Saltzman, Jonathan Adrain, and Steve Westrop in *Geology* this year), and the onset of the Great Ordovician Biodiversification Event. We expanded this research to include the sulfur isotope record and presented an abstract at the annual GSA meeting in Baltimore, along with David Fike, comparing the timing of isotopic excursions and trilobite extinctions. This paired carbon-sulfur isotope research has expanded to include portions of the Late Ordovician in collaboration with Seth Young, Ben Gill, and Steve Leslie (*in press* in the Ordovician Special Volume in *Palaeo3*), as well as using paired carbonate and organic carbon isotope stratigraphy with Matt Saltzman (also published in the same *Palaeo3* special volume). Currently I am working on a project with Dana Royer to model atmospheric oxygen in order to compare how the timing of oxygenation may be linked with biodiversification. Lastly, I am continuing collaborative work with Matt Saltzman, Steve Leslie, Walt Sweet, and David Fike on conodont apatite oxygen isotopes as a paleotemperature proxy where we are using the Cameca 7f/geo Secondary Ion Mass Spectrometer (SIMS) at Washington University to analyze high-resolution, in situ measurements of $d^{18}O$ in Ordovician conodonts.

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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 of Canada. A paper on the identification of Hirnantian strata in these basins has been published in *Canadian Journal of Earth Sciences*.

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). A paper on the morphometrics and palaeoecology of *Agetolites* from South China is being published in *Alcheringa*.

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Frank ETTENSOHN (U.S.A.) continues to work in three different areas of Ordovician geology. With my graduate students, I continue to work on depositional environments and seismites in the Upper Ordovician Lexington Limestone. With other colleagues, I also continue to work on the influence of Laurentian Ordovician tectonics in the deposition of Ordovician black shales, like the Utica and its equivalents, in the Appalachian foreland basin. On a third front, I am working with colleagues in China on the Ordovician stratigraphy and depositional settings of the South China craton.

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David H. EVANS (U.K.) is currently preparing a description of the cephalopod faunas from the Middle Ordovician Gehli Formation of northeastern Iran. I am also completing a study of the modes of occurrence, distribution and composition of a range of cephalopod assemblages occurring in the latest Katian (K4) strata of northern England. Additionally I am in the process of preparing a monograph of the Late Ordovician cephalopod faunas of England and Wales. This is a couple of years off completion.

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Ru FAN (China) continues working on Ordovician and Cambrian integrated stratigraphy, especially on conodonts and carbon isotope chemostratigraphy from the Upper Yangtze Platform in South China and the Ordos Basin in North China. I had the opportunity to have great cooperation with Prof. Stig M. Bergström, and we published a paper in *PALAEO3* on the early Katian GICE and related conodonts in South China.

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Oldřich FATKA (Czech Republic) in cooperation with Petr Budil continues in study of exceptionally preserved fossils (frozen behaviour, soft-part preservation) of Cambrian and Ordovician trilobites and other invertebrates from Gondwana (Czech Republic, China, Morocco). Together with PhD students I continue also in study of morphology and ontogeny of trilobites and agnostids (with Lukáš Laibl), and echinoderms (with Martina Nohejlová).

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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 Arabian 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 *Birkfeldia* is a senior synonym of *Gamachignathus* and *Notiodella* a junior synonym of *Icriodella*. Application of the recently introduced Baltic $\delta^{13}\text{C}$ isotope zonation to a composite North American Darriwilian through Hirnantian succession shows that in most intervals there is good trans-Atlantic agreement not only between the isotope zones but also with the available biostratigraphic (conodont and graptolite) data. This study, recently published (Bergström, Saltzman, Leslie, Ferretti & Young), indicates that this isotope zonation is a useful tool for improving previously uncertain long-distance correlations. Study of new conodont material from the Portrane Limestone (Ireland), recently described by Ferretti, Bergström & Sevastopulo (2014), is currently going on as well. A revision on the significance of conodonts

in Ordovician chronostratigraphy has been recently submitted (Bergström & Ferretti). Finally, formal lithostratigraphic units have been proposed for the Ordovician of the Carnic Alps by a team-group coordinated by Hans Peter Schönlaub.

The session “The contribution of fossils to chronostratigraphy, 150 years after Albert Oppel” (with M. Balini, S. Finney and S. Monechi) has been recently held at the 2nd International Congress on Stratigraphy-STRATI 2015 (Graz, Austria). The 150th anniversary of the death of A. Oppel has provided the opportunity to celebrate this outstanding stratigrapher with a session dedicated on fossils in the modern chronostratigraphy. A thematic set of papers arising from the STRATI-2015 Symposium will follow as a Special Issue to be published in *Lethaia*. The volume is comprehensive of several Ordovician papers and will provide a good opportunity to unravel significance and importance of this time interval.

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Stanley C. Finney

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Richard FORTEY (UK) is *emeritus* at the Natural History Museum, London. He is continuing research on trilobite faunas from Oman and Morocco. A multi-authored paper on the Middle Ordovician Amdeh Formation in the Sultanate of Oman is completed, and includes well preserved phosphatised material of the little known - and hitherto Chinese - trinucleid *Yinpanoplithus*. The Moroccan work includes another trinucleid of late Ordovician age which is probably the largest species of the family yet discovered.

Richard Fortey

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Franziska FRANECK (Norway) finished her Master’s thesis on the sedimentology, sequence stratigraphy and carbon isotope analysis of the Late Ordovician (Hirnantian) Langøyene Formation in the Oslo Region in summer 2015 under supervision of Johan Petter Nystuen, Ivar Midtkandal (both University of Oslo) and Hans Arne Nakrem (Natural History Museum, Oslo). She found an incised valley system with three major unconformities, which are correlated with glacioeustatic sea-level lowstands. The results of her Master’s theses are planned to be published in 2016.

In January 2016, Franziska started as a PhD candidate at the Natural History Museum in Oslo under supervision of Lee Hsiang Liow. In collaboration with Seth Finnegan

(University of California, Berkeley), Melanie Hopkins (American Museum of Natural History) and Björn Kröger (University of Helsinki), she plans to contribute new research to ecological and sedimentological aspects of the Great Ordovician Biodiversification Event.

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Robert GANIS (USA) is working on structural, stratigraphic, & biostratigraphic definition of the Appalachian Great Valley clastic sequences involving the Martinsburg, Cocalico, & Dauphin formations of Pennsylvania. Graptolite collecting in the Martinsburg Formation (Sandbian-Katian) has identified undescribed problematic fossils currently under study with Michael Meyer (Carnegie Institution for Science, Washington DC) & Jan Zalasiewicz (University of Leicester, UK).

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Mansoureh GHOBADI POUR (Iran) is currently working on various aspects of the Ordovician biostratigraphy and faunas of Central Asia and the Middle East. Ongoing research is focused on substantial revision of lithostratigraphy and biostratigraphy of Central Iran, Alborz Range and Kopet-Dagh which is carried out in cooperation with Leonid Popov, Javier Alvaro, and Mohammad Kebria-ee Zadeh and other colleagues. Papers on the Lower to Middle Ordovician trilobite faunas of Deh-Molla section in Alborz and on the Katian trilobites from raphiophorid and olenid biofacies of West Balkhash Region in Kazakhstan will be completed later this year.

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David A.T. HARPER (UK) is continuing research on Ordovician stratigraphy and faunas in China, Scotland, Ireland, Greenland and Scandinavia. Work continues on the Ordovician of southern Tibet and Xinjiang with Zhan Renbin (Nanjing), Liu Jianbo (Beijing), Lars Stemmerik and Svend Stouge (Copenhagen); a paper on conodonts from the Everest Range is near completion. Involvement with identification of the causes of the GOBE (with Christian Rasmussen) and the End Ordovician extinction (with Seth Finnegan and Christian Rasmussen) continues, with a recent paper in *Scientific Reports* on the former and a paper in press, *Philosophical Transactions, Royal Society*, on the latter. A major review of the

Hirnantia and related faunas in the east Baltic was published in *Palaeo*³ and a monograph on the Ordovician brachiopod faunas of Tramore, SE Ireland (lead author Maria Liljeroth) is in review. Lastly a 'final' part of A.D. (Tony) Wright's Portrane monograph is near completion, co-authored with Robin Cocks.

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Thomas HEARING (UK) is continuing work from his master's thesis (University of Oxford, 2014) on a new Ordovician deposit containing exceptionally preserved fossils from the Darriwilian Llanfallteg Formation of South Wales, UK. This is a collaborative project, orchestrated by the late Martin Brasier, and involving Joe Botting, Lucy Muir, David Legg, Patrick McDermott and Ced Conolly. There have been two recent publications on this site and work is ongoing. Thomas is currently working towards a PhD at the University of Leicester investigating the marine environment of the Cambrian metazoan adaptive radiation.

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Linda HINTS (Estonia) continues studies on Upper Ordovician brachiopods and stratigraphy in the East Baltic. Special attention is paid on the Sandbian-Katian boundary interval in the region.

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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 taxonomy, paleobiogeography and diversification history of Palaeozoic jaw-

bearing polychaetes. A discovery on latest Ordovician scolecodonts from Anticosti was presented at the IGCP 591 together with André Desrochers and a paper will be published in 2016 in *Canadian Journal of Earth Sciences*. Work is in progress with other new collections of Ordovician scolecodonts, notably from Baltoscandia, US and Siberia. Together with Liina Paluveer, Jaak Nõlvak and Viiu 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. Data on Baltic chitinozoans, including publications, SEM images, occurrence data etc, have been assembled and is made available at <http://chitinozoa.net>. Since 2015 Olle is involved in a project with Tõnu Martma and Heikki Bauert (Estonia), focusing on carbon isotopes of the Ordovician-Silurian succession. New data from the GICE interval and from the Llandovery has been collected and will be presented in 2016.

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Warren HUFF (USA) continues to work on K-bentonites of all ages. For the Ordovician, Andrei Dronov and I and several of his colleagues have been studying a succession of explosive volcanic events in the Upper Ordovician of the Siberian Platform. Eight individual K-bentonite beds have been identified in the Baksian (three beds), Dolborean (three beds), Nirunda (one bed) and Burian (one bed) regional stages, which correspond roughly to the Upper Sandbian, Katian and probably lowermost Hirnantian Global Stages. All of them are represented by thin beds (0.3-2 cm) of soapy, light gray or yellowish plastic clays that are usually easily identifiable in the outcrop. Some of the beds in the Dolborean regional stage were traced in more than one outcrop along the Bolshaya Nirunda and Nizhnaya Chunku River valleys. All K-bentonite beds have been studied by powder X-ray diffraction and scanning electron microscopy together with energy dispersive X-ray analysis. The Dolborean K-bentonites from the Nizhnaya Chunku River valley and the Burian K-bentonite are very typical with regard to their clay mineralogy. The Dolborean K-bentonite beds from the Bolshaya Nirunda River valley and the Nirundian K-bentonite from the Nizhnaya Chunku River valley have a slightly different clay mineralogy dominated by illite. But these beds are in close proximity to the Triassic basalt sills of about 200 m thick, and the heating effect of these volcanic bodies could likely have converted the smectite component to illite. All the studied beds seem to represent very distal deposits because they have very little in the way of volcanic phenocrysts in them. Nevertheless, all of them contain volcanogenic apatite phenocrysts and euhedral zircon crystals, which are now in the process of $^{206}\text{Pb}/^{238}\text{U}$ age dating. The studied K-bentonites provide evidence of intensive explosive volcanism on or near the western (in present day orientation) margin of the Siberian craton in Late Ordovician time. The timing of volcanism in the Ordovician of Siberia is surprisingly close to the period of volcanic activity of the Taconic arc near the eastern margin of Laurentia. It seems logical, therefore, to propose that there was a continuation of the Taconic arc along the western margin of Siberia as a united Taconic-Yenisei volcanic arc. Following our publication of our initial results in 2014 (*Estonian Journal of Earth Sciences* v. 63(4), p. 244-250) we updated our findings at the 2015 Euroclay Conference in Edinburgh. In addition, I recently published a review paper on K-bentonites, which is devoted partly to Ordovician occurrences.

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Hadi JAHANGIR (Iran) is a Ph.D student at Ferdowsi University in Mashhad, with interests in conodonts of Cambrian to Silurian age from Iran. Currently I am working on the Cambrian (Furongian) to Middle Ordovician (Darriwilian) biostratigraphy and conodonts of Albers and Kopet-Dagh Regions, northern Iran. I am also involved in the studies of the Ordovician – Silurian boundary beds in Kuh-e Soluk Mountains south of Bojnurd, Kopet-Dagh in cooperation with Mansoureh Ghobadi Pour and Leonid Popov.

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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 the *Estonian Journal of Earth Sciences*. The second part of a special issue of this journal devoted to IGCP 591 annual meeting in Estonia in 2014 was published as No 1, 2015 including 21 short papers and a preface by Guest Editors Kathleen Histon and Živilė Žigaitė. I am glad to acknowledge their great contribution into the publication.

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Tarmo KIIPLI (Estonia) worked on geochemistry and correlation of Ordovician bentonites. A Ph.D project by Sven Siir was supervised, together with Alvar Soesoo – the thesis entitled “Internal Geochemical Stratification of Bentonites (Altered Volcanic Ash Beds) and its interpretation” was defended in August 2015 and may be viewed at <http://digi.lib.ttu.ee/i/?3043>

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Petr KRAFT (Czech Republic) continues his studies in the Prague Basin, Czech Republic. After two years I finished extensive field works in the Dobrotivá Formation under the project of the West Bohemian Museum aimed at the research of paleontological localities in the Ordovician of the south-western Prague Basin. I also continue my collaborations focused on graptolites with several colleagues.

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Björn KRÖGER (Finland). My work is focused on the evolution of Ordovician reef ecosystems. Currently, additionally, I built and compile a large stratigraphic database covering all names of Ordovician stratigraphic units and their relations (should be published in 2016). I continue my systematic and paleoecological work on Paleozoic cephalopods. Ongoing cooperative projects with Melanie Hopkins (USA), Seth Finnegan (USA), Lee Hsiang Liow (Norway), Linda Hints (Estonia), Jan Ove Ebbestad (Sweden), Andrej Ernst (Germany), Oliver Lehnert (Germany), and Martina Aubrechtova (Czech Republic).

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Stephen LESLIE (USA) is primarily working on Middle and Late Ordovician conodont biostratigraphy and integrating the biostratigraphy with studies of Ordovician paleoclimate change. Last year was a busy year hosting the 12th ISOS at James Madison University. Steve is continuing his work with Achim Herrmann (Louisiana State University), Ken MacLeod & Page Quinton (University of Missouri) testing the early Late Ordovician cool water carbonate hypothesis in the North American Midcontinent using oxygen isotopes from conodont apatite. A project with Matt Saltzman (The Ohio State University) related to Sr and Nd isotope stratigraphy of the Ordovician, particularly focused on the continuity of deposition through the Darriwilian and early Sandbian in the Central Appalachians was completed last year. This work was collaborative with Stig Bergström (The Ohio State University), John Repetski (USGS) and Seth Young (Indiana University). Steve continues his work with Dan Goldman (University of Dayton) integrating graptolite and conodont biostratigraphy in dark shale successions. Steve is also working with Mike Pope (Texas A & M) on Late Ordovician

– Early Silurian sequence stratigraphy and conodont biostratigraphy in the Northwest Territories. Other projects include helping Paul Myrow with conodont control on projects in Inner Mongolia and India, and working with Carlton Brett, Jessie Carlucci, Steve Westrop and Dan Goldman.

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Lixia LI (China) is currently a postdoctor in NIGPAS, Nanjing, working on 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 are also doing some comparisons between fossils and living sponges.

Lixia LI

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Qi-jian LI (China) is working on Ordovician reefs and hypercalcified sponges (e.g. calathids, stromatoporoids and sphinctozoans). In 2015, I finished my Ph.D thesis on the Ordovician Radiation in reef ecosystems at the University of Erlangen-Nürnberg. I have recently returned to China, and am now working at Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences.

In 2016, complete taxonomic studies of the calathids from Tarim and South China will be carried out. With the quantitative data collected from the field, further investigation of the late Katian reef from southeast China will be conducted. I am also involved into investigation of the Silurian reefs of South China in cooperation with Dr. Emilia Jarochowska and Prof. Axel Munnecke.

Qi-jian LI

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LIANG Yan (China) is working on Ordovician chitinozoans. In the first half of 2015, I was concentrating on my PhD thesis which was focused on the Early and Middle Ordovician chitinozoans of South China. I obtained my doctoral degree in July and now I am working as an assistant researcher at the Nanjing Institute of Geology and Palaeontology. In the second half of 2015, I continued my research on the Early and Middle Ordovician chitinozoans, trying to reveal the biodiversity patterns and to establish the chitinozoan biostratigraphy during this period of South China. During 2015, two papers have been published with my colleagues and three manuscripts have been prepared based on my PhD thesis. Also, I attended some relevant symposiums and conferences last year which inspired me a lot.

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Alfredo LOI (Italy) is working on: 1) Characterization of sources areas of terrigenous inputs and palaeogeographic reconstructions using discriminatory elements of magmatic rocks (eg zircon) were investigated and applied to various areas of North Gondwana (e.g. Sardinia, Armorican Massif); 2) Reevaluation of eustatic variations in different time scales for the North Gondwana with an original approach based on very high frequency sequence analysis combined with a backstripping procedure on Middle to Upper Ordovician successions of the Armorican Massif (France) and the Anti Atlas (Morocco); 3) Gamma ray facies characterization within Ordovician depositional sequences. In the shoreface sequences, the distribution of heavy minerals between progradation and retrogradation phases allowed to establish a predictive depositional model and to validate the temporal significance of placers deposits.

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Elena V. LYKOVA (Russia) is working on Ordovician graptolites from Gornyy Altay (South of West Siberia).

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Jörg MALETZ (Germany) is working on a number of projects, including the ‘Graptolite

Treatise Project' for which two chapters have been published in 2014 and 2015 and another three have been submitted to the Treatise editors in 2015. The work on a book on Graptolites for the 'Topics on Palaeobiology' Series (Ed. Michael J. Benton) is finished and the book is in production now. Research on Cambrian and Ordovician pterobranchs is in progress in a project financed 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).

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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 the 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 together 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 going on.

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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. It has been a busy year finding a replacement for the conodont/foram lab technician who retired in 2014, getting a new conodont Post-Doc (Sofie Gouwy) settled (and a new Post-Doc in Mesozoic-Cenozoic forams, Lisa Neville), and continuing management duties as leader of GSC's PaleoLabs.

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Ana MESTRE (Argentina) continues working in cooperation with Dra. Susana Heredia on biostratigraphy, taxonomy and palaeoecology of Darriwilian conodonts, especially on the taxonomy of the genera *Lenodus* and *Eoplacognathus*, as well as on conodont-based high-resolution stratigraphy of the Argentine Precordillera. Also, I am interested on sequence stratigraphy and evolution of the Ordovician and Silurian sedimentary Precordillera basin. Together with Dra. Josefina Carlorosi we started developing a collaborative project about comparison and correlation of the Floian conodonts from Argentine Precordillera and Eastern Cordillera.

Dra. Ana Mestre

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Tatiana L. MODZALEVSKAYA (Russia) continues to work on Upper Ordovician and Silurian brachiopods from various locations in Kotel'ny Island (Novosibirsk Islands, Arctic Russia). My research mainly focuses on brachiopod taxonomy and biostratigraphy and comparison with other Arctic regions.

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Axel MUNNECKE (Germany) is currently working on Ordovician and Silurian carbonate microfacies and chemostratigraphy in different areas, and I am especially interested in the biological response(s) to the pronounced climatic changes that took place during this time interval. Furthermore, I am organising an annual international course on carbonate microfacies ("Flügel Course") in Erlangen (Germany) which includes a lot of Palaeozoic examples. If somebody is interested please drop me an E-mail as soon as possible (the course is usually booked out months in advance). Information can be found at: www.gzn.fau.de/en/palaeontology/events/fluegel-course/ or on Facebook at: <https://www.facebook.com/fluegelkurs/>

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Diego Fernando MUÑOZ (Argentina) is a postdoc student at Centro de Investigaciones en Ciencias de la Tierra (CICTERRA - CONICET and Universidad Nacional de Córdoba), working on Lower Ordovician deposits of NW Argentina. He was studying systematics, taphonomy, diversity and palaeogeography of brachiopods and he's beginning to study trace fossils in the same deposits. He has published with colleagues about linguloidean brachiopods and biostratigraphy based on trilobites and graptolites. A publication about plectorthoidean brachiopods is in press. A revision of the genus *Lipanorthis*, which is present in Tremadocian and Floian deposits of the Santa Victoria Group, is in the final stages of preparation. More results (taphonomy, diversity, palaeogeography, ontogeny) from his PhD will be send to publication in the near future.

Diego F. Muñoz

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Elise NARDIN (France) is working on the investigation of faunal dynamism and ecological adaptations as major factors of the Early-Middle Palaeozoic biodiversifications. The first approach is the investigation of the functional morphology of echinoderms (blastozoans and crinoids) during the Paleozoic and the ecological interactions of these echinoderms with the other benthic fauna. The second approach is the question of the impact of the paleogeography and the environmental factors on the diversity dynamics of Paleozoic fauna (collaboration B. Lefebvre (Univ.-Lyon, France), M. Aretz (Univ.-Toulouse, France) Y. Donnadiou (LSCE, France). The biodiversification constraints are also investigated by global earth modeling to reconstruct marine environment, paleoclimate variations, paleobioproductivity and boundary conditions of anoxic events (collaboration with G. Dera and Y. Goddérís (Univ.-Toulouse, France), Y. Donnadiou (LSCE, France), E. Pucéat (Univ. Dijon, France), and G. Le Hir (IGCP, France)), and their impact on the dynamics of the marine life.

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Arne NIELSEN (Denmark) has for a number of years worked mainly in the Cambrian, but is slowly approaching the Ordovician again! During my "exile" in the Cambrian, I have, however, participated in a various research projects on the Ordovician, for instance including drilling the Ordovician succession on the Island of Bornholm, eastern Denmark. Together with post-doc Christian M.Ø. Rasmussen (also SNM) I am currently working on high-resolution scanning of Ordovician shales, based on drill-cores from Scania, southern Sweden. We hope to constrain climatic changes. Also, I am coordinator on a revision of Ordovician

stages in Scandinavia, but progress is slow. My key interest is still in sea-level changes, Ordovician as well as Cambrian.

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Godfrey S. NOWLAN (Canada) has no research activities to report but retains an interest in Ordovician geology. Please note my new e-mail address: godfrey.nowlan@canada.ca.

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Olga T. OBUT (Russia) continues investigation of Ordovician radiolarians and conodonts from Gorny Altai (South of West Siberia), Russia and biostratigraphy of Lower Paleozoic of Siberia.

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Alan OWEN (UK) is continuing his investigations of the Ordovician biodiversification in general and of deep water faunas in particular. Significant progress should also be made over the coming year on the description of Upper Ordovician trilobites from South Wales with Patrick McDermott (St Clears, South Wales) and Lucy McCobb (National Museum of Wales) as should the preparation of further papers on trilobite eyes with Martin Lee (Glasgow) and former research student Clare Torney (now with Historic Scotland).

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Ian PERCIVAL (Australia) has relinquished his position as the Palaeontologist for the Geological Survey of NSW after 20 years, and is now in semi-retirement, on contract for the next three years but mostly using up my long-service leave on half-pay. My colleague Yong Yi Zhen was successful in the competitive application process for this role, which ensures that the palaeontological position (now a rarity in Geological Surveys in Australia) is not lost.

Ian participated in two international conferences (7th International Brachiopod Congress held in Nanjing in late May, followed almost immediately by the 12th International Symposium on the Ordovician System at James Madison University in Harrisonburg, Virginia, USA in June), and helped organize a local conference for the Linnean Society of NSW on the Natural History of the Belubula River Valley (which includes the Ordovician succession of the Cliefden Caves area, under threat of flooding if a proposed dam is built on the river). I was also heavily involved in background work to get the NSW State Fossil Emblem proclaimed (it is the Devonian fish *Mandageria fairfaxi* from the Canowindra area). Current research centres on Cambrian, Ordovician and Silurian brachiopods, Ordovician and Silurian conodonts, Ordovician graptolites from NSW, and regional stratigraphic studies mainly in the Ordovician of eastern Australia and South China. I also continue to edit *Ordovician News* and *Nomen Nudum* (the latter is the annual newsletter for the Association of Australasian Palaeontologists).

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Teresa PODHALAŃSKA (Poland) studies the Ordovician and Silurian deposits to locate the prospective areas and stratigraphic horizons of the unconventional hydrocarbon accumulations. Stratigraphic examination of mudrock facies based on graptolites make a valuable contribution in this context.

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Marika POLECHOVÁ (Czech Republic) is working on the Ordovician bivalves and rostroconchs, their systematics, palaeoecology and palaeobiogeography and has published an article about the youngest *Ribeiria* from the Upper Ordovician of Bohemia.

RNDr. Marika Polechová PhD.

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Leonid POPOV (United Kingdom) continues to work on general aspects of the Ordovician brachiopod faunas focusing on taxonomy, biostratigraphy and biogeography. There is a good progress in revision of the Katian brachiopod faunas from the Ishim Region (Kalmykkol-Kokchetav terrane of Kazakhstan), the Late Katian faunas of Zerafshan Range (in cooperation with Irina Kim and Mansoureh Ghobadi Pour) and the Darriwilian brachiopods of northern Iran (in cooperation Mansoureh Ghobadi Pour and Mohammad Kebria-ee Zadeh. Significant revisions of the Katian faunas of Zagros Ranges made in cooperation with M. Ghavidel-Syooki, D.H.Evans, M. Ghobadi Pour, J.J. Álvaro, U. Rakhmonov, I.A. Klishevich, and M.D. Ehsani, were recently completed and published.

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Page **QUINTON (USA)** has continued to work on stable oxygen and carbon isotope research in the Ordovician. In a collaborative project with Stephen Leslie, Kenneth MacLeod, and Achim Herrmann we are using stable oxygen isotopes from conodont elements to test the 'cool-water' interpretation of early Katian carbonates. In another project with Kenneth MacLeod, James Miller, and Ray Ethington we are using conodont elements to constrain Early Ordovician sea surface temperature trends. I will be defending my dissertation in April and will be moving to upstate New York where I have accepted a faculty position at SUNY Potsdam.

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John E. REPETSKI (USA) reports his Ordovician work continued to be chiefly on conodont biostratigraphy, CAI and systematics, USA and elsewhere, with numerous colleagues: compiling CAI maps and biostratigraphy of [oil- & gas-rich] black shales in eastern U.S. basins; biostratigraphic support for USGS and other mapping projects; paleobiogeographic studies relating North American Lower Paleozoic faunas to those of other paleocontinents; conodont studies of impact structures; also age-dating of faunas and studies of Cambrian and Ordovician phosphatic problematica.

During 2015, much [welcome] time and energy were spent related to the ISOS meeting in the U.S. and with the pre-meeting Cambrian-Ordovician field trip associated with the Geol. Soc. America annual meeting in Maryland.

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Sergey ROZHNOV (Russia) is working on the Ordovician echinoderms from St-Petersburg region and Estonia. Two papers on this topic will be published in 2016: «Aboral Nervous System of Two Baltic Ordovician Crinoids: Reconstruction and Comparison of *Pentamerocrinus* Jaekel and *Grammocrinus* Eichwald» (Paleontological Journal, N 2) and «Revision of *Scoliocystis* (Rhombifera: Echinoencrinitidae) and Associated Cystoids» with C.R.C. Paul. Some crinoids from Upper Ordovician of Estonia are being worked on together with Linda Hintz. I have interesting results on typical hardgrounds of Volkhov regional stage (St-Petersburg area). This hardground has revealed the structure and dolomitization typical of mineralized cyanobacterial films. The paper about cyanobacterial origin and morphology of the Volkhov hardgrounds (Dapingian, Middle Ordovician) of the St. Petersburg Region (Russia) is in progress.

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Artur Abreu Sá (Portugal) is working on Ordovician stratigraphy and paleontology of Portugal and Spain, in collaboration with Juan Carlos Gutiérrez-Marco, Isabel Rábano, Diego García-Bellido, Carlos Meireles, and Nuno Vaz. His work is also focused in the 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. He is currently the Scientific Coordinator of the Arouca Global Geopark of UNESCO, President of the Portuguese National Committee for the International Geoscience Programme (IGCP-UNESCO) and Chair of the UNESCO theme “Geoparks, Regional Sustainable Development and Healthy Lifestyles”.

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Matthew SALTZMAN (USA) continues working on stable (C, S) and radiogenic (Sr, Nd) isotope stratigraphy. A collaborative project with Steve Westrop, Jonathan Adrain and Cole Edwards has looked at the base Stairsian (Tremadocian) biomere boundary and carbon isotope excursion. This carbon isotope work from Ibex, Utah and Shingle Pass, Nevada was published this year in *Geology*, and also included a small sulfur isotope dataset from Shingle Pass that Cole Edwards worked on for his PhD. Cole Edwards (a postdoc at Washington Univ in St Louis with Dave Fike) also published a paper in *GSA Bulletin* on Sr isotopes in Ordovician bulk carbonate rock that compares results with those obtained from conodont apatite in the same sections (the conodont Sr work was published in last year in *GSA Bulletin* v. 126, p. 1551-1568). Cole and I were helped in these Sr isotope studies by Steve Leslie, Stig Bergström, Seth Young, Alexa Sedlacek, Jeff Bauer, and others. Following up on the C and S isotope studies, collaborative efforts with Ben Gill and Sarah Pruss are planned. A project is underway with Alycia Stigall and Jesse Carlucci on Middle Ordovician brachiopod evolution in North America and comparisons to Baltoscandia. Our efforts continue in collaboration with Olle Hints and colleagues in Estonia to use Sr isotope stratigraphy on conodont apatite to correlate USA and Estonia sections. Work is nearly complete on a co-edited Special Volume of *Palaeo*³ together with Tom Algeo and Pedro Marengo. This Special Volume on Ordovician climate, biogeochemistry, and the biosphere will be published by the middle of 2016 we hope. Currently all but one of the papers is available in the 'in press' section of *Palaeo*³ on ScienceDirect, including a paper by Seth Young, Ben Gill, Cole Edwards, myself and Steve Leslie on Middle Ordovician S-isotopes (doi:10.1016/j.palaeo.2015.09.040) and a paper by Cole Edwards and I on organic carbon isotopes (doi:10.1016/j.palaeo.2015.08.005)

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Nikolay V. SENNIKOV (Russia) continues investigation of the regional Ordovician zonal stratigraphy of Siberian regions - Gorny Altai, Salair, Siberian Platform and others. Graptolite zonation was aligned with conodont and chitinozoan ones (in collaboration with Tatyana Tolmacheva, Olga Obut, Elena Lykova and Nadya Izokh). We continue improvement of the regional stratigraphic charts for Ordovician of the different Siberian regions. All-Russian Stratigraphic Committee has improved the following charts for the official use: Ordovician of the western part of the Altai-Sayan Folded Area, Ordovician of Tuva and Ordovician of the West Sayan. Along with Ordovician graptolites I study Middle Cambrian Pterobranchia. In collaboration with Estonian colleagues L. Ainsaar and T. Meidla we investigated isotope Carbon excursion in Upper Ordovician strata of the Gormy Altai (HICE event).

We started to prepare Ordovician sections of the Gorny Altai for the future geological excursion in the framework of the 13th International Symposium on the Ordovician System, to be held in Siberia in July 2019.

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Thomas SERVAIS (France) is a research director of the French CNRS, and now no longer head of department: the palaeontological team of Lille moved from Earth Sciences to Environmental and Ecological Sciences, to be a part of the new ‘Evo-Eco-Paleo’ department at Lille University (UMR 8198 CNRS). Research and publications in 2015 were already very much palaeoecological, and focused on two major ‘ANR’ projects that are now completed (with several special issues in *Rev Palaeobot Palyn* and *Palaeo3*): (1) the terrestrialization process, including the evolution of land plants (with first cryptospores and miospores in the Ordovician) and their impact on the marine biosphere, the pCO_2 and the pO_2 ; (2) the Cambrian-Ordovician radiation and the evolution of marine trophic webs, including the analyses of the Fezouata Biota (Anti-Atlas, Morocco), an Early Ordovician Burgess Shale-type Lagerstätte. Hendrik Nowak concluded his PhD in the frame of this project and published several papers, including the analysis of the Cambrian dataset of acritarchs, in order to decipher the dynamics of the phytoplankton from the Cambrian Explosion to the onset of the Great Ordovician Biodiversification Event (GOBE). Future studies should focus on the the origin of the GOBE (partly in the Cambrian). A new IGCP project has been proposed on the subject together with Dave Harper, Olga Obut, Christian Rasmussen, Alycia Stigall, and Zhang Yuandong. We are very pleased that this project, IGCP 653, was successful in its evaluation (see details elsewhere in this newsletter). Thomas is currently a vice-president of the International Paleontological Association (IPA) and past-president of the International Federation of Palynological Societies (IFPS).

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Lawrence SHERWIN (Australia) has retired from paid work but remains with the Geological Survey as an Honorary Research Associate. Work is proceeding slowly on Katian-Hirnantian graptolite faunas from the Forbes district and Katian graptolites from the Yass area of New South Wales.

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Christopher STOCKER (UK) is currently studying towards a PhD at the University of Leicester, entitled “The palaeobiogeographical significance of the Silurian trilobite faunas of Japan”, supervised by Mark Williams and Jan Zalasiewicz of the University of Leicester (external supervisors are Derek Siveter and Phil Lane of Oxford University Museum of Natural History and Keele University respectively). He is also Leverhulme Project Administrator for the project “Assembling the early Palaeozoic terranes of Japan”. This aims to enhance palaeogeographical reconstructions for the early and mid Palaeozoic of Japan. The main element of my work is concerned with Silurian and Devonian trilobite taxonomy, biogeography and biostratigraphy. However, as part of a broader Leverhulme Trust-funded project that encapsulates the trilobite work, we have also sampled Ordovician strata in central and southern Japan for chitinozoans, in conjunction with Thijs Vandenbroucke of Ghent University.

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Justin STRAUSS (USA) is working on Cambrian-Ordovician strata in Alaska, USA, and Yukon and Northwest Territories, Canada. Over the past few years, I have been collaborating with John Taylor (IUP) and John Repetski (USGS) to refine the sedimentological, chemostratigraphic, and biostratigraphic records of key northwestern Laurentian localities, including Jones Ridge in east-central Alaska. This work has been expanded over the past year with collaborators Erik Sperling (Stanford) and Tiffani Fraser (YGS) to develop a better regional stratigraphic framework for Cambrian-Ordovician platformal and basinal strata throughout Yukon (e.g., Bouvette Formation, Road River group, etc...). I have also been working on a similar project in the northeastern Brooks Range, where we are close to finishing a major project on refining the trilobite and conodont biostratigraphy of the Nanook Limestone. These projects aim to understand the paleogeography and depositional history of NW Laurentia and make direct comparisons to nearby and far-field accreted terranes (e.g., Arctic Alaska, Farewell, etc...).

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Zardasht A. TAHA (UK) is a PhD student in the Department of Geology, University of Leicester, UK, working on the ostracods of the Late Ordovician Ellis Bay Formation of Anticosti Island, eastern Canada. I am examining the environmental ranges of the ostracods to determine their environmental response to end Ordovician environmental change. The goals of my study also include the detailed systematic analysis of the ostracods and the identification of their biogeographical significance. My thesis team comprises Mark Williams, Jan Zalasiewicz and David Siveter in Leicester, Tõnu Meidla in Tartu, and Vincent Perrier in Lyon.

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John TAYLOR (USA) continues to study Cambrian and Early Ordovician faunas in various areas of Laurentian North America to refine their biostratigraphic and paleobiogeographic utility. Having retired on January 8, 2016, he finds himself with more time for research than he has enjoyed since his graduate student days in the early 1980's. With no classes or committee duties, he is making splendid progress on several projects that involve Tremadocian trilobites and agnostoid arthropods, conodonts (with John E. Repetski), and brachiopods (with Rebecca Freeman). Basal Tremadocian (*Symphysurina* Zone) faunas from the Jones Ridge Limestone in easternmost Alaska are proving far more diverse and endemic than previously appreciated, and their description has drawn him back to large collections from that zone collected in previous projects in Montana, Wyoming, New Mexico, Texas, and Utah. Younger Tremadocian (Stairsian and Tulean Stages) faunas from the Nanook Limestone in northern Alaska have done likewise, returning him to work begun years ago on faunas of the old *Bellefontia*, *Paraplethopeltis*, and *Leiostrigium* Zones in the Appalachians and across the western USA. Despite his "retired" status, he continues to entrain undergraduate students in these projects. Savannah Irwin is assisting with the work on *Symphysurina* and the description of Stairsian faunas from New Mexico, while Wes Kamerer is driving the work on agnostoids from Jones Ridge and elsewhere. Chas Cavalotti recently joined the Paleontology-Stratigraphy research group to work on basal Stairsian taxa from the Nannook Limestone and (perhaps) age-equivalent faunas in the Stonehenge Formation in Pennsylvania. Aaron Voegtle has been working diligently since January on agnostoid- and olenid-dominated collections under study (with James D. Loch) from the Windfall and Goodwin Formations in the Antelope Range in Nevada. The Goodwin collections are from strata very low in the Stairsian Stage. Paul Myrow and Justin V. Strauss continue to collaborate in the all the aforementioned projects, collecting the sedimentological and geochemical data to be integrated with the biostratigraphy.

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Tatiana TOLMACHEVA (Russia) continues to work on Ordovician conodonts from different parts of Russia and is involved in research projects concerning litho- and sequence stratigraphy, tectonic and paleodynamic reconstructions of Central Asia and Siberia in the Ordovician (with Andrei Dronov, Alexander Alekseev, Kirill Degryarev). An updated regional stratigraphic scheme of the Timano-Pechora region of the East European Platform and Northern Kazakhstan (with Kirill Degryarev and Olga Nikitina) is in preparation.

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Thijs VANDENBROUCKE (Belgium) remains interested in reconstructing the Ordovician palaeoclimate and palaeo-environment. In October 2015, I changed jobs and moved back to Ghent University in Belgium for a lecturer position in stratigraphy and palaeontology.

Two MSc students have started their Ordovician research projects with me in Ghent: Jules Velleman, working on Upper Ordovician chitinozoan biostratigraphy in the Cincinnati Arch (co-supervised by Patrick McLaughlin, Indiana Geological Survey) and Alexis Hylebos, working on the Middle Ordovician palaeobiogeography of graptolites co-supervised by Peter Sadler, University of California, Riverside). This spring, Julie De Weirdt will be starting her PhD research project in Ghent, focussing on Upper Ordovician chitinozoans from the US (in collaboration with Poul Emsbo, USGS and Patrick McLaughlin). I also continue to co-supervise Matthias Sinnesael, who has recently started a PhD project with Philippe Claeys at the VUB (Belgium) on astronomical forcing during the Late Ordovician. With an international team coordinated by Mark Williams (University of Leicester, UK) and funded by the Leverhulme Trust, we are currently re-investigating the early Palaeozoic strata of Japan.

I continue to supervise two research students in Lille who are finishing and writing up their theses: 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 part of the ANR grant focuses on the glacial deposits of the Upper Ordovician in Morocco.

I remain active as one of the coordinators of the IGCP 591 project. All information can be found on our website www.igcp591.org. The project's closing meeting will be in Ghent this year (6-9 July + workshop on 5 July & field trip 10-15 July) and I am looking forward to welcoming many of you there. For details see <http://www.igcp591.ugent.be>

Please note my new contact details:

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Marco VECOLI (Saudi Arabia) is working on several projects on the Lower Palaeozoic (mainly Ordovician and Silurian) of Saudi Arabia, involving the study of acritarchs, cryptospores and chitinozoans. I am also starting a new project on optical kerogen analysis of organic-rich sediments of early Silurian age to better characterize the hydrocarbon generation potential of organic-rich shales for exploration in unconventional reservoirs.

I continue to collaborate with colleagues in academia such as Paul Strother (Boston College) on taxonomic analysis of cryptospores of Darriwilian age and their significance in the evolution of early land plants; Anthony Butcher (University of Portsmouth) on chitinozoan stratigraphy of the Sharawra Member of Qalibah Formation in Saudi Arabia; Prof. Geoff Clayton (Trinity College) on the application of PDI for assessing thermal maturity of sediments; Philippe Gerrienne (Liege University), Thomas Servais (CNRS Lille) and Brigitte Meyer Bertrhaud (CNRS, Montpellier) on the evolution of land plants; Dr. Amalia Spina (University of Perugia) on Lower Paleozoic palynostratigraphy and palynofacies in North Africa.

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Viive VIIRA (Estonia) is continuing studies on Ordovician and Silurian conodont biostratigraphy of Estonia as a part-time worker.

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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. I am also working on the evolution of symbiosis, predation, bioerosion and biofouling in the Ordovician of Baltica and beyond. My current research interests include trace fossils of the Ordovician of Estonia.

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Gustavo G. VOLDMAN (Argentina) continues his work on taxonomy, biostratigraphy, and thermal alteration studies of conodonts from the Ordovician basins of Argentina. A study on new conodont taxa and biozones from the Lower Ordovician of the Cordillera Oriental has been recently published (Voldman et al., 2016). He is also involved in a multidisciplinary project to study the lower Paleozoic continental margin slope deposits of the Argentine Precordillera with colleagues from the Universidad de Oviedo (J.L. Alonso, L.P. Fernández), Universidad Nacional de San Juan (A.L. Banchig, R. Cardó) and Universidad Nacional de Córdoba (G.L. Albanesi, G. Ortega).

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Beatriz G. WAISFELD (Argentina) continues working on trilobites from the Cambro-Ordovician successions of western Argentina. Main focus of this research is on taxonomy, biostratigraphy, paleoecology and diversification events. New data derived from ongoing projects with PhD and postdoc students (Facundo Meroi, Diego Muñoz, Arnaud Bignon) and several colleagues has resulted in new insights into the history of biodiversity of trilobites from the Central Andean Basin of Northwestern Argentina. As well, ongoing biostratigraphic studies have recently provided a more resolved, high-resolution scheme based on trilobites that filled important gaps in previous knowledge. A paper on these results is in advanced stage of preparation along with Facundo Meroi and Emilio Vaccari. Additionally, a number of taxonomic studies in both, Precordillera and Northwestern basins, are also in progress.

Beatriz G. Waisfeld

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WANG Guangxu (China) continues working on carbonates and corals across the Ordovician-Silurian transition in South China, where a complete coral sequence has been recognized in recent years. Some of these results have already been published or are in press. A manuscript with Yong Yi Zhen and Ian Percival (Geological Survey of New South Wales) dealing with Katian-age conodonts and tabulate corals from New South Wales is in review. I am also working on early corals of early Late Ordovician age in South China.

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Barry WEBBY (Australia) resumed studies of a number of small, conjoint projects on Ordovician trilobites, stromatoporoids, sphinctozoan sponges and late Cambrian trace fossils. These include: (1) description of Ordovician stromatoporoids, sphinctozoans and possibly also a few other hypercalcified sponges from Kazakhstan; (2) work on a few remaining undescribed Ordovician trilobites from central New South Wales; and (3) a project documenting the distinctive assemblages of trace fossils from the Late Cambrian (Chatsworth Limestone) of North-West Queensland. Each of these has languished for a number of years because of my role as “Coordinating Author” of the “Treatise” project on hypercalcified sponges—for so many years such a challenging activity! The project involved long-sustained and closely cooperative working relationships with many experts, and coordination through all stages with the editorial staff, based in Lawrence, Kansas.

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Charles WELLMAN (UK) continues his work on early land plant spores and other remains, including those from the Ordovician. He is currently involved in collaborative work on Ordovician spore assemblages from Oman, Saudi Arabia, Siberia and Turkey.

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Mark WILLIAMS (UK) continues work on Ordovician ostracods from Anticosti Island with PhD student Zardasht Taha, and colleagues Tõnu Meidla, David Siveter, Jan Zalasiewicz and Vincent Perrier. He has recently begun looking at possible Ordovician ostracod material from Navan, County Meath, Ireland, with George Sevastopulo of Trinity College, Dublin. In addition to studies of Ordovician ostracods, Mark is also working on the Leverhulme Trust project ‘Assembling the Early Palaeozoic Terranes of Japan’, with colleagues from the UK, Japan and Belgium. As part of this project, the team have sampled strata of putative

Ordovician age in the Hida Gaien Terrane of central Honshu, and are awaiting the results of palynological investigations through Thijs Vandenbroucke's lab in Ghent.

Mark Williams

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Rongchang WU (China) has returned to NIGPAS (Nanjing) from Lund (Sweden) to continue working on Ordovician and Silurian stratigraphy of China. The current focus of my research is on the Ordovician and Silurian conodonts from China, analysing fluctuations in palaeoclimate and palaeoenvironments during this period by use of stable isotopes and microfacies analysis.

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Graham YOUNG (Canada) is continuing to work on Palaeozoic palaeoecology and on the diversity of Ordovician cnidarians and arthropods. In 2015 I co-led a week-long field trip to Ordovician type sections along the Churchill River in northern Manitoba, with Michelle Nicolas of the Manitoba Geological Survey. This was followed by collaborative fieldwork at the Airport Cove site, near Churchill, with Dave Rudkin and Michael Cuggy. Detailed studies of the varied fossils at the William Lake and Airport Cove sites of Manitoba are well 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.

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ZHAN Renbin (China) concentrated mainly on investigations on the Great Ordovician Biodiversification Event in China (particularly in South China) and on the end-Ordovician mass extinction collaborating with his domestic and international colleagues in 2015. Together with Jisuo Jin and David Harper, he edited a special volume in *Palaeoworld* under the theme "Geologic and biotic events and their relationships during the Early to Middle Paleozoic" (*Palaeoworld*, v. 24, issues 1-2, 250 pp), including papers from the IGCP 591 Kunming meeting in August 2014. In May 2015, as a co-chair, he also organized the 7th International Brachiopod Congress in Nanjing which has nearly 60 participants from outside

China; this consisted of a three-day indoor meeting plus three one-week post-conference field excursions. Academically, he and his colleagues have finished a multidisciplinary study on the enigmatic Upper Ordovician Pagoda Limestone, and put forward a hypothesis on the origin of the 3-dimensional cracks of this unique rock unit. The paper is now published online in *Palaeogeography, Palaeoclimatology, Palaeoecology*.

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Shunxin ZHANG (Canada) has focused her research on Late Ordovician and Early Silurian biostratigraphy in Ungava Bay, and on Cornwallis, Devon and Ellesmere islands in the Arctic area. She did field work on Akpatok Island in the Ungava Bay in 2015, and has tried to improve understanding of the Ordovician stratigraphy and biostratigraphy of the island. She has also cooperated with Chris Barnes on the Late Ordovician and Early Silurian conodonts from Cornwallis, Devon and Ellesmere islands in order to update the conodont biostratigraphy on these Arctic islands.

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Yuangdong ZHANG (China) is continuously 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) and Dan Goldman (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 (Atlas of Ordovician Index Fossils in China, 2014-2019).

(2) Geological features of major 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). Late Katian to Aeronian black shales (Wufeng and Lungmachi formations) in South China has produced rich shale gas in recent years, and on which many researches are being conducted aiming on a precise correlation. 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) will be carried on during 2014-2018. 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 cores are open to global scientists for study and appropriate sampling, and some samples have been collected in 2015 for geochemical and microfacies analysis. Those who have interests to be involved in this work or aim at some other related approaches, please contact the project leader (Zhang Yuandong).

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Yong Yi ZHEN (Australia) in September 2015 was successful in his application for the ongoing role of State Palaeontologist in the Geological Survey of New South Wales (the position previously held by Dr Ian Percival), and has recently been appointed Senior Research Scientist. Yong Yi has been actively working on various projects in collection management (digitization of the old paper catalogue records and building a modern database), in support of the regional geological mapping programs of the Geological Survey. He continues research into Early Palaeozoic fossils (mainly conodonts) of Australia and China, and their biostratigraphic applications. A manuscript on conodonts and tabulate corals of the Upper Ordovician Angullong Formation of central NSW (with Guangxu Wang and Ian Percival) has recently been submitted to *Alcheringa*. Current projects include completion of an extensive revision of the Early Ordovician conodont fauna of the Horn Valley Siltstone of the Amadeus Basin in central Australia, study of latest Cambrian to Tremadoc conodonts in the Koonenberry Belt of far western NSW, and collaborative research with the geological surveys of Western Australia and the Northern Territory into Ordovician conodonts of the Canning Basin and Daly Basin, respectively.

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ORDOVICIAN RESEARCH PUBLICATIONS 2015-2016

[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 Furongian and Llandovery biota and stratigraphy]

A

- Adomat, F., Munnecke, A. & Kido, E. 2016 (in press). Mass occurrence of the large solitary rugose coral *Phaulactis angusta* at the boundary Lower/Upper Visby Formation, Silurian, Gotland: Palaeoecology and depositional implications. *GFF*.
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