

# SILURIAN TIMES

NEWSLETTER OF THE INTERNATIONAL SUBCOMMISSION ON  
SILURIAN STRATIGRAPHY (ISSS)

(<http://silurian.stratigraphy.org>)

INTERNATIONAL COMMISSION ON STRATIGRAPHY (ICS)

No. 28 (for 2020)

Edited by David Ray



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Cover photo: Precambrian basement unconformably overlain by Sheinwoodian limestones, Strinds Quarry, Old Radnor, Wales (courtesy of David Ray).

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## SILURIAN TIMES Number 28 (for 2020)

### CHAIRMAN'S CORNER

Dear Silurian Colleagues,

It is my pleasure to give a warm welcome to four new titular members of the ISSS Alyssa Bancroft, Huang Bing, Tonu Meidla and David Ray; all of which have been formally approved by the ICS executive. David Ray is the new secretary of the subcommission, and Huang Bing is the new webperson. Despite the absence of the International Geological Congress (IGC), which formally marks the new four-year cycle of the ICS subcommissions, this new organisational structure of the ISSS has been operational since April 2020.

The principal efforts of the ISSS in 2020 has been focused upon the long-intended replacement of those previously ratified basal stratotypes, which had been deemed unfit for purpose. Two of our three respective working groups were expected to submit their official proposals for new GSSPs for the Aeronian and Telychian stages at the 36th IGC in Delhi (March 2020). Unfortunately, the Covid-19 pandemic has resulted in the IGC being postponed twice. At present, the IGC is rescheduled for 16th to 21st August, 2021. Given the current progress of the pandemic, and the related travel restrictions and border closures, a further postponement of the 36th IGC seems likely.

The Aeronian working group has focused on a candidate section for a new base Aeronian GSSP in Wales, United Kingdom. Chitinozoan biostratigraphy of the classic Rheidol Gorge section has been published by De Weirdt *et al.* (2020). A final report by Mike Melchin *et al.* is near its completion, but has been delayed due to Covid-related restrictions within the United Kingdom. A comprehensive study of a Czech candidate section – the Hlásná Třebaň section in the Barrandian area – has been already published by Štorch *et al.* (2018) and supplemented by Butcher (2019). Finally, work on a Chinese candidate section, has not made significant progress in 2020.

The working group for the base Telychian GSSP has focused its attention on a single candidate, the El Pintado Reservoir section, in the Seville province of Spain (Loydell 2019). The Aeronian-Telychian boundary and the lower Telychian part of the El Pintado succession was described by Loydell *et al.* (2015), and the Aeronian part of the section was presented by Štorch *et al.* (2019) to the ISSS in the Silurian thematic session at STRATI 2019 in Milano, Italy. A manuscript describing the Aeronian part of the section has not yet been submitted for publication. The formal proposal of the El Pintado Reservoir section for the new boundary stratotype of the Telychian Stage should be submitted to the subcommission body in 2021. Please, stay tuned for discussion and a subsequent formal ballot later this year.

Apart from this formal program, some efforts have been made to find good tools for the subdivision of the Pridoli Series, within its type area, into two stages. The results of this work will be submitted for publication in 2021.

The only event organized by the ISSS in 2021 was a bi-annual conference/field meeting. This was originally planned for late August 2021. However, based on the present pandemic travel constraints and alternate easing and tightening of border restrictions, the meeting has been rescheduled for summer 2022. I wish to express my gratitude to Valeri Sačanski from the Geological Institute of the Bulgarian Academy of Sciences, who is still willing to organize with us this bi-annual Silurian Symposium and ISSS business meeting in Sofia, Bulgaria. Our aim, already discussed in July 2019 at STRATI Congress in Milano, was to hold this conference in

a new region with Silurian outcrops less well-known to active titular and corresponding members of the subcommission.

The continuing Covid-related restrictions and general absence of international meetings and conferences, will move further ISSS activities in 2021 to the online space.

Myself and David Ray are going to organize an online ISSS business meeting of titular members in summer 2021, using either Microsoft Teams, Zoom or a similar online meeting platform. I hope to have at least one of our GSSP proposals at hand by then. With this meeting in mind, please send me your comments, suggestions and proposals, regarding the intended online meeting and, in turn, stay tuned to receive further details in due time.

We have made a significant update to the list of corresponding members and Silurian experts. Please, check the address list at the end of this annual report and send changes and pending updates to David's email address (daveray01@yahoo.com). We would greatly appreciate this help, which will also indicate your willingness to participate in the present and future activities of the subcommission. In addition, we will be finally able to improve and update our homepage on the ICS website. This long needed refurbishment will be conducted by our webperson Huang Bing, in cooperation with the new ICS webperson Nick Car.

Last but not least, I wish to thank secretary David Ray and vice-chair Carlo Corradini for their collaboration. Also David's hard work on his first issue of the Silurian Times is much appreciated.

## References

Butcher, A. 2019. Chitinozoan biostratigraphy of the Hlásná Třebaň section (candidate replacement GSSP for the base Aeronian). *3rd International Congress on Stratigraphy (STRATI 2019), ISSS business meeting, Milano, Italy. Lecture, July 2, 2019.*

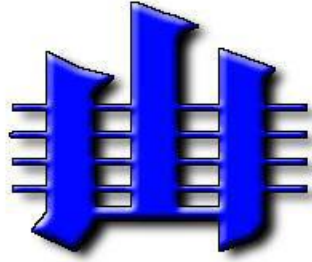
De Weirdt, J., Vandenbroucke, T.R.A., Cocq, J., Russell, C., Davies, J.R., Melchin, M. and Zalasiewicz, J. 2020. Chitinozoan biostratigraphy of the Rheidol Gorge Section, Central Wales, UK: a GSSP replacement candidate for the Rhuddanian–Aeronian boundary. *Papers in Palaeontology*, **6**, 173–192, <https://doi.org/10.1002/spp2.1260>.

Loydell, D.K. 2019. The base of the Telychian: is the El Pintado section, Spain suitable as a replacement GSSP? *3rd International Congress on Stratigraphy (STRATI 2019), ISSS business meeting, Milano, Italy. Lecture, July 2, 2019.*

Loydell, D.K., Frýda, J. and Gutiérrez-Marco, J.C. 2015. The Aeronian/Telychian (Llandoverly, Silurian) boundary, with particular reference to sections around the El Pintado reservoir, Seville Province, Spain. *Bulletin of Geosciences*, **90**, 743–794, <https://doi.org/10.3140/bull.geosci.1564>.

Štorch, P., Manda, Š., Tasáryová, Z., Frýda, J., Chadimová, L. and Melchin, M.J. 2018. A proposed new global stratotype for Aeronian Stage of the Silurian System: Hlásná Třebaň section, Czech Republic. *Lethaia*, **51**, 357–388, <https://doi.org/10.1111/let.12250>.

Štorch, P., Loydell, D.K., Frýda, J. and Gutiérrez-Marco, J.C. 2019. The Aeronian succession of the El Pintado section (proposed replacement GSSP for the base Telychian), Seville Province, Spain. *3rd International Congress on Stratigraphy (STRATI 2019), Session ST3.3, Milano, Italy. Lecture, July 2, 2019.*



**International Commission on Stratigraphy**  
**Subcommission on Silurian Stratigraphy**  
**ANNUAL REPORT 2020**

1. TITLE OF CONSTITUENT BODY and NAME OF REPORTER

**Subcommission on Silurian Stratigraphy (ISSS)**

Submitted by:

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2. OVERALL OBJECTIVES AND FIT WITHIN IUGS SCIENCE POLICY

**Mission statement**

The objectives of the Subcommission relate to three main aspects of IUGS policy:

- (1) The development of an internationally agreed scale of chronostratigraphic units, fully defined by GSSPs at Series and Stage levels and related to a hierarchy of units (Substages, Standard Zones, Subzones etc.) to maximize relative time resolution within the Silurian Period;
- (2) Establishment of frameworks and mechanisms to encourage international collaboration in understanding the evolution of the Earth during the Silurian Period;
- (3) Working towards an international policy concerning conservation of geologically important sites (such as GSSPs, global and regional stratotype sections, etc.).

**Goals**

- Rationalization of Global chronostratigraphical classification

- Intercalibration of fossil biostratigraphies, integrated zonations, and recognition of global datums.
- Establishment of magneto- and chemo-stratigraphic scales
- Redefinition of stage boundaries and restudy of global boundary stratotype sections
- Correlation of Silurian rock successions and events, including marine and non-marine
- Application of astronomically tuned cyclostratigraphy integrated with radiometric data and biostratigraphy

### 3. ORGANISATION - interface with other international projects / groups

#### **Organisation**

The ISSS is a Subcommittee of the International Commission on Stratigraphy. The Subcommittee is organized by an Executive consisting of Chairman, Vice-Chairman and Secretary, who are all Voting Members of the Subcommittee. In the Subcommittee elected for 2020-2024 there are thirteen other Voting Members. Five members have been replaced by four new Voting members in March 2020. Broad network of Corresponding Members has first of all a responsibility for communication in both directions between the Subcommittee and researchers on Silurian topics in their region. Secondly, they represent a broad spectrum of specialized stratigraphical disciplines from those countries or regions where Silurian rocks are extensively studied in relation to fundamental and/or applied geological research.

Current research activities and future plans are communicated through publication of the annual ISSS newsletter, *Silurian Times*, distributed as an email attachment and a web release. Website: <http://silurian.stratigraphy.org/> contains newsletters, meeting announcements, discussion posting-boards, bibliography of Silurian articles, links to related sites, and other information.

#### **Interface with other international projects / groups**

IGCP project no. 652 “Reading geologic time in Paleozoic sedimentary rocks” and newly established “International Subcommittee on Geochronology” under chairmanship of B. D. Cramer, titular member of the ISSS.

Collaboration will be developed with stratigraphically neighbouring subcommittees on Ordovician (ISOS) and Devonian (SDS) stratigraphy depending on subsequent revival of international meetings and conferences.

#### 3a. Current Officers for 2020-2024 period:

Chair: **Petr Štorch** (second term)

Vice-Chair: **Carlo Corradini** (second term)

Secretary: **David Ray** (first term)

Webperson: **Huang Bing** (first term)

#### 4. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

National/regional support has been provided to active members of Aeronian, Telychian and Wenlock GSSP working groups to facilitate their work.

#### 5. CHIEF ACCOMPLISHMENTS IN 2020 (including any publications arising from ICS working groups)

- Silurian Times No 27 was edited by the secretary, Renbin Zhan, and distributed in April, 2020, posted on the web site for the ISSS, and circulated as an email attachment to all titular, corresponding and interested members of the Subcommittee. It contained the reports on previous meetings, announcements of upcoming meetings and publications, the latest news and recent publications on Silurian research.
- The restudy of the Rheidol Gorge section experienced some delays due to Covid lockdown. Full paper by Melchin *et al.* (in prep) presenting the proposal of Rheidol Gorge as a candidate section for the base of the Aeronian Stage will be submitted for publication by early 2021. Chitinozoan biostratigraphy and faunas have been already published by De Weirdt *et al.* (2020).

De Weirdt, J., Vandenbroucke, T.R.A., Cocq, J., Russell, C., Davies, J.R., Melchin, M. and Zalasiewicz, J. 2020. Chitinozoan biostratigraphy of the Rheidol Gorge Section, Central Wales, UK: a GSSP replacement candidate for the Rhuddanian–Aeronian boundary. *Papers in Palaeontology*, **6**, 173–192, <https://doi.org/10.1002/spp2.1260>.

Melchin, M.J., Davies, J.R., Boom, A.R.A., Zalasiewicz, J.A., De Weirdt, J., Vandenbroucke, T.R.A., Russell, C.T., McIntyre, A.J., Morgan, G., Phillips, S. (in prep.). Integrated stratigraphic study of the Rhuddanian-Aeronian (Llandovery, Silurian) boundary succession at Rheidol Gorge, Wales: A proposed GSSP candidate for the Base of the Aeronian Stage.

#### 6. SUMMARY OF EXPENDITURE IN 2020:

Expenditures US\$ 0

Total US\$ 0

#### 7. SUMMARY OF INCOME IN 2020:

Carried forward from 2019 US\$ 3,500

ICS Allocation US\$ 0

Total US\$ 3,500

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Balance (carried forward from 2020) US\$ 3,500

#### 8. BUDGET REQUESTED FROM ICS IN 2020

Requested ICS Allocation US\$ 0

#### 9. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR:

- Two ISSS groups working on restudy of the base of the Aeronian GSSP and base of the Telychian GSSP will complete their work by submission of the formal proposals of the candidate sections (Štorch *et al.*, Hlasna Treban, Czech Republic and Melchin *et al.*, Rheidol Gorge, UK for Aeronian GSSP and David Loydell *et al.*, El Pintado Reservoir, Spain, for Telychian GSSP).
- ISSS online discussion and formal voting on the Aeronian and Telychian GSSP replacement candidate sections is anticipated for 2021.
- Further update of the website for Silurian Subcommittee by new webmaster Huang Bing. We gratefully acknowledge this work and the support provided by the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences.

#### Potential funding sources external to IUGS

Most of the costs of preparing Silurian Times and research activities of the working groups will be met by local support from host institutions and participation by individuals through national research grants and travel grants from their own authorities.



## 10. OBJECTIVES AND WORK PLAN FOR THE PERIOD 2020-2024

- Principal work will be devoted to GSSP-related research activities – restudy of some previously ratified but currently inadequate basal stratotypes. Delayed formal proposals of the Aeronian and Telychian GSSP replacement candidates will be completed in 2021 and new stratotypes will be chosen. We aimed to vote on these candidate sections in 2019 in Milano but the deadline had to be postponed due to delayed work on some of the candidate sections and subsequent Covid related restrictions.
- Homerician working group will be established and restudy of the Homerician GSSP will join the program, along with never ending search for potential sections suitable for new GSSP of the Wenlock Series.
- Application of astronomically tuned cyclostratigraphy integrated with radiometric data and high-resolution biostratigraphy in conjunction with IGCP no 652 “Reading geologic time in Paleozoic sedimentary rocks”.
- We will take part in further development of databases that would bring together and make available information from all sources associated with the Silurian researchers. One such database, operated by the Nanjing Institute of Geology and Palaeontology (Geobiodiversity Database, GBDB) is the official database of the ICS.
- ISSS bi-annual field-meeting and business meeting organized in Sofia, Bulgaria in August 2021 in collaboration with Geological Institute of Bulgarian Academy of Sciences may be postponed until the end of international travel restrictions, most likely until 2022.

**APPENDIX** (Names and Addresses of Current Officers and Voting Members)

**Nominated officers**

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## **Working group leaders**

Base of Aeronian GSSP Restudy Working Group

Leader **Petr Štorch**

Base of Telychian GSSP Restudy Working Group

Leader **Michael J. Melchin**

Base of Wenlock GSSP Restudy Working Group

Leader **David K. Loydell**

## REPORTS OF ACTIVITIES IN 2020



Online | 4–8 May 2020

### European Geosciences Union General Assembly 2020, session SSP1.3

By Emilia Jarochowska

European Geosciences Union General Assembly 2020, online, session SSP1.3, May 4<sup>th</sup> 2020. Earth System Paleobiology: closing the geological and biological gap (Convener: Kenneth De Baets Co-conveners: Emilia Jarochowska, Martin Schobben, Melanie Tietje), contained a number of Silurian themed presentations including:

Leonhard, I., Shirley, B., Murdock, D., and Jarochowska, E.: Micropredators skulking in Silurian oceans?, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-650, <https://doi.org/10.5194/egusphere-egu2020-650>, 2019.

Gomez Correa, M. A., Jarochowska, E., Männik, P., Munnecke, A., and Joachimski, M.: High-resolution assessment of the Valgu event: conodont diversity and  $\delta^{18}\text{O}$ phos during the early Telychian (Silurian) in the Baltic Basin, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-950, <https://doi.org/10.5194/egusphere-egu2020-950>, 2019.

Mulvey, L., Shirley, B., Pye, F., B. Raja, N., and Jarochowska, E.: You Are Where You Live: Using the size of conodont dental tools to shed light on environmental conditions and community complexity, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-1057, <https://doi.org/10.5194/egusphere-egu2020-1057>, 2019.

Claussen, A. L., Munnecke, A., and Ernst, A.: Bryozoan-rich stromatolites (“bryoliths”) from the Silurian of Gotland and their relation to climate-related perturbations of the carbon cycle, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-22300, <https://doi.org/10.5194/egusphere-egu2020-22300>, 2020.

Harrison, G. W., Claußen, L., Schulbert, C., and Munnecke, A.: Extreme reefs: Analyses of modern bryostromatolite (“bryolith”) reefs from marginal environments in the Netherlands with comparisons to ancient analogues, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-22617, <https://doi.org/10.5194/egusphere-egu2020-22617>, 2020.

Details of the session, abstracts and presentations can be found at: <https://meetingorganizer.copernicus.org/EGU2020/displays/36479>



## **Geological Society of America Annual Meeting 2020, session T87**

By Emilia Jarochowska

Geological Society of America Annual Meeting, online, session T87, October 27<sup>th</sup>. Growing a skeleton: methodological and theoretical approaches to unraveling the stories preserved in skeletal materials (organizers: E. Jarochowska with D. K. Moss, Y. Haridy, R. Bhatia and I. Coronado Vila) contained a number of Silurian themed presentations including:

Leonhard, I., Jarochowska, E., Shirley, B. and Murdock, D.J.E. 181-3: The ins and outs of coniform conodonts: insights into feeding behavior using 2d and 3d analysis. Geological Society of America Abstracts with Programs. Vol 52, No. 6, 2020, doi: 10.1130/abs/2020AM-352220

Shirley, B., Bestmann, M. and Jarochowska, E. 181-5: The cono-dos and cono-donts of phosphatic microfossil preparation and microanalysis. Geological Society of America Abstracts with Programs. Vol 52, No. 6, 2020, doi: 10.1130/abs/2020AM-357056

Details of the session, abstracts and presentations can be found at: <https://community.geosociety.org/gsa2020/home>





## Lithological Meeting GEOLOGY OF REEFS

Syktvykar, Komi Republic, Russia

June 23-25, 2020



IG FRC Komi SC UB RAS

### **All-Russian Lithological on-line Meeting "Geology of Reefs"**

July 25-26, 2020 Syktvykar, Komi Republic, Russia

By Anna Antoshkina (Chairperson)

In Syktvykar, the Institute of Geology named after the academician N. P. Yushkin FIC Komi NC URO RAS held the All-Russian Lithological Meeting "Geology of Reefs" dedicated to the 130th anniversary of the birth of Vera Alexandrovna Varsanofyeva. The meeting was organized by the Ministry of Science and Higher Education of the Russian Federation, the Scientific Council on Lithology and Sedimentary Minerals at the Department of Earth Sciences of the Russian Academy of Sciences, the Institute of Geology of the Komi Research Center of the Ural Branch of the Russian Academy of Sciences.

The meeting highlighted topical issues at the present stage on the geology and lithology of sensitive indicators of paleogeographic conditions of organogenic structures, biodiversity and evolution of reef ecosystems, determining the role of microbiota and fluids in the formation of carbonate buildings, comprehensive analysis of reef-forming areas, as well as their relationship with oil and gas fields and other minerals. The materials for the meeting's reports were announced by 112 people from 33 scientific production organizations and higher education institutions in Russia and neighbouring countries. The number of listeners, thanks to the format of video conference and broadcasting of online meetings on the video portal of the Institute of Geology, was recorded more than 400 people. Thirteen online reports were heard and discussed at the plenary and sectional sessions, and 31 reports were submitted in the form of e-posters. The program of the meeting included a youth school, which heard online lectures by I. G. Dobretsova "Underwater Volcanoes and Life" and V.I. Silaev "Isotopes of Carbon and Oxygen in Carbonates: Genetic Information in Geology and Geoarcheology."

Details of the meeting, presentations and other materials can be found at: <http://conf.uran.ru/Default?cid=reefs> (in English page).

# **The Black Country UNESCO Global Geopark (UK): the Silurian stratigraphy of a newly established Geopark**

By Graham J. Worton

Black Country UNESCO Global Geopark, Dudley Museum at the Archives, Tipton Road, Dudley, West Midlands, UK. E-mail: [graham.worton@dudley.gov.uk](mailto:graham.worton@dudley.gov.uk)

## **The Black Country UNESCO Global Geopark**

The Silurian Subcommittee has visited this classic area of British Geology twice before. Members may recall visiting for the ‘Murchison Symposium’ in 1989, (for the 150th anniversary of the publication of the ‘Silurian System’) and then again during the ‘Siluria Revisited’ symposium in 2011.

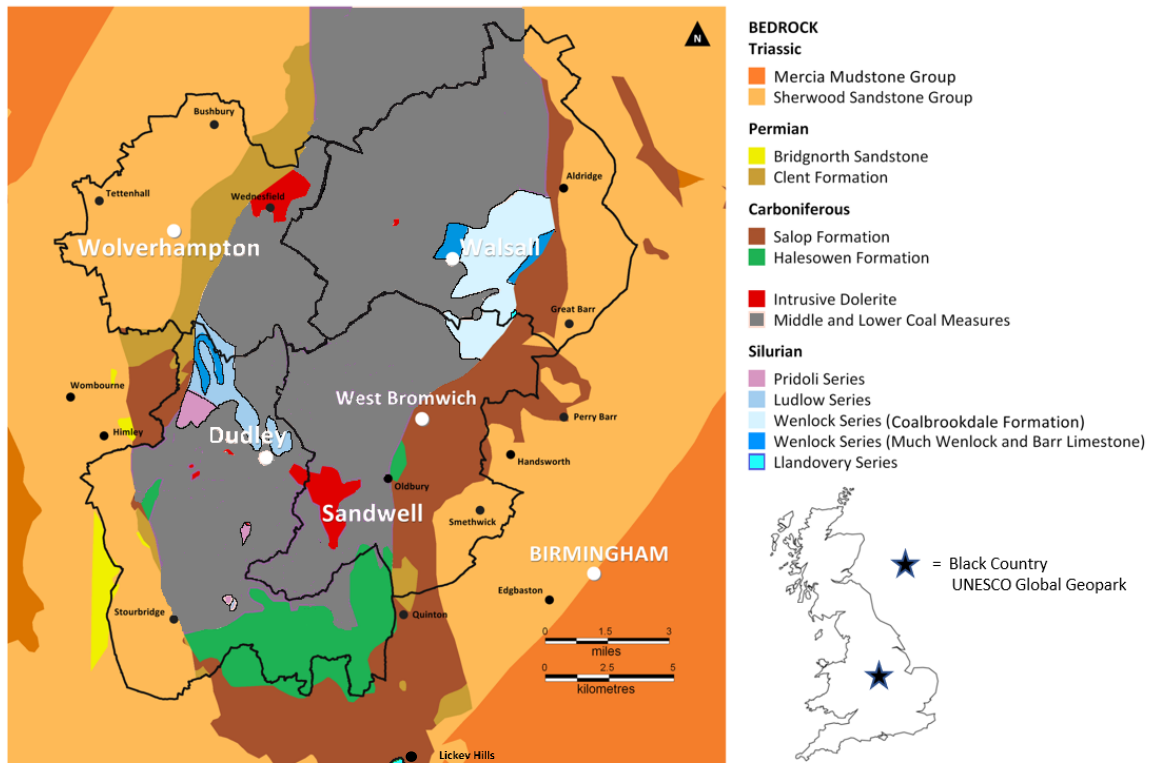
Since those visits, the Black Country has become a UNESCO Global Geopark (established July 2020) in recognition of its internationally important geological and related cultural heritage (**Figure 1**). The Geopark is located in central England and it is the most urban Geopark in the UNESCO global network, it covers 365km<sup>2</sup> and is home to 1.1 million people. The geological setting is that of an exposed Carboniferous coalfield with older Palaeozoic anticlinal inliers of Silurian rocks. As a consequence of its particular geological history, this area was exceptionally rich in shallow, easily-mined economic minerals, particularly Carboniferous coal, ironstone, fireclay and Silurian limestones, which were extensively worked during the Industrial Revolution. The activities of the Industrial Revolution have created a legacy of disused quarries, many of which remain accessible today.

The area has particular fame for the exceptional preservation of its Silurian fossils and has strong associations with the history of the development of the geological sciences. The founder of the Silurian Period, Sir Roderick Murchison, who studied these rocks while composing the ‘Silurian System’ said that ‘Nowhere in England are more Geological features brought together in a small compass than in the environs of Dudley or in which their characters have been more successfully developed by the labours of practical men’. Murchison included many examples of local fossils in his defining work on the Silurian System.

## **The Silurian of the Geopark**

The Silurian of the Geopark ranges from Sheinwoodian to Pridoli age (**Figure 2**). These strata are lithologically diverse marine platform to coastal estuarine deposits (the latter with notable thin bone-bed horizons). The succession is highly fossiliferous and contains numerous bentonites. The Silurian strata are exposed in a series of faulted anticlines produced by Caledonian earth movements that were subsequently modified by later gentle Variscan deformation. The oldest Silurian in the area are clastic sediments of the Telychian and Sheinwoodian. These occur in small fault bounded inliers along the eastern boundary fault of the coalfield at Great Barr, and in the Lickey Hills area 3km to the south of the southern border of the Geopark. The best-known Silurian strata are the highly fossiliferous limestones and

shales of the Homerian, situated in the centre of the Geopark (at sites such as Wrens Nest National Nature Reserve). The Homerian Much Wenlock Limestone Formation contains more than 600 marine invertebrate macrofossil species and numerous volcanogenic bentonite horizons (one of which provides a high-resolution radio-isotopic date for the Homerian/Gorstian boundary), and has been subject to detailed stable carbon isotopic analysis. The youngest Silurian strata are of Gorstian to Pridoli age. These deposits are dominated by increasingly coarse-grained clastic sediments (with some minor limestones) and reflect regional uplift towards the close of Silurian times.



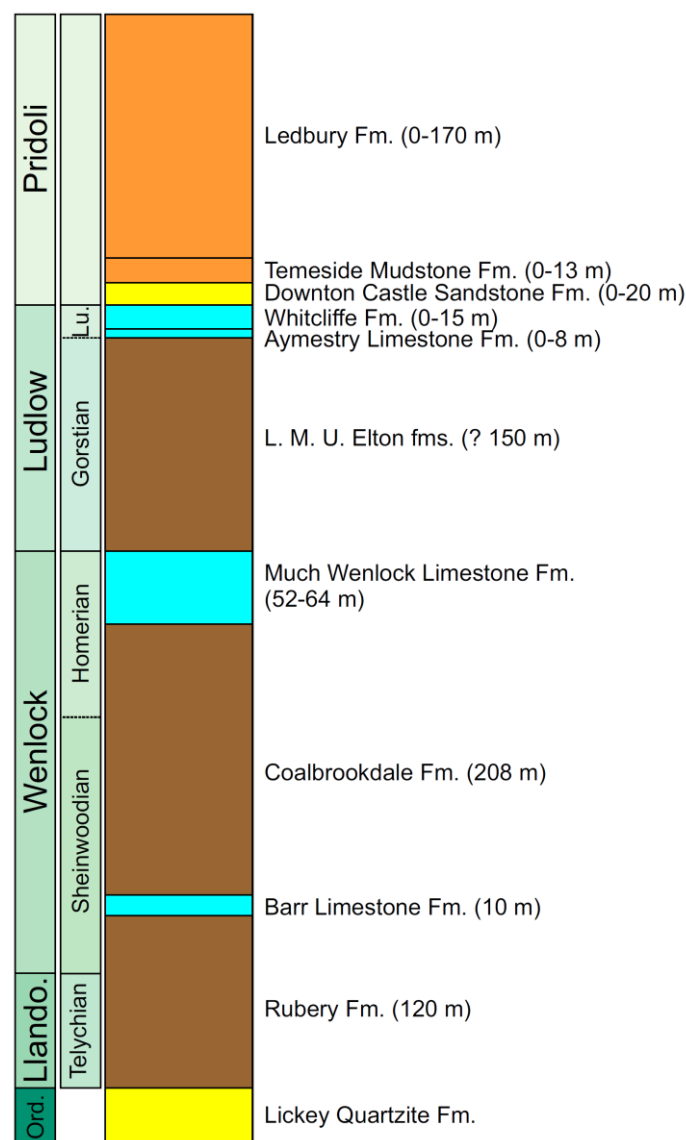
**Figure 1.** A simplified geological map of the Black Country UNESCO Global Geopark. Black boundaries delineate the four local authorities of the Geopark.

### Accessing the Geopark

The accessibility of most of the Silurian succession is excellent, either by well-established footpaths within nature reserves (**Figure 3**) or via narrowboat at underground tourist attractions. The area is well serviced by public transport and is easily accessed from the national road network. In addition, there is a wide range of accommodation and hospitality on offer to accommodate visiting researchers. For further information about visiting the area, please contact the tourism officer at Dudley Council (<https://www.dudley.gov.uk/business/regeneration/tourism-development/>).

Most of the exposed Silurian is now designated at international, regional or local level and is protected by national law and/or within controls of the planning and development control systems. This means, in practice, that the exposures are situated within nature reserves that are

jointly managed by Natural England and Local Authorities through their helpful and enthusiastic site-based teams. Working at some sites therefore requires a permit from Natural England. For details on how to obtain permits to collect or sample sites of Special Scientific Interest (SSSI), National Nature Reserves and other designated Geological Sites, contact Natural England via their web pages at: <https://www.gov.uk/government/publications/request-permission-for-works-or-an-activity-on-an-sssi>. In addition, working on such sites will require a statement about the nature of work intended, and dates that the work will occur; to avoid clashes with site management operations; the Keeper of Geology at Dudley Museum will be happy to assist with this process ([graham.worton@dudley.gov.uk](mailto:graham.worton@dudley.gov.uk)).



**Figure 2.** A simplified Silurian stratigraphic column for the Black Country UNESCO Global Geopark. Yellow = dominantly shallow marine sandstones; Brown = dominantly shallow marine siltstones with occasional limestones; Blue = dominantly shallow marine limestones with siltstones; Orange = lacustrine or shallow-marine siltstones and sandstones.





**Figure 3.** Examples of easily accessed parts of the Silurian succession. Top: The Old Tramway Cutting (Ludfordian), Saltwells National Nature Reserve, Netherton. Bottom: The Ripple Beds (Homerian), Wrens Nest National Nature Reserve, Dudley.



## **Further Geological Information and Support**

Further information about the Black Country UNESCO Global Geopark is available on a dedicated website (<https://blackcountrygeopark.dudley.gov.uk/bcg/>), where basic information on the various sites is available. For more detailed information about specific geological sites such as maps guidebooks and leaflets, contact The Keeper of Geology at Dudley Museum ([graham.worton@dudley.gov.uk](mailto:graham.worton@dudley.gov.uk) or Tel: +0044 01384 815574).

## **Museum Collections**

Dudley Museum hosts the definitive collection of Silurian fossils from the area. In addition, there is also a wealth of geological and palaeontological specimens collected from the Silurian of the Black Country in the natural history collections of a number of national and regional museums: most notably, the Lapworth Museum at the University of Birmingham (The Lapworth Museum of Geology, The Aston Webb Building, University of Birmingham, Edgbaston, West Midlands, UK, B15 2TT; E-mail: [j.c.clatworthy@bham.ac.uk](mailto:j.c.clatworthy@bham.ac.uk); Tel: +0044 9121 414 7294), The British Geological Survey collection in Nottingham, which also hosts the national rock core storage facility (The British Geological Survey Collections, at BGS Offices, Keyworth, Nottingham, UK. For general enquiries or to arrange a visit; E-mail: [enquiries@bgs.ac.uk](mailto:enquiries@bgs.ac.uk); Tel: +0044 0115 936 3143), and Wollaton Hall in Nottingham (Wollaton Hall Natural History Museum collections, Wollaton Hall and Deer Park, Nottingham, Nottinghamshire, UK. E-mail: [Wollaton.hall@nottinghamcity.gov.uk](mailto:Wollaton.hall@nottinghamcity.gov.uk); Tel: +0044 0115 876 3100).

## **Ongoing Research within the Geopark**

It is the mission of the Geopark to raise awareness and appreciation of the geological importance of the area, and its intrinsic influences on the natural environment and culture of the Black Country. We welcome and are happy to assist and support research on geology and geoheritage within the Geopark. Currently, research on the Silurian of the Black Country is focused upon microfossils (e.g., chitinozoa and scolecodont groups) associated with bentonite horizons of the Homerian and Gorstian. We are also carrying out research on a number of aspects of Geoconservation based on fixed-point photography and 3D LIDAR scanning of tunnels and caverns, in order to monitor change and the impacts of visitor use. We would welcome collaborative research projects on the Silurian geology within the Geopark, and more broadly look forward to welcoming members of the ISSS to the UK's newest UNESCO Global Geopark.

## **ANNOUNCEMENTS OF SILURIAN RELATED MEETINGS AND ACTIVITIES IN 2021**



### **Opportunity for International Study at Vilnius University, Lithuania**

Prospective international students that are interested in doing their MSc and PhD on the Silurian palaeobiology/stratigraphy/palaeobiogeography themes, and would be interested in studying in Vilnius University please contact Andrej Spiridonov.

#### **Andrej Spiridonov**

Vilnius University, M.K. Čiurlionio g. 21, LT-03101 Vilnius, Lithuania.

Tel: +370 611 38973; E-mail: [andrej.spiridonov@gf.vu.lt](mailto:andrej.spiridonov@gf.vu.lt)



## **Institute of Geology of Komi SC UB RAS - joint thematic and practical lithological workshops**

**Dates:** 07/04/2021 to 09/04/2021

**Contact person:** Chairman of the organizing committee Anna Antoshkina ([Antoshkina@geo.komisc.ru](mailto:Antoshkina@geo.komisc.ru)). For participation in the thematic workshop, contact: Evgeny Ponomarenko ([lithseminar@geo.komisc.ru](mailto:lithseminar@geo.komisc.ru)). For participation in the practical workshop, please contact the Seminar Curator Andrey Sandula ([sandula@geo.komisc.ru](mailto:sandula@geo.komisc.ru)) or the workshop leaders: Lyubov Shmeleva ([lyubov.shmeleva@inbox.ru](mailto:lyubov.shmeleva@inbox.ru)) or Natalya Matveeva ([nakaneva@geo.komisc.ru](mailto:nakaneva@geo.komisc.ru)).

**Website:** <https://geo.komisc.ru/en/latest-news/conf/joint-thematic-and-practical-lithological-workshops-2021>

**Description:** On April 7-9, 2021, the Laboratory of Lithology and Geochemistry of Sedimentary Formations Institute of Geology of Komi Science Centre of the Ural Branch of the Russian Academy of Sciences under the auspices of Science Committee on Problems of Lithology and Sedimentary Minerals are holding a thematic workshop «Isotopic characteristics of carbonate rocks and their relationship with sedimentation conditions: problems and opportunities» and a practical workshop «Variety of genetic types of rocks of organogenic structures».

**Scientific program:** The thematic workshop will discuss isotopic characteristics for the purposes of reconstructing environments and conditions of carbonate accumulation. There is an agreement with specialists in isotope geochemistry to deliver plenary reports. Those wishing to submit their reports on this topic, please e-mail (indicated in the contacts).

The purpose of the workshop is to expand knowledge and improve the level of scientific researches among young scientists:

Acquaintance with the collection of thin sections of various types of organogenic structures from the Upper Ordovician to the Lower Permian;

Acquaintance with the collections of participants for the exchange of experience, solving problems and issues related to frame organisms, biocenoses, etc.

Acquaintance with publications of laboratory staff on the topic of the seminar.





## **5th International Meeting of Early-stage Researchers in Palaeontology**

(online meeting at Akmenė, Lithuania, organized by Vilnius paleontology team:  
<http://www.pastglobalchanges.org/calendar/upcoming/127-pages/2008-imerp-5>)

**Dates:** 18/05/2021 to 21/05/2021

**Venue:** Online

**Contact person:** Darja Dankina-Beyer, [imerp2021@gmail.com](mailto:imerp2021@gmail.com)

**Website:** <https://imerp2021.weebly.com/>

The 5th International Meeting of Early-stage Researchers in Palaeontology (IMERP) will be held online from 18-21 May 2021.

This meeting was originally scheduled for 18-21 May 2020 in Akmenė, Lithuania.

**Description:** The IMERP is aimed at early-stage paleontologists, from undergraduate students to recent post-doctoral researchers. Geologists, biologists or any scientist with research topics related to paleontology, as well as paleoartists, are also welcome.

The IMERP has two main objectives:

- To provide a friendly environment for early-stage researchers to share their research through oral or poster presentations and follow each other's progress.
- To share new methods and ideas useful in paleontology, and develop the skills of the attendees with the help of leading experts, invited to give lectures about their fields.

### **Important dates:**

Registration opens: 16 November 2020

Call for abstracts opens: 1 January 2021

Deadline for abstract submissions: 28 February 2021

Registration closes: 16 March 2021

Brainstorm game questions deadline: 1 April 2021



## **35<sup>th</sup> IAS Meeting of Sedimentology, Carbonate Diagenesis short course**

**Axel Munnecke** (Friedrich-Alexander University Erlangen-Nuremberg, Germany) is giving a one-day course on Carbonate Diagenesis: **SC1 Carbonate Diagenesis (Microscopy Course)**; 1 day, June 17, live virtual course; 2nd day, June 18, will be devoted to a discussion of participants' thin-sections. Price: Delegate 35 EUR, Student 25 EUR

**Website:** <https://www.iasprague2021.com/programme/short-courses/>

**Course description:** Every carbonate rock has experienced some sort of diagenetic alteration – otherwise it would not be a solid rock. Whereas most modern carbonate deposits are composed of metastable phases such as aragonite and high-Mg-calcite, their fossil counterparts are composed mostly of low-Mg-calcite and/or dolomite. This mineralogical change is one of the results of the diagenetic alteration. Especially shallow-water carbonates are typically lithified very early after their deposition, but might have experienced later diagenetic alteration during burial such as chemical and mechanical compaction, dissolution, recrystallization, or dolomitization. Simply phrased, early diagenesis turns a sediment into a rock, late diagenesis alters the rock. Many of the diagenetic processes can be reconstructed based on careful observation of thin sections, and that is the topic of this course. During the 1-day course, different diagenetic environments will be introduced in several lectures, followed by microscopic exercises (live via Zoom). Thin sections from very different time slices as well as depositional and diagenetic environments will be discussed, and their sequence of diagenetic processes will be reconstructed. A special lecture and exercise deals with the comparatively poorly studied “early marine-burial diagenesis”.

**Important dates** (please check for updates <https://www.iasprague2021.com/conference-information/>):

Deadline for early registration fee: 14 April 2021

Deadline to short course registration and fees: 30 April 2021

Deadline for regular registration fee: 31 May 2021

Fieldtrips and short courses: 15–19 June 2021

Virtual conference sessions: 21–25 June 2021



## 90th Congress of the Italian Geological Society

**Dates:** 13/09/2021 to 17/09/2021

**Venue:** Trieste, Italy

**Website:** <http://www.geoscienze.org/trieste2020/>

The annual meeting of the Italian Geological Society is scheduled in Trieste in September 2021, if the pandemic situation allows it (a final decision will be taken in May).

The Scientific Program includes: Scientific Conference for participants and the citizens; Overarching Scientific themes composed by scientific sessions (oral and poster presentations); Plenary Scientific Sessions; Short Courses; Workshops; Round-Table discussions; High-School science teachers workshop; Pre- and post-Congress field excursions. Notably, **Carlo Corradini** will coach a **three-day pre-conference field trip to the Pre-Variscan sequence of the Carnic Alps**.

For information refer to: <http://www.geoscienze.org/trieste2020/index.php/programma/field-trips/28-field-trips/171-ft1-the-pre-variscan-sequence-of-the-carnic-alps>

### **Important dates:**

Opening of abstract submission and early registration: 22 March 2021

Deadline for abstract submission: 16 May 2021 - 7 p.m.

Publication of scientific program online: 1 July 2021

Closure of field trips payment: 20 June 2021

Closure early-registration: 20 July 2021

Closure online registration: 6 September 2021 (after this date registration will be allowed exclusively on-site)

# 古生物、精时地层及化石能源国际研讨会

## International Conference on Palaeobiology, High Resolution Stratigraphy and Fossil Energy

November 18-19, 2021, Nanjing, China

### *First Circular*

To celebrate the 70<sup>th</sup> Anniversary of Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS), the *International Conference on Palaeobiology, High Resolution Stratigraphy and Fossil Energy* will be held in Nanjing during 18-19 November 2021. The Organizing Committee cordially invites you to join us for this big convention. The conference will concentrate on recent advances and perspectives in the fields of palaeobiology, stratigraphy, fossil energy and other relevant areas.

### **VENUE**

Nanjing Museum of Palaeontology, NIGPAS, 39 East Beijing Road, Nanjing, China.

### **SPONSORS**

Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences

### **ORGANISERS:**

State Key Laboratory of Palaeobiology and Stratigraphy (LPS)

Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS)

### **STEERING COMMITTEE**

Chairs: RONG Jiayu, CHEN Xu, ZHOU Zhiyan

Members (listed in alphabetical order):

DING Lin, GUO Zhengtang, HAO Fang, JIN Zhijun, LI Xianhua, QIU Zhanxiang, SU Degan, WANG Chengshan, WANG Pinxian, WANG Tieguan, WU Fuyuan, WU Xinzhi, YIN Hongfu, XU Yigang, ZHANG Miman, ZHOU Zhonghe, ZOU Caineng

### **ORGANIZING COMMITTEE**

Chair: ZHAN Renbin, Director of NIGPAS

Vice Chair: WANG Jun, Vice-Director of NIGPAS

Members: (to be completed)

## **SCIENTIFIC COMMITTEE**

Chair: ZHU Maoyan, NIGPAS

Vice Chair: WANG Bo, NIGPAS

Members: (to be completed)

## **SECRETARY**

### **Secretary-General:**

WU Rongchang NIGPAS

CHEN Xiaozheng NIGPAS

### **Members:**

WANG Dan NIGPAS

YIN Zongjun NIGPAS

WAN Mingli NIGPAS

## **PRELIMINARY AGENDA**

Nov. 17, 2021 (Wednesday): Arrival and ice breaker

Nov. 18, 2021 (Thursday): Opening ceremony, invited plenary talks and other lectures

Nov. 19, 2021 (Friday): Invited plenary talks and other lectures

Nov. 20, 2021 (Saturday): Departures

## **INVITATION AND VISA**

An official invitation letter will be available for participants upon request for their application for visas at the Embassies or Consulates of China in their own countries. Such invitation letter will be arranged by electronic version (PDF file) signed by the Chair of the Organizing Committee with the official seal and will be sent to participants as email attachments. Those who need an Invitation Letter are supposed to provide following information when making their preliminary registration:

- 1). Full name (Family and given names);
- 2). Gender;
- 3). Date of birth;
- 4). Nationality;
- 5). Passport number and valid dates (a scanned file of passport is required);
- 6). Institution or affiliation;
- 7). Periods of stay in China.

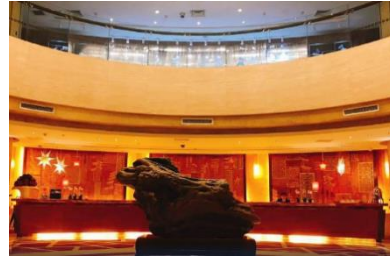
## **TRANSPORTATION**

All delegates outside Nanjing are suggested to stay in the Jiu Hua Hotel, about 600 m east of NIGPAS along the same side of the East Beijing Road. It is about 44 km to the Nanjing Lukou International Airport, and about 5 km to the Nanjing High Speed Railway Station. Public underground transportation is very convenient between the Hotel and the Airport or Station.



## ACCOMODATION AND HOTEL RESERVATION

**Jiuhua Hotel:** We will book some hotel rooms in advance with a special discount. Delegates who need can contact us when make the registration.



## CORRESPONDANCE

Office of Science & Technology  
Nanjing Institute of Geology & Palaeontology  
Chinese Academy of Sciences  
39 East Beijing Road, Nanjing 210008  
CHINA  
Email: [kjc@nigpas.ac.cn](mailto:kjc@nigpas.ac.cn)  
Tel: 025-83282106, 83282198



# 古生物、精时地层及化石能源国际研讨会

## International Conference on Palaeobiology, High Resolution Stratigraphy and Fossil Energy

November 18-19, 2021, Nanjing, China

### Registration Form

Family name (last name): \_\_\_\_\_ First name(s): \_\_\_\_\_

Title or position: \_\_\_\_\_ Nationality: \_\_\_\_\_

Male ( ) Female ( )

Institution: \_\_\_\_\_

Address: \_\_\_\_\_

Periods of stay in China \_\_\_\_\_

Passport number and valid dates: \_\_\_\_\_

E-mail: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

● I plan to register as (use  $\sqrt{\quad}$  to indicate your choice):

Formal participant ( ); Student ( )

● I plan to give:

( ) Oral presentation entitled:

\_\_\_\_\_

( ) Poster presentation entitled:

\_\_\_\_\_

Other suggestions and comments: \_\_\_\_\_

Date:

Signature:

**Please send this form by email before May 31, 2021 to:**

Office of Science & Technology

Nanjing Institute of Geology and Palaeontology, CAS

39 East Beijing Road, Nanjing 210008, P. R. CHINA

e-mail: [kjc@nigpas.ac.cn](mailto:kjc@nigpas.ac.cn)



## **GAC-MAC London 2021 joint annual meeting London, Ontario, Canada: Pre-meeting workshop on the Silurian Lockport Group**

**Venue:** to be held at Western University, London, Ontario. It is anticipated to be a hybrid conference. This one-day pre-meeting workshop will be virtual and will take place Sunday October 31, 2021 (**TBC**); approximate duration 9am to 3pm, EST, with breaks and time for questions/discussions.

**Website:** <https://gacmac2021.ca/workshops-and-short-courses/#Details4>

**Course description:** A New exploration model for Silurian Lockport Group “Guelph” carbonate plays, southwestern Ontario and Great Lakes region. Organizers: Shuo Sun (Western University; Oil, Gas and Salt Resources Library), Frank Brunton (Ontario Geological Survey, Western University), Jordan Clark (Oil, Gas and Salt Resources Library), and Jisuo Jin (Western University).

Regional-scale outcrop/subcrop and deeper subsurface mapping by staff/students at Ontario Geological Survey with staff at the Oil, Gas and Salt Resources Library has resulted in the development of a revised stratigraphic nomenclature and paleoenvironmental interpretation for the mature early Silurian petroleum play formerly referred to as the “Guelph” pinnacle play in southwestern Ontario. This predominantly dolostone succession is now referred to as the Lockport Group and comprises, in ascending order: Gasport, Goat Island, Eramosa and Guelph formations. Recognition of subregional disconformities within the revised lithofacies relationships indicate that these stacked carbonates were deposited on a complex, structurally-influenced, carbonate ramp that dipped towards the Appalachian foreland basin. This core workshop includes the recent study on regional porosity and permeability variations of these Lockport Group pinnacles and inter-pinnacle areas in southwestern Ontario. Data from cored wells in various depositional regimes will be displayed to show the regional stratigraphic architecture, depositional and diagenetic attributes, and geological controls on porosity and permeability distributions. This workshop will also provide: 1) geo-spatial analysis of the porosity-permeability distributions of the stacked carbonate cycles relative to the re-interpretation of the largely non-reefal pinnacle structures as paleokarstic remnant landforms; 2) descriptions of the re-interpreted paleokarstic rubble that characterizes the dramatically thinner Lockport Group inter-pinnacle settings; 3) case studies of the reef mound cycles in middle to outer ramp areas where paleokarstic features are less well developed. Virtual reality



tools are also employed for videos demonstrating the 3D model of the preserved carbonate structures in the subsurface.

**Important dates** (<https://gacmac2021.ca/>):

Deadline for abstract submission (new): 12 July 2021

Deadline for Early-Bird registration: 17 September 2021

Conference: 3-5 November 2021

## **SILURIAN RESEARCH 2020**

### **NEWS FROM THE MEMBERS**

(in alphabetical order)

#### **Fernando Alvarez**

Departamento de Geología, Universidad de Oviedo, Oviedo, Spain.

E-mail: [fernando@geol.uniovi.es](mailto:fernando@geol.uniovi.es)

Publications: Alvarez and Alonso-Zarazaga 2018; Alvarez and Talent 2018; Emig *et al.* 2018

#### **Anna Antoshkina**

Institute of Geology FSC Komi SC UB of RAS, Syktyvkar, Russia.

E-mail: [Antoshkina@geo.komisc.ru](mailto:Antoshkina@geo.komisc.ru)

I work on Upper Ordovician and Silurian bioevents, paleogeography and Paleozoic reefs. I am also interested in the evolution of the Lower Paleozoic sedimentary basin in the northeastern part of the European Platform. Projects - the Ordovician-Silurian border, Hirnantian and Silurian strata, exposed in the Subpolar and Northern Urals, together with my young colleagues Lyuba Shmeleva and Evgeny Ponomarenko, continue. Together with my colleagues from our institute and others, a comprehensive study of various rocks, ooids and nodules in Phanerozoic sediments using modern methods of physics continues.

Publication: Antoshkina *et al.* 2020

#### **Gudveig Baarli**

Williams College, Geoscience Department, Wachenheim Science Center, 18 Hoxsey Street, Williamstown, MA 01267, USA.

Tel.: +1 413 587 2329; E-mail: [gbaarli@williams.edu](mailto:gbaarli@williams.edu)

I am continuing work on the atrypids of the Solvik Formation in the central Oslo Region. Last year I published the second article on the Atrypinae from the Uppermost Hirnantian through Aeronian and finished the ribbed atrypids. At this moment I am close to finishing the third and last article treating the smooth atrypids. This makes a total of 25 ribbed atrypids and ten smooth atrypids from the formation. The Solvik Formation, thus, gives good insight into the recovery of this group after the end-Ordovician mass extinction.

Publications: Baarli 2021b, a

### **Alyssa M. Bancroft**

Indiana Geological and Water Survey, Indiana University, 1001 East 10th Street, Bloomington, Indiana USA 47405-1405.

Tel.: +1 231 881 0533; E-mail (primary): [ambancroft@gmail.com](mailto:ambancroft@gmail.com); E-mail (work): [ambancro@iu.edu](mailto:ambancro@iu.edu)

Publications: Bancroft and Cramer 2020; Oborny *et al.* 2020b; Rine *et al.* 2020; Žigaitė *et al.* 2020; Hartke *et al.* 2021

### **Chris Barnes**

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

Tel.: +1 250 920 8382 (cell); E-mail: [crbarnes@uvic.ca](mailto:crbarnes@uvic.ca)

Chris Barnes, Canada, is continuing Silurian conodont paleontology/stratigraphy/isotope geochemistry research. The main current projects being: a) Ordovician and Silurian conodont biostratigraphy, bioevents, eustasy, and thermal maturation; b) analysis of the effects of climate, eustasy and tectonics on conodont evolution and ecology during the early Paleozoic from the major database developed from a half-century of sampling throughout the Canadian part of Laurentia; and c) Early Silurian microvertebrate assemblages from the Cape Phillips Formation, Sheills Peninsula, Devon Island, Nunavut, Canada (with Susan Turner (Queensland Museum) and David Sprague (Calgary)).

Publication: Barnes 2020

### **James E. Barrick**

Department of Geosciences, Texas Tech University, Lubbock, TX 79709-1053, USA.

Tel.: +1 806 441 9185; E-mail: [Jim.barrick@ttu.edu](mailto:Jim.barrick@ttu.edu)

I am retired from the university, but still working on some Silurian conodont projects.

## **Frank R. Brunton**

Ontario Geological Survey, Ministry of Energy, Northern Development & Mines, Sudbury, Ontario P3E 6B5, Canada.

Tel.: +1 705 670 5956; +1 888 415 9845 ext. 5956 (Toll); + 1 705 920 3775 (Cell); E-mail: [frank.brunton@ontario.ca](mailto:frank.brunton@ontario.ca)

Main research interests involve field-based mapping of Ontario's Paleozoic bedrock & groundwater resources. This approach involves: 1) basin analysis studies – sequence stratigraphy / sedimentology / paleobiology / bio-chemostratigraphy, and paleobiogeographic reconstructions; 2) creation of 3D block diagrams and models; 3) karst mapping and assessment – leading to collaboration with other provincial ministries to create mitigation and guidance documents for land-use planners and regulators.

Field-based mapping & subsurface projects of Silurian strata in Ontario – late 2019 to winter 2021:

A multi-year surface and subsurface mapping program of lower Silurian stacked dolostones of Lockport Group was completed in 2020. Main goals were to assess regional sequence stratigraphic and other geologic controls on groundwater flow zone distributions across the Niagara Escarpment cuesta of southwestern Ontario. Study involved: 1) logging hundreds of cores and oil/gas wells, including incorporation of geophysical well logs; chemostratigraphy profiles of select wells; development of 3D block diagrams and integration of this data into a regional 3D Leapfrog model of entire Paleozoic succession in southwestern and southcentral Ontario.

Other Silurian studies:

Rhys Paterson, University of Western Ontario, London is undertaking MSc study of lower Silurian Medina and Clinton Groups, southwestern Ontario.

Subsurface Pinnacle study of southwestern Ontario:

Dr Shuo Sun is in second year of Post-Doctoral study that involves summarizing porosity and permeability test results conducted on cores both within and adjacent to early Silurian Lockport Group pinnacle structures. Industry data was conducted between 1950s to early 2000s and includes 11,543 core analysis data sets from 155 cored wells that were conducted at 14 different laboratories. Measurements include: porosity, vertical and horizontal permeability ( $K_v$ ,  $K_h$  +  $K_{90^\circ}$ ), depth intervals, oil/water saturation, and bulk and grain density.

This study also involves improving formation rank picks of Lockport Group in oil/gas wells across southwestern Ontario to be included in phase 2 of 3D Leapfrog modelling work.

3D Paleozoic Bedrock studies, Southern Ontario:

The Ontario Geological Survey and Geological Survey of Canada began a collaborative 5-yr study to develop the first 3D Leapfrog model of Paleozoic strata of southwestern and southcentral Ontario (2015-2019). The study area is greater than 110,000 km<sup>2</sup> and thickest parts of succession is approximately 1400m. The sedimentary strata are predominantly

Ordovician through Devonian age. The initial publications were produced in late November 2019.

Publications: Brett *et al.* 2018; Carter *et al.* 2019; Priebe *et al.* 2019, 2020, 2021; Brunton and Brintnell 2020; Clark *et al.* 2020; Paterson *et al.* 2020; Sun *et al.* 2020, 2021.

### **Carole J. Burrow**

Geosciences, Queensland Museum, 122 Gerler Rd, Hendra 4011, Qld, Australia.

Tel.: +61 7 33916626; E-mail: [carole.burrow@gmail.com](mailto:carole.burrow@gmail.com)

The past year's work has again concentrated on Devonian rather than Silurian fossil fish. The project investigating the vertebrate microfossils in sediments from the late Silurian to Middle Devonian in the Mossgiel-DDH1 core from the Darling Basin, western NSW continues in partnership with Sue Turner and Pat Conaghan (MUCEP). The project has been delayed by our inability to locate the microfossils picked from the samples. Otherwise, the main Silurian-relevant activity has been preparing a revision of the *Acanthodii Handbook*, which will hopefully be published in 2021.

### **Carlo Corradini**

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My work on Silurian conodonts and biostratigraphy continues. Last year most of the researches were devoted to the Carnic Alps, where I am investigating the Pre-Variscan Sequence (Upper Ordovician-lower Carboniferous). Studies on Silurian and Lower Devonian mainly focus on "Orthoceras limestones" and calcareous levels within black shales sequences, both studying new sections and updating data from classical localities. A few papers were published: one on conodonts and stratigraphy across the Silurian/Devonian boundary in the whole Carnic Alps (Corradini *et al.* 2020a); one dealing on the classical, but strongly tectonized, Valentintörl section, where a huge hiatus separating rocks of Hirnantian to Ludlow age is present (Corriga *et al.* 2021); two geological maps on selected areas of the Central Carnic Alps (Corradini *et al.* 2020a; Pondrelli *et al.* 2020).

The study of conodonts from the San Juan Precordillera (Argentina) is in progress (with M.J. Gomez, A. Mestre and S. Heredia), and a new conodont species, *Ozarkodina huenickeni* was described (Gómez *et al.* 2021). Finally, trace fossils in Telychian black shales of Sardinia were studied (Baucon *et al.* 2020b).

Publications: Baucon *et al.* 2020b; Corradini *et al.* 2020a, b; Pondrelli *et al.* 2020; Corriga *et al.* 2021; Gómez *et al.* 2021

## **Brad Cramer**

Department of Earth and Environmental Sciences, Provost's Faculty Fellow for Diversity, Equity, and Inclusion, University of Iowa. Iowa City, Iowa 52242, USA.

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Our research group continues its work on the Altajme Core from Gotland, Sweden, and are currently working on Sulfur isotopes and U-Pb dating of zircons from the core. The first half of the carbon isotope record was recently published in Hartke *et al.*, 2021, and the upper half of the core is in review in a manuscript by Biebesheimer *et al.* in review. We also published a range of conodont and carbon isotope data from the Appalachian Basin (Bancroft and Cramer 2020; Oborny *et al.* 2020b) as well as the carbon isotope and Silurian chapters of the GTS. A new study on conodont crystallography was also published in Royal Society Open Science (Shohel *et al.* 2020).

Publications: Bancroft and Cramer 2020; Cramer and Jarvis 2020; Melchin *et al.* 2020; Oborny *et al.* 2020b, a; Shohel *et al.* 2020; Cramer *et al.* 2021; Hartke *et al.* 2021

## **G. Susana de la Puente**

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My research continues to focus on Chitinozoan and Paleozoic geological studies.

Publication: de la Puente *et al.* 2020

## **André Desrochers**

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I am working on the Upper Ordovician to Lower Silurian strata of Anticosti Island in Eastern Canada. My research program focuses on high-resolution stratigraphic studies integrating carbonate sedimentology, sequence stratigraphy, biostratigraphy, and chemostratigraphy. A number of collaborative projects are in progress including i) testing global anoxia an alternative cause for the Hirnantian mass extinction (with Julie De Weirdt, Thijs Vanderbrouke and others), ii) time-series analyses derived from high-resolution stable isotope data of the Upper Ordovician Anticosti succession (with Matthias Sinnesael and others), iii) stratigraphy and timing of the End Ordovician mass extinction (with Joshua Zimmt and Seth Finnegan), iv) sedimentology and paleoecology of Telychian encrinites (with Bill Ausich, Selina Cole, and

David Wright), and v) paleoecology of giant Aulacerid stromatoporoids. (with Geneviève Riopel and Rachel Wood).

Publications: Mauviel *et al.* 2020; Penny *et al.* 2020

### **Rein Einasto**

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I am interested in sedimentology, facies-modelling, sequence and cyclo-stratigraphy, palaeoclimatology and the evolution of sedimentary basins. I continue to work on bed-by-bed studies of sequences of building-limestone in Estonia.

### **Annalisa Ferretti**

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My Silurian research continues to be focused on the biosedimentology and paleoecology of the Austrian Carnic Alps.

My recent papers have strictly focused on the effect of diagenesis on bioapatite mineralogy and crystallization patterns over geological time (Medici *et al.* 2020, 2021; Ferretti *et al.* 2021).

I have also co-guest edited with Alyssa Bancroft and John Repetski (Ferretti *et al.* 2020a) the Special Issue of Palaeogeography, Palaeoclimatology, Palaeoecology “GECKO: Global Events impacting Conodont evolution”, a collection of 20 conodont contributions, including six Silurian papers.

A detailed biostratigraphic investigation has been carried out by means of conodonts in the uppermost Ordovician-lowermost Devonian sector of the Valentintörl cliff, located in the Austrian part of the Carnic Alps (Corriga *et al.* 2021).

The behaviour of the iconic ichnogenus Chondrites was re-evaluated in Baucon *et al.* (2020a) based on review of existing literature and analysis of novel data (macroscopic, thin section and ESEM-EDX observations; CT-scans and resin peels of modern analogues; computer-controlled serial grinding; morphometric analysis and theoretical morphology).

Finally, a paper describing Leonardo da Vinci’s contribution to stratigraphy, of broad interest to any stratigrapher, exactly five hundred years after Leonardo’s death, has been published (Ferretti *et al.* 2020b).

Publications: Baucon *et al.* 2020a; Ferretti *et al.* 2020a, b, 2021; Medici *et al.* 2020, 2021; Corrigan *et al.* 2021

### **Mansoureh Ghobadi Pour**

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I continue my work on rich silicified early Aeronian trilobite, brachiopod and bryozoan faunas of the Derenjal Mountains, North-Eastern Central Iran in cooperation with Caroline Buttler, Robert Owens and Leonid Popov. Another Aeronian fauna under study is from Qarabil Formation of Southern Kopet-Dagh. The manuscript on moderately rich Aeronian Stegocornu brachiopod association from Kerman Region, written jointly with Leonid Popov, Shaahin Zaman, Valeriy Baranov and Lars Holmer, is completed and will be published later this year.

### **Juan Carlos Gutiérrez-Marco**

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Publications: Lorenzo *et al.* 2020; Gutiérrez-Marco *et al.* In press

### **Olle Hints**

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In 2020 I have been involved in studying Silurian bio- and chemostratigraphy of several Baltic sections, notably from Latvia and Lithuania, together with Peep Männik, Tõnu Meidla, Leho Ainsaar and Aivo Lepland (Estonia). Work is in progress on a newly exposed Ordovician-Silurian boundary succession from northern Estonia, where microfossils and carbon isotopes have been recently analyzed. Also, some Baltic sections have been studied for various geochemical proxies for better understanding of redox changes in the Silurian Baltic Basin as well as the influence of early diagenetic environments on stable isotope records. These studies have been led by the teams of Seth Young (Florida) and David Fike (Missouri), respectively. Few papers are out on these topics and others are in preparation. Together with Liang Yan, Wang Wenhui and Jaak Nõlvak we are studying organic-walled microfossils, notably chitinozoans, from Ordovician-Silurian successions of Baltica, Laurentia and South China and some intriguing results got published in 2020. Taxonomic work on Silurian scolecodonts



(polychaete jaws) together with Petra Tonarova (Czechia) and Mats Eriksson (Sweden) has been progressing slowly, but soon some parts will get finished.

Publications: Liang *et al.* 2020; Young *et al.* 2020

## **Bing Huang**

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I have been studying brachiopods during the end Ordovician mass extinction for three years according to the topic of the sub-project (led by myself) of a Program from the Chinese Academy of sciences. In 2020, I published more papers than previous years with my colleagues (see the list), mostly due to coincidences of scheduling of several journals. These published studies were finished in 2018 and 2019. Among them, for myself, the Hirnantia Fauna discovered from the western Yunnan province (Sibumasu) is most interesting. We reported a vertical transition within the Hirnantia fauna. This transition parallels the pattern apparent in onshore–offshore gradients within the Hirnantian, predicting the seaward transitions between community types within a single transgressive sequence. At the beginning of 2020, my great honor to know that I will be the ISSS titular member and manager of Silurian webpage. I am grateful for the trust from both the ISSS body of titular members and the ICS executive, and will be responsible for being the titular member. To the end of 2020, I have finished one study about epipunctae with Prof Jin Jisuo (already published online) and preparation of another one about a middle Aeronian brachiopod fauna from South China. Now I am in vocation and begin writing the latter one. As a deputy editor in chief of <Acta Palaeontologica Sinica>, I also managed and reviewed many manuscripts during the last year. I only attended two short national meeting, both held at the end of the 2020, one is editorial board conference, the other is about my sub-project from Chinese Academy of Sciences. During the last year, with my help, Wang Qian (my MSc student) finished his preparation and photography of specimens which will be described and analyzed in his master thesis, and also published a paper (in Chinese). I also have my first PhD student from the last September, who begin learning Telychian brachiopods from South China.

Publications: Huang and Jin 2020; Huang and Li 2020; Huang *et al.* 2020d, b, a, c; Wang and Huang 2020

## **Emilia Jarochovska**

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I have become Newsletter Editor and Council Member of the Palaeontological Association and Member of the Scientific Advisory Board, Paleosynthesis, <http://www.paleosynthesis.nat.fau.de/>

In October 2020, I joined Vienna University as a Guest Professor in Biomineralization and Sclerochronology.

I continue work on my DFG-funded project Ultrastructural evolution of conodont skeletal tissues - reconstruction using electron backscatter diffraction (EBSD) with Bryan Shirley as my PhD student. I also served on the PhD committee of Pauline Guenser, a conodont researcher at Université Claude Bernard Lyon. With Duncan Murdock (Oxford Museum of Natural History), I co-supervise a Master student Isabella Leonhard, who is working on sclerochronology in Cambrian and Silurian conodonts. Together with my Master student Niklas Hohmann, we developed an online app for teaching the effects of sedimentation rate on formation of fossil concentrations and on age models: [https://stratigraphicpaleobiology.shinyapps.io/shellbed\\_condensator/](https://stratigraphicpaleobiology.shinyapps.io/shellbed_condensator/)

Publications: Bremer *et al.* 2020; Jarochovska *et al.* 2020; Petryshen *et al.* 2020; Ray *et al.* 2020a, In press; Shirley *et al.* 2020; Zatoń and Jarochovska 2020

## **Markes E. Johnson**

Department of Geosciences, Williams College, Wachenheim /science Center, 18 Hoxsey Street, Williamstown, Massachusetts, 01267, USA.

I plan to revisit my research on the Ordovician-Silurian transition in the Churchill River Group on Canada's Hudson Bay in order to make new calculations on wave heights responsible for development of the basal quartzite conglomerate that sits unconformably on Proterozoic quartzite. This planned work fits with my recent interests using mathematical equations to estimate waves impacting rocky shores of Pleistocene and Holocene ages around the world.

## **Dimitri Kaljo**

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Dimitri Kaljo (Estonia): continued some studies on the Ordovician and Silurian bio- and chemostratigraphy of Baltica as an emeritus member at the geology department of the Taltech. The Covid pandemia slowed down different activities, but electronic cooperation with some colleagues from USA and Europe still works. Last half a year I have been busy together with my earlier Taltech colleagues (T. Martma, T. Märss, V. Nestor, V. Viira) in a project under a running heading “A search for the missing MLCIE in Ohesaare”. Hopefully we can report about publication in the next issue of the news.

## **Stephen Kershaw**

Department of Life Sciences, Brunel University, UK (I am retired and work from home).

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Principal focus on Palaeozoic stromatoporoids, working on a range of projects, leading to the following three publications; Kershaw and Sendino 2020; Balthasar et al. 2021; Sandström et al. 2021. Also work on a monograph of British Silurian stromatoporoids, that is now at an advanced stage.

Publications: Huang *et al.* 2020e; Kershaw and Sendino 2020; Yu *et al.* 2020; Balthasar *et al.* 2021; Sandström *et al.* 2021

## **Anna Kozłowska**

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I still work on Silurian graptolites, mostly of the unique group, the retiolitines. Together with Denis Bates, I am preparing a new paper about morphology and reconstruction of *Paraplectograptus tubarium*. The well-preserved membranes of some retiolitines is a subject of the new paper prepared by Alf Lenz, Mike Melchin and me.

Publications: Kozłowska and Bates 2021; Kozłowska In press

## **Qi-jian Li**

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Qi-jian LI (China) is mainly working on Palaeozoic reefs and hypercalcified sponges (e.g. calathids, stromatoporoids and sphinctozoans). In 2020, I continued my sedimentological and paleoecological research on Ordovician-Silurian reefs. Apart from the colleagues in Nanjing, I am now working on Early Silurian reefs of South China with Prof. Axel Munnecke, Dr Stephen Kershaw and Dr. Andrej Ernst. I also continue my collaborations focused on quantitative paleoecological analyses of reefs at the Ordovician-Silurian transition with several colleagues.

Publications: Yuan *et al.* 2020; Ernst *et al.* 2021

## **Steve LoDuca**

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Ongoing work includes descriptions of new and poorly known noncalcified macroalgae from the Cambrian, Ordovician, and Silurian of North America, Europe, and China.

Publication: LoDuca *et al.* 2021

## **David K Loydell**

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I look forward to returning to more research activity later this year. Preparing online teaching, etc. and trying somehow to maintain a practical element to the student experience used up virtually all of my time last year. Research-wise, I continued to contribute to various SGP (Sedimentary Geochemistry and Palaeoenvironments Project) research projects. I refereed a few papers. Lots of catching up to do.

Publications: Cole *et al.* 2020; Loydell 2020, 2021; Stockey *et al.* 2020

## **Jörg Maletz**

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I am working on several projects in the Ordovician and Silurian. The Silurian work focusses on a number of Llandovery successions in sections and drill cores on the Yangtze Platform of China with Wang Xiaofeng, Wang Chuanshang and colleagues from Wuhan, Hubei Province, China. Further work on the Röstanga drill core of Scania, southern Sweden will be done with Anna Suyarkova (St. Petersburg, Russia) and David Loydell (Portsmouth, UK), but already started years ago. A paper on some Silurian graptolites described and illustrated by Eduard Suess (1851) is close to be finished with Barbara Hopfensperger and Petera Lukeneder (Vienna, Austria). This material recently surfaced in the collection of the Cistercian Dominik Bilimek at the monastery Heiligenkreuz in lower Austria. Work on the Treatise on Invertebrate Paleontology, part V, Hemichordata (Graptolithina, Enteropneusta) is nearly finished and most chapters are available through 'Treatise Online'.

Publications: Bergstroem *et al.* 2020; Laibl *et al.* 2020; Maletz 2020e, a, b, d, c; Maletz *et al.* 2020a, b; Menning *et al.* 2020; Rønning *et al.* 2020; Maletz and Ahlberg 2021; Wang *et al.* 2021

## **Peep Männik**

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I continue to work on evolution, taxonomy and palaeoecology of conodonts, conodont-based high-resolution stratigraphy, bioevents and palaeogeography. I am also interested in sequence stratigraphy, palaeoclimatology and evolution of sedimentary basins. Joint studies together with colleagues from Estonia, Czech Republic, Germany, Poland, 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.

Publications: Chen *et al.* 2020c, d, b; Gubanov *et al.* 2020

## **Tiiu Märss**

Department of Geology at TTU, Ehitajate tee 5, 19086 Tallinn, Estonia (I am retired from the department).

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Publications: Bremer *et al.* 2020; Chen *et al.* 2020a

## **Alexander (Sandy) D. McCracken**

Geological Survey of Canada (Calgary). 816-160 Wilson St., Victoria, BC V9A 7P9, Canada (please contact me by e-mail or post (Victoria mailing address) only).

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Alexander (Sandy) D. McCracken is periodically working on good Ordovician-Silurian collections from Hudson Bay and Moose River basins, Ontario and Manitoba, and also has some Arctic Island Ordovician-Silurian conodonts to review. I retired to Victoria, BC in September 2017, but continue as a part-time volunteer with the GSC Calgary office. I am in email contact with the Calgary office once a week, and so may be a bit slow to respond to emails. Regular mail to the Calgary office does not get forwarded so please send only emails or email attachments.

## **Tõnu Meidla**

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I am teaching several courses related to historical geology and palaeontology at the University of Tartu (Institute of Ecology and Earth Sciences), Estonia. Our group continues work on several aspects related to the Silurian System: regional stratigraphy, stable isotopes, events (Mulde and Lau in particular) and faunal dynamics. We are carrying out an integrated study of several Lithuanian and Latvian core sections in cooperation with colleagues from Lithuania (S. Radzevičius, A. Spiridonov, S. Rinkevičiūtė) and Taltech in Estonia (O. Hints, P. Männik). We are preparing a paper of stable isotopes in the Ordovician-Silurian boundary interval of Estonia (with B. Gul, L. Ainsaar). We published an overview chapter on the Silurian and Devonian in the book 'Nature through Time' (with O. Tinn, L. Ainsaar). I have projects on ostracod taxonomy and distribution in progress in Llandovery of Estonia and Latvia, but also in Wenlock and Ludlow of Lithuania (with S. Rinkevičiūtė and A. Spiridonov). My PhD student Karin Truuver (co-supervised with O. Tinn) completed her PhD thesis on ostracod dynamics in the Ordovician-Silurian boundary interval in Baltoscandia and submitted it to the defence.

Publications: Meidla *et al.* 2020; Spiridonov *et al.* 2020a, b; Tinn *et al.* 2020; Truuver *et al.* 2021

## **Michael Melchin**

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I am currently working on several projects related to graptolite biostratigraphy and biodiversity, as well as chemostratigraphy through the Late Ordovician and Early Silurian, particularly in North America, Europe, and China, collaborating with Charles Mitchell, Chris Holmden, Gordon Love, Brad Cramer, Junxuan Fan, and others. I am collaborating with Petr Štorch, Junxuan Fan, Xu Chen, Jan Zalasiewicz, Jerry Davies, Thijs Vandenbroucke and others on the study of potential GSSP candidate sections for the base of the Aeronian Stage in Wales and China. I am collaborating with Erik Sperling, Justin Strauss, and Tiffani Fraser on Ordovician to Lower Devonian graptolite biostratigraphy and chemostratigraphy in northern Yukon. I am also working with Petr Štorch and others on several projects related to morphologic and phylogenetic analyses of early Silurian graptolites.

Publications: Melchin and Cameron 2020; Melchin *et al.* 2020; Strauss *et al.* 2020; Hartke *et al.* 2021

## **Tatiana L. Modzalevskaya**

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I continue to take part in thematic project connected with analysis of Regional scales of EurAsian Russions regions. New project: Atlas of compilation on the Phanerozoic stratigraphical key sections of European Arctic Russia will be start in 2021. In the network of this project I describe Silurian section of Polar and west slope Urals with lithologic and biostratigraphic analysing.

## **Axel Munnecke**

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Publications: Kröger *et al.* 2019; Jarochowska *et al.* 2020; Ray *et al.* 2020a; Claussen *et al.* 2021; Ernst *et al.* 2021

## **Stephan Oborny**

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Activities during 2020 involved publication of two manuscripts pertaining to the Silurian succession in the Appalachian Basin. A third manuscript on this topic will be submitted for review in 2021. I was also a coauthor on two manuscripts focused upon the Ireviken and Mulde excursions observed within in the Altajme core, Gotland Sweden. One of these remains in review.

I also took on a new role at the Kansas Geological Survey as an Assistant Research Professor. With this position, I have been modeling the Paleozoic succession within the Cherokee-Forest City Basin, central United States. This Pennsylvanian aged basin extends from eastern Oklahoma to south-central Iowa and is structurally related to the Arkoma Foreland Basin. There exist 10s of thousands of oil well data in this region that have not historically been studied in detail. One aim of this project (one of many) is to better deconstruct the tectonic history of the central United States—bringing it into alignment with modern basin theory—therein providing an improved means for modeling the Paleozoic succession in that area (e.g., Silurian System).

Publications: Oborny *et al.* 2020a, b; Hartke *et al.* 2021

## **Silvio H. Peralta**

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“Biofacies y paleoambientes en el límite Hirnantiano-Rhudaniano de la Precordillera Argentina: caracterización del evento glacimarino Hirnantiano”. Financial support from the National University of San Juan, Argentina. 2020-2021.

PhD Thesis: In process by Geologist Jessica Gómez Sánchez, conicet, cigeobio. “Biofacies y paleoambientes en el límite Hirnantiano-Rhudaniano de la Precordillera Argentina: caracterización del evento glacimarino Hirnantiano”. Advisor; Dr. Silvio H. Peralta (CONICET-UNSJ); Co-Advisor: Dra. Matilde S. Beresi (CRICTY, CCT Mendoza).



## **Ian Percival**

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In the latter half of 2020 I co-wrote a manuscript on the structural preservation of the Cadia porphyry Au-Cu deposits in central New South Wales – my contribution involved revision and updating of the Silurian stratigraphy overlying the deposit. The paper has been accepted for Australian Journal of Earth Sciences and will be published later this year.

Publication: Wang *et al.* 2020a

## **José Manuel Piçarra d'Almeida**

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I'm retired, but still being collaborator of the LNEG (Portuguese Geological Survey).

## **Leonid Popov**

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My Silurian studies are presently focused on the Llandovery brachiopod faunas of Kazakhstan and Iran. The paper on the mid-Aeronian brachiopod fauna of Kerman Region with a special attention to the early radiation of spiriferides, written jointly with, Shaahin Zaman, Valeriy Baranov, Mansoureh Ghobadi Pour and Lars Holmer, is currently in press in the Journal of Systematic Paleontology. Another paper in the advance stage of preparation is dedicated to the first Ludlow brachiopod fauna documented from Iran.

## **Sigitas Radzevičius**

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I am working on the taxonomy, stratigraphic distribution, diversity, disparity, and phylogeny of Silurian graptolites. Most of my research is concentrated on the construction of high-resolution Silurian time scales by means of integrated stratigraphy. I'm integrating stratigraphic models, taxonomic data, geochemical, and geophysical proxies in order to understanding the drivers of Silurian global extinction and turnover events.

Publications: Ainsaar *et al.* 2020; Radzevičius *et al.* 2020; Spiridonov *et al.* 2020a, b; Whittingham *et al.* 2020

## **David Ray**

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My research activities over the past year have focused upon a review of Phanerozoic eustasy, field and training guides, and the Silurian of the Midland Platform (England and Wales). In particular, collaboration with Emilia Jarochowska, Helen Hughes, Anna Claussen and others has focused on the area between Old Radnor and Presteigne (Powys and Herefordshire). We have now completed our stratigraphic assessment of the succession (Aeronian, Telychian and Sheinwoodian) and can confirm the identification of the early Sheinwoodian carbon isotope excursion, paleo-shoreline deposits and sea-level variations of regional and global significance. We hope to see this work published in the summer (currently in press). In addition, work continues on the Usk inlier succession (Monmouthshire), with initial carbon isotopic values from the Usk Limestone and sequence stratigraphic interpretations, suggesting synchronicity with the Homerian Much Wenlock Limestone Formation. Preliminary investigations are also underway upon the Telychian succession around the Lickey Hills (Birmingham).

Publications: Ray 2020; Ray and Worton 2020; Ray *et al.* 2020a, b, In press; Simmons *et al.* 2020

## **Valeri Sachanski**

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I continue from 2013 to teach students at the University of Mining and Geology “St. Ivan Rilski”, Sofia, Bulgaria. Teaching takes most of my time. I am working on Ordovician–Devonian stratigraphy of Bulgaria and Turkey and especially on Silurian–Lower Devonian graptolite biostratigraphy. In the past year, I published my studies related to the Silurian metalliferous nodules, as well as those related to the Paleozoic phyllocarid crustaceans are established for the first time in Southeastern Europe.

Publications: Boncheva *et al.* 2020b, a; Hikov *et al.* 2020; Sachanski 2020

## **David J. Siveter**

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Silurian research has concentrated on aspects of the Herefordshire Lagerstätte and ostracods from the UK, Japan and central Asia.

Publications: Männik *et al.* 2018; Siveter *et al.* 2018a, b, 2019, 2020b, a; Nadhira *et al.* 2019; Perrier *et al.* 2019a, b, 2020; Rahman *et al.* 2019; Stocker *et al.* 2019a, b; Vandenbroucke *et al.* 2019; Mikhailova *et al.* 2020; Mikhailova and Siveter 2021

## **Derek J. Siveter**

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My Silurian research has largely involved investigation of the Herefordshire Lagerstätte fauna.

Publications: Siveter *et al.* 2018b, a, 2020b; Stocker *et al.* 2018, 2019a, b; Nadhira *et al.* 2019; Rahman *et al.* 2019

## **Ladislav Slavík**

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Most activities concentrated on Mid-Palaeozoic global correlation and late Silurian and early Devonian conodont biostratigraphy.

The year 2020 was mostly dedicated to the Pridoli Series – integration of all obtained data and testing possibilities for the subdivision of the Series.

Apart from Silurian tasks, late in 2020, a new project on Lower Devonian GSSPs has been started. Several candidate sections were sampled for conodonts and geochemistry.

Publications: Hušková and Slavík 2020; Machado *et al.* 2020; Slavík and Hladil 2020; Suttner *et al.* 2020; Weinerová *et al.* 2020

## **Andrej Spiridonov**

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Working on the integrated stratigraphy of the Ludlow and Pridoli of the Silurian Baltic Basin. Working on the development of quantitative methods of stratigraphic correlation, causal inference from stratigraphic series, stratigraphic phylogeny reconstruction methods. Supervising 5 PhD students on various paleobiological themes, including Silurian conodonts and ostracods.

Publications: Spiridonov *et al.* 2020a, b; Whittingham *et al.* 2020

## **Petr Štorch**

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Multi-proxy studies related to the current search for Aeronian, Telychian and Homeric GSSP replacement candidate sections continued in the frame of a new three-year project focussed on biostratigraphy and faunal dynamics of the Silurian pelagic biota in the Prague Synform. Work on the Aeronian part of the El Pintado reservoir section (Seville Province Spain) continued in collaboration with J. C. Gutiérrez-Marco and D. K. Loydell. This section is the only candidate to be proposed for new base Telychian GSSP. A detailed study on lower Aeronian rastritid

graptolites and their worldwide palaeobiogeographical distribution has been completed at last in collaboration with Zongyuan Sun, Junxuan Fan, M. J. Melchin and A. Suyarkova. Field work on black-shale dominated Sheinwoodian-Homerian succession exposed in Kosov Quarry, carried out with Š. Manda, L. Slavík and Z. Tasáryová, has been completed in October 2020 and a joint paper is under preparation. Another paper on lower Gorstian graptolites and biostratigraphy is nearly complete. I am supervising a new PhD-student Zuzana Strossová in her project on lower Telychian graptolites and high-resolution stratigraphy of the Prague Synform.

### **Anna A. Suyarkova**

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Publication: Suyarkova and Yakupov 2020

### **Thijs R. A. Vandenbroucke**

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Thijs Vandenbroucke remains interested in reconstructing the Silurian palaeoclimate and palaeo-environment. Julie De Weirdt and Tim De Backer continue their PhD research projects with me at UGent. Julie focusses on geochemistry and palynology of the Upper Ordovician - lower Silurian in N. America while Tim uses similar methods in the upper Silurian and Devonian (these are projects in collaboration with Poul Emsbo, USGS, Patrick McLaughlin, Indiana Geol. Survey and André Desrochers, UOttawa). The other members of the lab, including PhD students Cristiana Esteves and Cecile-Marie Lissens and postdoc Dr. Thomas Wong Hearing pursue their interests in the Cambrian-Ordovician, but remain involved in various Silurian side projects.

Publications: Jarochovska *et al.* 2020; Perrier *et al.* 2020; Saparin *et al.* 2020

## **Jacques Verniers**

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I have been:

- Editing for publication the PhD (2014) of Jan Mortier on the stratigraphy and chitinozoans of the Silurian of the Condruz inlier Belgium.
- Preparation of a Revision of the stratigraphy of the Silurian formations in Belgium.

## **Olev Vinn**

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I am working on the evolution of symbiosis, predation, bioerosion and encrustation in the Silurian. My other interests include palaeontology of problematic tubeworms and other tubicolous fossils from the Palaeozoic (e.g. cornulitids, tentaculitids, microconchids, Sphenothallus etc.), and evolution of tubeworm biomineralization. I have been also studying the trace fossils from the Silurian of Estonia.

Publications: Vinn and Toom 2020; Vinn *et al.* 2020

## **Guangxu Wang**

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In 2020, proof corrections of the monograph on Silurian Rocks and Index Fossils in China (in Chinese) with Renbin Zhan and other colleagues at NIGPAS were completed and it is now published with Zhejiang University Press. A paper on the chemostratigraphy of the Wulipo Formation in northern Guizhou, SW China, which represents one of the very rare records of shelly fauna across the Ordovician and Silurian transition worldwide, was published. The rock unit was previously dated as middle Rhuddanian (early Silurian) and is now believed to be of late Hirnantian age based on the presence of the HICE, as well as the Transitional Benthic Fauna 3 (TBF 3) characterizing this time interval. In addition, a monograph on the Ordovician-Silurian boundary rugose corals in South China is being prepared and hopefully finalized within 2021.

Publications: Wang *et al.* 2020a, b

### **Wenwei Yuan**

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A short paper on Silurian proetids from Ningqiang, Shaanxi, China has been published in Paleoworld (Yuan *et al.* 2020). Currently I am working on Silurian trilobite genera *Senticucullus* and *Aulacopleura* based on new material collected this year from South China.

Publications: Yuan *et al.* 2020

### **Renbin Zhan**

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In 2020, most of my research time is on the Ordovician study. But, I did finish some work Silurian-related together with my colleagues here in our institute. We have compiled and published a reference book on the Silurian stratigraphy and index fossils of China particularly for experts in exploring oil and gas, and geological survey, and also for university graduate and undergraduate students. It contains more than 200 plates covering all major fossil groups of Silurian, such as graptolites, brachiopods, trilobites, cephalopods, conodonts, chitinozoans, acritarchs, corals, bryzoans, etc. Besides, we also made a case study on the recovery of some major fossil groups after the end-Ordovician mass extinction using the material from South China.

Publications: Wang *et al.* 2020b, a

### **Yuandong Zhang**

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Yuandong ZHANG is continuously working on:

(1) Systematic palaeontology and biostratigraphy of the late Katian to Rhuddanian sponges and graptolites (Anji Biota) in Anji, Northwestern Zhejiang Province, SE China. This work has

been financially supported by President's International Fellowship Initiatives program (PIFI) and a granted by NSF of China (2018-2021). In the Anji area, a complete graptolite succession has been revealed based on a big collection of specimens obtained in the past years, including *Dicellograptus complexus*, *Paraorthograptus pacificus*, *Metabolograptus extraordinarius*, *Metabolograptus persculptus*, *Akidograptus ascensus*, and *Parakidograptus acuminatus* biozones. This succession has been ratified by the National Committee on Stratigraphy of China as a reference standard for the Lower Yangtze Region. A highly diverse (over 100 species), deep-water sponge-dominated community of latest Hirnantian age has been recovered, shedding lights on the survival dynamics in the aftermath of End-Ordovician mass extinction. This work is jointed carried out with Drs. Joseph Botting and Lucy Muir from UK.

(2) Geological characteristics of typified black shale in China. This has been the main task of a project supported by the Chinese Academy of Sciences (2014-2018) and one of the ongoing National Science and Technology Major Projects (2017-2021). As scheduled by the projects, over 5000 m long of drill cores of the most potential gas shale in China have been accumulated in the past years for multi-disciplinary analysis. The cores are opened to global scientists for study and sampling, and from which some samples have been collected for geochemical and microfacies analysis. Those who are interested in this work or aim at some other related approaches, please contact the project leader (Zhang Yuandong).

Publications: Botting *et al.* 2020; Chen *et al.* 2020b; Fang *et al.* 2020; Li *et al.* 2020; Muir *et al.* 2020; Wu *et al.* 2020

## **Wenjin Zhao**

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In 2020, I was continuously working on the Siluro-Devonian vertebrate paleontology and relative stratigraphy together with my colleagues in IVPP, CAS. The main achievements this year can be represented by the redescription of the Telychian *Sinogaleaspis shankouensis* (Galeaspida, stem-Gnathostomata) from Jiangxi, the discovery of the Early Silurian galeaspid *Rumporostralis shipanensis* gen. et sp. nov., the further study on Early Silurian chondrichthyans from the Tarim Basin (Xinjiang, China), and the subdivision and correlation of the Silurian fish-bearing strata both in East Yunan and Xinjiang, China.

In addition, I went to Chengjiang (Yunnan, China) to attend the 8th Annual Meeting of Paleocology Committee of Chinese paleontological Society hold in November 12 to 15, 2020, and gave a talk of "Diversity of Silurian fossil fishes in Xinjiang and the relative paleozoogeography". I conducted the field works both in East Yunnan and Lower Yangtze Region in South China during August 24 to December 10 in 2020, supported by the Special Grant for Fossil Excavation and Preparation of the Chinese Academy of Sciences, the National Natural Science Foundation of China, and the Strategic Priority Research Program of the Chinese Academy of Sciences. Some new important and interesting Siluro-Devonian fossil fishes have been found and collected from Lower Silurian to Middle Devonian during series



of excursions, and some new knowledges on the Siluro-Devonian stratigraphic division and correlation in South China were obtained.

Publications: Andreev *et al.* 2020; Cai *et al.* 2020; Gai *et al.* 2020; Shan *et al.* 2020; Wang *et al.* 2020c

## RECENT PUBLICATIONS

Please note that a few publications are from 2019 or even earlier, as they were not included previously in the *Silurian Times*. In addition, some papers are dealing with Ordovician and Devonian topics by members of ISSS. There are also a few papers in the list that are in press or online.

- Ainsaar, L., Tinn, O., Dronov, A.V., Kiipli, E., Radzevičius, S. and Meidla, T. 2020. Stratigraphy and facies differences of the Middle Darriwilian Isotopic Carbon Excursion (MDICE) in Baltoscandia. *Estonian Journal of Earth Sciences*, **69**, 214–222, <https://doi.org/10.3176/earth.2020.16>.
- Alvarez, F. and Alonso-Zarazaga, M.A. 2018. Paleopetria Özdikmen, 2008 is a junior objective synonym of Petriathyris Lee & Jin, 2006, new name pro Petria Mendes, 1961 (Brachiopoda, Terebratulida) preoccupied by Petria Semenov 1893 (Arthropoda, Coleoptera). *Zootaxa*, **4429**, 585–588, <https://doi.org/10.11646/zootaxa.4429.3.10>.
- Alvarez, F. and Talent, J. 2018. Book review: Phanerozoic Brachiopod Genera of China, by Rong Jiayu (editor-in-chief), Jin Yugan, Shen Shuzhong and Zhan Renbin (eds.), 2017. *Carnets de Géologie, Madrid*, **18**, 183–186, <https://doi.org/10.4267/2042/66094>.
- Andreev, P.S., Zhao, W., et al. 2020. Early Silurian chondrichthyans from the Tarim Basin (Xinjiang, China). *PLOS ONE*, **15**, e0228589, <https://doi.org/10.1371/journal.pone.0228589>.
- Antoshkina, A.I., Zhegallo, E.A. and Isaenko, S.I. 2020. Microbially Mediated Organomineralization in Paleozoic Carbonate Ooids. *Paleontological Journal*, **54**, 825–834, <https://doi.org/10.1134/S003103012008002X>.
- Baarli, B.G. 2021a. Plectatrypinae and other ribbed atrypides succeeding the end Ordovician extinction event, Central Oslo Region, Norway. *Journal of Paleontology*, **95**, 75–105, <https://doi.org/10.1017/jpa.2020.69>.
- Baarli, B.G. 2021b. Survival and recovery atrypid fauna following the terminal Ordovician extinction, the Atrypinae: central Oslo Region, Norway. *Historical Biology*, **33**, 403–440, <https://doi.org/10.1080/08912963.2019.1620228>.
- Balthasar, U., Kershaw, S., Da Silva, A.-C., Seuss, B., Cusack, M., Eichenseer, K. and Chung, P. 2021. Palaeozoic stromatoporoids and chaetetids analysed using electron backscatter diffraction (EBSD); implications for original mineralogy and microstructure. *Facies*, **67**, 8, <https://doi.org/10.1007/s10347-020-00618-5>.
- Bancroft, A.M. and Cramer, B.D. 2020. Silurian conodont biostratigraphy of the east-central Appalachian Basin (eastern USA): Re-examination of the C.T. Helfrich Collection. *Bulletin of Geosciences*, **95**, 1–22, <https://doi.org/10.3140/bull.geosci.1748>.
- Barnes, C.R. 2020. Impacts of climate-ocean-tectonic changes on early Paleozoic conodont ecology and evolution evidenced by the Canadian part of Laurentia. Ferretti, A., Bancroft, A. and Repetski, J. (eds). *Palaeogeography, Palaeoclimatology*,

- Palaeoecology (Special Issue: Global Events impacting CO<sub>2</sub> evolution)*, **549**, 109092, <https://doi.org/10.1016/j.palaeo.2019.02.018>.
- Baucon, A., Bednarz, M., et al. 2020a. Ethology of the trace fossil Chondrites: Form, function and environment. *Earth-Science Reviews*, **202**, 102989, <https://doi.org/10.1016/j.earscirev.2019.102989>.
- Baucon, A., Corradini, C., et al. 2020b. Life in near-anoxic conditions: A case study of the ichnology and infaunal ecology of Silurian graptolitic black shales from Sardinia, Italy. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **556**, 109889, <https://doi.org/10.1016/j.palaeo.2020.109889>.
- Bergstroem, S.M., Ahlberg, P., Maletz, J., Lundberg, F. and Joachimski, M. 2020. Integration of Darriwilian (Middle Ordovician) delta C-13(org) chemostratigraphy with graptolite biostratigraphy in the classical Rostanga area in northwestern Scania (southern Sweden). *Estonian Journal of Geology*, **69**, 121–133, <https://doi.org/10.3176/earth.2020.08>.
- Boncheva, I., Sachanski, V. and Lakova, I. 2020a. 100th anniversary of Prof. Dr. Hristo Spassov – a life devoted to stratigraphy and geology of Bulgaria. *Review of the Bulgarian geological society*, **81**, 21–22.
- Boncheva, I., Sachanski, V. and Andreeva, P. 2020b. Global events in sections of the Upper Devonian and Devonian/Carboniferous boundary interval (Western Bulgaria). *Review of the Bulgarian geological society*, **81**, 121–123.
- Botting, J.P., Janussen, D., Zhang, Y. and Muir, L.A. 2020. Exceptional preservation of two new early rossellid sponges: the dominant species in the Hirnantian (Late Ordovician) Anji Biota of China. *Journal of the Geological Society*, **177**, 1025–1038, <https://doi.org/10.1144/jgs2020-002>.
- Bremer, O., Jarochowska, E. and Märss, T. 2020. Vertebrate remains and conodonts in the upper Silurian Hamra and Sundre formations of Gotland, Sweden. *GFF*, **142**, 52–80, <https://doi.org/10.1080/11035897.2019.1655790>.
- Brett, C.E., Brunton, F.R. and Calkin, P.E. 2018. *Sequence Stratigraphy and Paleontology of the Classic Upper Ordovician-Silurian Succession in Niagara County, New York – with Supplement on Quaternary Geology of Western New York*. Association of Earth Science Editors, 52nd Annual Meeting, Sept. 26-29, Niagara Falls, New York. 1-191.
- Brunton, F.R. and Brintnell, C. 2020. Early Silurian Sequence Stratigraphy and Geological Controls on Karstic Bedrock Groundwater Flow zones, Niagara Escarpment Region and the Subsurface of Southwestern Ontario. *Ontario Geological Survey, Groundwater Resource Study*, **13**, 1–120, plus 7 appendices-372p., and GRS013.kmz.
- Cai, J., Zhao, W. and Zhu, M. 2020. Subdivision and age of the Silurian fish-bearing Kuantu Formation in Qujing, Yunnan Province. *Vertebrata Palasiatica*, **58**, 249–266, <https://doi.org/10.19615/j.cnki.1000-3118.200513>.
- Carter, T.R., Brunton, F.R., et al. 2019. A three-dimensional geological model of the Paleozoic bedrock of southern Ontario. *Geological Survey of Canada, Open File*, **8618**, 1–56, <https://doi.org/10.4095/315045>.

- Chen, D., Blom, H., Sanchez, S., Tafforeau, P., Märss, T. and Ahlberg, P.E. 2020a. The developmental relationship between teeth and dermal odontodes in the most primitive bony fish *Lophosteus*. *eLife*, **9**, <https://doi.org/10.7554/eLife.60985>.
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- Chen, Z.-Y., Männik, P., Tang, P., Wang, J., Ma, J.-Y. and Luan, X.-C. 2020c. Age of the Silurian Wuxiahe Formation in Langao, Northwest China: New conodont data. *Palaeoworld*, <https://doi.org/10.1016/j.palwor.2020.12.004>.
- Chen, Z.-Y., Männik, P., Wang, X., Li, C. and Wang, J. 2020d. First documentation of Llandovery (Silurian) conodont genus *Astropentagnathus* in China (Langao, Shaanxi Province) and the age of Baiyaya Formation. *Palaeoworld*, **29**, 662–671, <https://doi.org/10.1016/j.palwor.2019.11.002>.
- Clark, J.K., Carter, T.R., Brunton, F.R., Logan, C., Somers, M., Sutherland, L. and Yeung, K.H. 2020. Improving the 3-D geological data infrastructure of southern Ontario: Data capture, compilation, enhancement and QA/QC. In: Russell, H. A. J. and Kjarsgaard, B. A. (eds) *Southern Ontario Groundwater Project 2014-2019 Summary Report*. Geological Survey of Canada. Open File 8536, 23–36., <https://doi.org/10.4095/321078>.
- Claussen, A.L., Munnecke, A. and Ernst, A. 2021. Bryozoan-rich stromatolites (bryostromatolites) from the Silurian of Gotland and their relation to climate-related perturbations of the global carbon cycle. *Sedimentology*, <https://doi.org/10.1111/sed.12863>.
- Cole, D.B., Planavsky, N.J., et al. 2020. Uranium Isotope Fractionation in Non-sulfidic Anoxic Settings and the Global Uranium Isotope Mass Balance. *Global Biogeochemical Cycles*, **34**, e2020GB006649, <https://doi.org/10.1029/2020GB006649>.
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- Corradini, C., Pondrelli, C., Simonetto, L. and Corrigan, M.G. 2020b. Geology of Mount Zermula massif (Carnic Alps, Italy). *Gortania Geologia, Paleontologia, Paleontologia*, **42**, 5–24.
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