



Edies

*International Commission on Stratigraphy
Subcommission on Ediacaran Stratigraphy*

**Newsletter of the Subcommission
on Ediacaran Stratigraphy**

**Number 7
April, 2019**

Remarks from the Chair

By Shuhai Xiao

First, I would like to thank Marc for once again putting together an excellent issue of *Eddies*.

The year of 2018 was a busy and fruitful one for the Ediacaran Subcommission. Many of us participated in one or more field workshops sponsored by the Subcommission. Several of the field workshops were focused on the TES, including the January 2018 field trip in Oman, the April-May 2018 field trip in Nevada of western US, and the August 2018 field trip in southern Shaanxi of South China. A special issue in Canadian Journal of Earth Science based on ISECT 2017 was published in 2018. Finally, the Upper Ediacaran Series (UESr) Working Group kicked off, with Jim Schiffbauer as the chair and a slate of 15 voting members. UESr will initiate the discussion on criteria to define the Upper Ediacaran Series. Thus, we currently have three active working groups, TES, SES, and UESr.

In 2019, the main Subcommission events include the Guadalupe field workshop in Spain and the Ediacaran symposium at STRATI 2019 in Milan, Italy. Hope to see many of you at both events. Other related events include the NAPC meeting at UC Riverside where several Ediacaran-related symposia have been planned, the Second Geobiology Conference in Banff (Canada) which is an excellent venue for junior scientists, and Ediacaran-related symposia at other regular meetings (GSA, AGU, EGU).

In 2020, the Subcommission will sponsor a field workshop in Brazil and Argentina, again focusing on the terminal Ediacaran stage. Also, there will be Ediacaran-related symposia and field workshops at the 36th IGC in India.

We have a new website. Our old website was hosted at Virginia Tech. To have more flexibility and easy access, we have decided to host our website at Google, which also manages our mailing list. The URL ediacaran.stratigraphy.org is still valid and it will be automatically directed to

<https://sites.google.com/view/ediacaran>. Check it out!

Finally, I would like to bring to your attention that my second term as the Subcommission chair will end in 2020. Per ICS statutes, the Subcommission will select a new chair, who will form a new executive team by the 36th IGC in 2020. An announcement will be sent out soon to solicit nominations for the next chair.

Notes from the Secretary

By Marc Laflamme

First off, I'd like to apologise for the delay in getting our newsletter to you. I am pretty excited to report the progress we have made over the past year, and I am delighted to see where 2019 takes us. As alluded to by Shuhai, several international meetings featuring Ediacaran sessions and field trips will soon be upon us, with the Canadian Geobiology conference in Banff, Alberta from June 9-13 (2019) (<https://cms.eas.ualberta.ca/geobiology2019/>), the North American Paleontological Convention in Riverside, CA (<https://napc2019.ucr.edu/>) from June 23-27, STRATI 2019 Milano Italy from July 2-5 2019 (<http://www.strati2019.it/>), and the International Meeting on the Ediacaran System and the Ediacaran–Cambrian Transition (IMECT 2019) (<https://www.geoparquevalluercas.es/imect2019/?lang=en>) in Guadalupe, Spain from 17-24 2019. The IMECT meeting is particularly important, as it will allow voting members of the Subcommission to visit key Ediacaran–Cambrian boundary sections in Spain.

I'd also like to highlight the special issue (Volume 55) of the Canadian Journal of Earth Science “*Geobiology of the Ediacaran–Cambrian Transition: ISECT 2017*”. The range of topics and the conclusions drawn from the articles in this special volume highlight the healthy state of Ediacaran and Cambrian research, while also identifying key questions that will shed new light on this critical interval in Earth history.

Stemming from discussions as part of the *Terminal Ediacaran field workshop in Nevada (April 26 – May 2 2018)*, Voting Member Jim Schiffbauer was nominated and agreed to chair the *Upper Ediacaran Series Working Group*. His executive team includes Vice Chair Jay Kaufman (Maryland) and Secretary Tara Selly (Missouri).

Upper Ediacaran Series (UESr) Working Group:

Voting Members:

Schiffbauer, James, Missouri (Chair)
Kaufman, Jay, Maryland (Vice Chair)
Cai, Yaoping, Northwest
Christie-Blick, Nick, Columbia
Fike, David, Washington
Jiang, Ganqing, UNLV
Laflamme, Marc, UToronto Mississauga
Liu, Pengju, CAS
Myrow, Paul, Colorado College
Narbonne, Guy, Queen's
Smith, Emmy, Johns Hopkins
Strauss, Justin, Dartmouth
Warren, Lucas, Sao Paulo
Wood, Rachel, Edinburgh
Xiao, Shuhai, Virginia Tech
Zhou, Chuanming, CAS

Corresponding members

Secretary – Selly, Tara, Missouri
Bykova, Natasha RAS
Maloof, Adam, Princeton
Muscente, Drew, UTAustin

TES Working Group:

Voting Members:

Narbonne, Guy M. (Chair)
Moczydlowska-Vidal, Malgorzata (Secretary)
Alvaro, Jose-Javier
Buatois, Luis A.
Gehling, James G.
Grazhdankin, Dmitri V.
Jensen, Soren
Kaufman, Alan Jay
Laflamme, Marc
Liu, Alex
Schiffbauer, James

Sharma, Mukund
Warren, Lucas
Wood, Rachel
Xiao, Shuhai
Yuan, Xunlai
Zhu, Maoyan

Corresponding Members:

Christie-Blick, Nicholas
Duda, Jean-Pierre
Dornbos, Stephen
Erdtmann, Bernd-D.
Erwin, Doug
Gärtner, Andreas
Grey, Kathleen
Hofmann, Mandy
Ivantsov, Andrey
Jiang, Ganqing
Knoll, Andrew
Li, Chao
Linnemann, Ulf
Mangano, Gabriela
Meyer, Michael
Rai, Vibhuti
Reitner, Jochim
Schiffbauer, James
Shields-Zhou, Graham A.
Vickers-Rich, Patricia
Weaver, Patricia
Yin, Chongyu
Zieger, Johannes
Zhu, Maoyan

SES Working Group:

Voting Members:

Chuanming Zhou (Chair)
Christie-Blick, Nicholas
Grazhdankin, Dima
Grey, Kathleen
Jiang, Ganqing
Kaufman, Alan Jay
Liu, Pengju
Moczydlowska-Vidal, Malgorzata
Sharma, Mukund
Shields, Graham
Xiao, Shuhai

Corresponding Members:

Adamson, Peter William
Alvaro, Jose-Javier
Gärtner, Andreas

Gaucher, Claudio
Gehling, James G.
Hofmann, Mandy
Jensen, Sören
Joshi, Harshita
Kenchington, Charlotte
Laflamme, Marc
Li, Chao
Linnemann, Ulf
Liu, Pengju
Liu, Alex
Nagovitsin, Konstantin
Rai, Vibhuti
Schiffbauer, James
Shukla, Rajita
Sperling, Erik
Tiwari, Meera
Vickers-Rich, Patricia
Willman, Sebastian
Xunlai Yuan
Yin, Chongyu
Zhu, Maoyan
Zieger, Johannes

Meeting reports:

Terminal Ediacaran field workshop in Oman, January 13-22, 2018. This field trip was sponsored by the Ediacaran Subcommittee and led by Dr. Kristin Bergmann from MIT. Six voting members of the Ediacaran Subcommittee and the Terminal Ediacaran Working Group (Luis Buatois, Pengju Liu, Lucas Warren, Shuhai Xiao, Chuanming Zhou, Maoyan Zhu) participated in this field workshop. The goal of this field workshop was to examine the Shuram Formation, to investigate the stratigraphic relationship between the Shuram negative carbon isotope excursion and the tubular fossil *Cloudina*, and to discuss the possibility of using either the Shuram excursion or *Cloudina* fossils as a criterion to define the terminal Ediacaran Stage.

Terminal Ediacaran field workshop in Nevada (USA), April 26 – May 2, 2018. This field workshop was led by Emmy Smith and Lyle Nelson (Johns Hopkins), with contributions from: Simon Darroch, E. B. Hodgin, Jon Husson, Akshay Mehra,

Beatrice Rodewald, Jim Schiffbauer, Tara Selly, Michael Strange, and Lydia Tarhan. Participants included 10 voting members of the Ediacaran Subcommittee and the Terminal Ediacaran Stage Working Group: Shuhai Xiao, Marc Laflamme, Jim Schiffbauer, Nicholas Christie-Blick, Jay Kaufman, Pengju Liu, Maoyan Zhu, Luis Buatois, Ganging Jiang, Chaunming Zhou. Like the Oman field workshop, the Nevada field workshop was also focused on the terminal Ediacaran stage, specifically to examine the Shuram excursion preserved in the Johnnie Formation as well as terminal Ediacaran tubular and trace fossils in the Deep Spring, Stirling, and Wood Canyon formations.

International Conference on Ediacaran and Cambrian Sciences (ICECS), held on August 12-16, 2018 in Northwest University, Xi'an, China (<http://www.icecs2018.cn>). Participants included 11 voting members of the Ediacaran Subcommittee and the Terminal Ediacaran Stage Working Group: Dima Grazhdankin, Alan J. Kaufman, Alex Liu, Pengju Liu, Guy Narbonne, Jim Schiffbauer, Shuhai Xiao, Xunlai Yuan, Chuanming Zhou, Maoyan Zhu, and Lucas Warren. Four pre- and post-conference field trips were organized to examine Cryogenian, Ediacaran, and Cambrian successions in North and South China. Of these four trips, Trip 2 (From Snowball Earth to Cambrian explosion, rocks and fossils in Yangtze Gorges) was directly relevant to the Second Ediacaran Stage Working Group, and Trip 3 (Precambrian-Cambrian transition in the northern margin of South China) was of importance to the Terminal Ediacaran Stage Working Group. With help from the Subcommittee and several funding agencies, we were able to offer financial assistance to ten participants (Guy Narbonne, Morrison Nolan, Lucas Warren, Huan Cui, Patricia Vickers-Rich, Juliana Okubo, Frances Dunn, Marjorie Cantine, Leandro Silva, Dana Korneisel), seven of whom were graduate students and post-doctoral fellows.

ICDP GRIND (*Geological Research through Integrated Neoproterozoic Drilling*) met at the Annual American Geophysical Union meeting on December 13, 2018, in Washington, DC. Specifically, they discussed the proposal to drill 13 cores through the Ediacaran-Cambrian transition in Namibia, Brazil, and China.

Upcoming meetings and workshops:

June 9-13 (2019): The Geobiology conference (<https://cms.eas.ualberta.ca/geobiology2019/>) is a multidisciplinary conference that is particularly relevant to Ediacaran Subcommission members interested in interpreting the geochemical signals that accentuate the Proterozoic. Several thematic sessions will be of interest to our Subcommission, including “*Evolution of the Precambrian Geosphere*” and “*Phanerozoic Earth-Life Transitions*”, in addition to a point-counterpoint debate surrounding “*Carbonate carbon isotope excursions: Tracers of global biogeochemical change or records of diagenetic processes?*” and “*What provides a better indicator of ancient metabolisms - the rock or genomic records?*”

June 23-27 2019 North American Paleontological Convention (<https://nape2019.ucr.edu/>), will include several sessions dedicated to Ediacaran questions, including “*Behavioral Innovations and Environmental Feedbacks*” hosted by Lidya Tarhan, Dan Hembree, Jon Smith, Jim Gehling, “*Avalon to Zaris*” by Emily Mitchell, Charlotte Kenchington, Chrissy Hall, “*Cambrian Konservat-Lagerstätten*” by Rudy Lerosey-Aubril, Robert Gaines, Xingliang Zhang, “*Environmental Change and the Dawn of Animal Life*” by Charles Diamond and Scott Evans, and a dedicated topical session “*Advances in understanding of Precambrian and Paleozoic life and environments*”.

July 2-5 2019: STRATI 2019 Milano Italy (<http://www.strati2019.it/>) will have a major Ediacaran session “*ST3.1 Ediacaran Subdivision*” hosted by Guy Narbonne, Shuhai Xiao, Marc

Laflamme, and Dima Grazhdankin and “*ST3.2 Cambrian stratigraphy, events and geochronology*” hosted by Per Ahlberg and Loren E. Babcock. Another session to keep an eye open for would be “*ST9.2 Calibrating rates and dates in stratigraphy*” by Urs Schaltegger and Daniel Condon.

October 17-24th, 2019 International Meeting on the Ediacaran System and the Ediacaran–Cambrian Transition organized by Soren Jensen, Javier Alvaro, and their colleagues (www.geoparquevalluercas.es/imect2019/?lang=en) will explore all aspects of the Ediacaran System and its boundaries, including paleontology, stratigraphy, sedimentology, geomicrobiology, geochemistry, geochronology and geodynamics. Field trips will provide opportunities to visit key outcrops of the Ediacaran and Ediacaran–Cambrian transition in the Central-Iberian Zone of the Iberian Massif.

March 2-8, 2020: The 36th International Geological Congress (IGC) will be held in Delhi, India, (<http://www.36igc.org/>). Ediacaran successions in northern India are important for SES stratigraphy. Voting members Mukund Sharma and Shuhai Xiao have proposed a symposium on the Ediacaran System and, working with Nigel Hughes at UC Riverside, the Ediacaran Subcommission will develop a field workshop at IGC to examine the Ediacaran and Cambrian succession in northern India.

Contributions by our members:

1. Álvaro, J.J. & González-Acebrón, L. (in press). Sublacustrine hydrothermal seeps and silicification of microbial bioherms in the Ediacaran Oued Dar’a caldera, Anti-Atlas, Morocco. *Sedimentology*, doi: 10.1111/sed.12568
2. Boyle, R., Dahl, T.W., Bjerrum, C.J. and Canfield, D. (2018) Bioturbation and directionality in Earth's carbon isotope record across the Neoproterozoic–Cambrian transition. *Geobiology* 16, 252-278

3. Buatois, L.A., Almond, J., Mángano, M.G., Jensen, S. & Germs, G.J. 2018. Sediment disturbance by Ediacaran bulldozers and the roots of the Cambrian explosion. *Nature Scientific Reports*, 8: 4514.
4. Buatois, L.A. 2018. *Treptichnus pedum* and the Ediacaran-Cambrian boundary: Significance and caveats. *Geological Magazine* 155: 174-180
5. Cheng, Meng, Chao Li*, Xi Chen, Lian Zhou, Thomas J. Algeo, Hong-Fei Ling, Lian-Jun Feng, Cheng-Sheng Jin, Delayed Neoproterozoic oceanic oxygenation: Evidence from Mo isotopes of the Cryogenian Datangpo Formation. *Precambrian Research*, 2018, 319:187-197
6. Chen, Zhe, Xiang Chen, Chuanming Zhou, Xunlai Yuan, Shuhai Xiao*, 2018. Late Ediacaran trackways produced by bilaterian animals with paired appendages. *Science Advances*, 4: eaao6691
7. Chengsheng, Jin, Chao Li*, Thomas J. Algeo, Brennan O'Connell, Meng Cheng, Wei Shi, Jun Shen, Noah J. Planavsky. Highly heterogeneous “poikiloredox” conditions in the early Ediacaran Yangtze Sea. *Precambrian Research*, 2018, 31:157-166
8. Coutts, F.J., Bradshaw, C.J.A., García-Bellido, D.C. and Gehling, J.G. 2018. Evidence of sensory-driven behavior in the Ediacaran organism *Parvancorina*: Implications and autecological interpretations *Gondwana Research* 55, 21-29
9. Cui, H., Kaufman, A.J., Peng, Y., Liu, X.-M., Plummer, R.E., Lee, E.I., 2018. The Neoproterozoic Hüttenberg $\delta^{13}\text{C}$ anomaly: Genesis and global implications. *Precambrian Research*, 313, 242–262
10. Cui, H., Kitajima, K., Spicuzza, M.J., Fournelle, J.H., Ishida, A., Denny, A., Zhang, F., Valley, J.W., 2018. Questioning the biogenicity of Neoproterozoic superheavy pyrite by SIMS. *American Mineralogist*, 103, 1362–1400
11. Darroch, S.A.F., Laflamme, M., and Wagner, P.J. 2018. High ecological complexity in benthic Ediacaran communities. *Nature Ecology and Evolution*, 2:1541–1547.
12. Darroch, S.A.F., Smith, E.F., Laflamme, M., and Erwin, D.H. 2018. Ediacaran extinction and Cambrian explosion. *Trends in Ecology and Evolution*, 33(9):653-663. <https://doi.org/10.1016/j.tree.2018.06.003>
13. Davies, N.S., Liu, A.G., Gibling, M.R. and Miller, R.F. (2018) Reply to Comment on the paper by Davies et al. “Resolving MISS conceptions and misconceptions: A geological approach to sedimentary surface textures generated by microbial and abiotic processes” (*Earth Science Reviews*, 154 (2016), 210-246) *Earth Science Reviews*, 176, 384-386
14. Dececchi, A.T., Narbonne, G.M., Greentree, C., and Laflamme, M., 2018, Phylogenetic relationships among the Rangeomorpha: The importance of outgroup selection and implications for their diversification. *Canadian Journal of Earth Sciences*, 55: 1223–1239.
15. Delarue, F., F. Robert, R. Tartese, K. Sugitani, Q. Tang, R. Duhamel, S. Pont, and S. Xiao, 2018, Can NanoSIMS probe quantitatively the geochemical composition of ancient organic-walled microfossils? A case study from the early Neoproterozoic Liulaobei Formation. *Precambrian Research*, 311: 65-73. doi: 10.1016/j.precamres.2018.03.003
16. Detlef, Walde, H.G.; Erdtmann, Bernd-D.; [Do Carmo, Dermeval A.](#); Karfunkel, J.; Silva, A.; [Silva, B. L. P.](#); Pollmann, H. Skelettbildende Fossilien aus dem späten Ediacarium von Corumbá (West- Brasilien): Corumbella und Cloudina. (Skeletal fossils from the late Ediacarium from Corumbá-W-Brazil: Corumbella und Cloudina.) *Der Aufschluss*, v.2, p.122 - 137, 2018(Heidelberg)
17. Detlef, Walde, H.G., Karfunkel, J, Poellmann, H, Silva, A. & Silva, B.L.P: Die neoproterozoischen Eisen- und Manganzlagerstätten von Urucum/Mutum in W-Brasilien/SE-Bolivien: ein Überblick. (Neoproterozoic Fe- and Mn ore deposits of Urucum/Mutum in W-Brazil/SE-Bolivia: Overview). *Der Aufschluss*, v.2, p. 81-97, 2018 (Heidelberg)
18. Droser, M.L., Evans, S.D., Dzaugis, P.W., Hughes, E.B., and Gehling, J.G., (2019).

- Attenborites janeae*: A new enigmatic organism from the Ediacara Member (Rawnsley Quartzite), South Australia. *Australian Journal of Earth Sciences*, v. 66. DOI: 10.1080/08120099.2018.1495668
19. Droser, M.L., Gehling, J.G., Tarhan, L.G., Evans, S.D., Hall, C.M.S., Hughes, I.V., Hughes, E.B., Dzaugis, M.E., Dzaugis, M.P., Dzaugis, P.W. and Rice, D., 2019, Piecing together the puzzle of the Ediacara Biota: Excavation and reconstruction at the Ediacara National Heritage site Nilpena (South Australia): *Palaeogeography, Palaeoclimatology, Palaeoecology*, v. 513, p. 132-145, doi: 10.1016/j.palaeo.2017.09.007
 20. Droser, M.L. Clites, E.C. and Gehling, J.G. in press. The short-lived but successful tri-radial body plan: a view from the Ediacaran of Australia. <https://doi.org/10.1080/08120099.2018.1472666>
 21. Dunn, F.S., Wilby, P.R., Kenchington, C.G., Grazhdankin, D.V., Donoghue, P.C.J. and Liu, A.G. Anatomy of the Ediacaran rangeomorph *Charnia masoni* Papers in Palaeontology, Early View. doi: 10.1002/spp2.1234
 22. Dunn, F.S., Liu, A.G. and Donoghue, P.C.J. (2018) Ediacaran developmental biology *Biological Reviews*, 93, 914-932. doi: 10.1111/brv.12379
 23. Dzaugis, P.W., Evans, S.D., Droser, M.L., Gehling, J.G. and Hughes, I.V., (2019). Stuck in the Mat: *Obamus coronatus*, A new benthic organism from the Ediacara Member, Rawnsley Quartzite, South Australia. *Australian Journal of Earth Sciences*, v. 66. DOI: 10.1080/08120099.2018.1479306
 24. Evans, S.D., Dzaugis, P.W., Droser, M.L., and Gehling, J.G., (2019). You can get anything you want from Alice's Restaurant Bed: exceptional preservation and an unusual fossil assemblage from a newly excavated bed (Ediacara Member, Nilpena, South Australia). *Australian Journal of Earth Sciences*, v. 66. DOI: 10.1080/08120099.2018.1470110.
 25. Evans, S.D., Diamond, S.W., Droser, M.L., and Lyons, T.W., (2018). Dynamic oxygen and coupled biological and ecological innovation during the second wave of the Ediacara Biota. *Emerging Topics in Life Sciences*, v. 2, pp. 223-233. DOI: 10.1042/ETLS20170148
 26. Fazio, Gabriella*, Edi Mendes Guimarães, Detlef W.G. Walde, Dermeval A. do Carmo, Rodrigo R. Adorno, Lucieth Cruz Vieira, Matheus Denezine, Carolina Blois da Silva, Hygor Viana de Godoy, Patrícia Caixeta Borges, David Pinho. Mineralogical and chemical composition of Ediacaran-Cambrian pelitic rocks of The Tamengo and Guaicurus formations, (Corumbá Group - MS, Brazil): Stratigraphic positioning and paleoenvironmental interpretations. *Journal of South American Earth Sciences*, in press.
 27. Gehling, J.G., and Droser, M.L. (2018). Ediacaran scavenging as a prelude to predation. *Emerging Topics in Life Sciences*, v. 2, pp. 213-222. DOI: 10.1042/ETLS20170166
 28. Gibson, B.M., Schiffbauer, J.D., and Darroch, S.A.F. Ediacaran-style decay experiments using mollusks and sea anemones. *Palaios* 33: 185–203
 29. Gougeon, R.C., Mángano, M.G., Buatois, L.A., Narbonne, G.M. & Laing, B.A. 2018. Early Cambrian origin of the shelf sediment mixed layer. *Nature Communications* 9:1909
 30. Hall, C.M.S., Droser, M.L., Clites, E.C., and Gehling, J.G. (2019). The short-lived but successful tri-radial body plan: a view from the Ediacaran of Australia. *Australian Journal of Earth Sciences*, v. 66. DOI: 10.1080/08120099.2018.1472666
 31. Hantsoo, K., Kaufman, A.J., Cui, H., Plummer, R.E., Narbonne, G.M., 2018. Effects of bioturbation on carbon and sulfur cycling across the Ediacaran–Cambrian transition at the GSSP in Newfoundland. *Canadian Journal of Earth Sciences*, 55, 1240–1252
 32. Hu, C.-L., Zhao, F.-C., Ji, Q.-M., Zhu, M.-Y., 2018. The basal Ediacaran cap carbonate in the Ningzhen Mountain area, South China. *Journal of Stratigraphy*, 42:381-392. (in Chinese with English abstract)

33. Hughes, N.C., Myrow, P.M., Ghazi, S., McKenzie, N.R., and DiPietro, J.A., *in press*, The Cambrian geology of the Salt Range of Pakistan: linking the Himalayan margin to the Indian craton: Geological Society of America Bulletin
34. Kochnev B.B., Pokrovsky B.G., Kuznetsov A.B., Marusin V.V. C and Sr isotope chemostratigraphy of Vendian-Lower Cambrian carbonate sequences in the central Siberian Platform // Russian Geology and Geophysics, 2018. V. 59. P. 585-605. DOI: 10.1016/j.rgg.2018.05.001
35. Kolesnikov, A.V., Liu, A.G., Danelian, T. and Grazhdankin, D.V. (2018) A reassessment of the problematic Ediacaran genus *Orbisiana* Sokolov 1976 Precambrian Research, 316, 197-205
36. Laflamme, M., Gehling, J.G., and Droser, M. L. (2018). Deconstructing an Ediacaran frond: three-dimensional preservation of *Arborea* from Ediacara, South Australia. *Journal of Paleontology*, v. 92, pp. 323-335. DOI: 10.1017/jpa.2017.128
37. Laing, B.A., Buatois, L.A., Mángano, M.G., Narbonne, G.M. & Gougeon, R.C. 2018. *Gyrolithes* from the Ediacaran-Cambrian boundary section in Fortune Head, Newfoundland, Canada: Exploring the onset of complex burrowing. *Palaeogeography, Palaeoclimatology, Palaeoecology* 495: 171-185
38. Lang, X., Chen, J., Cui, H., Man, L., Huang, K.-J., Fu, Y., Zhou, C., Shen, B., 2018. Cyclic cold climate during the Nantuo glaciation: evidence from the Cryogenian Nantuo Formation in the Yangtze Block, South China. *Precambrian Research*, 310, 243–255
39. Lang, X., B. Shen, Y. Peng, S. Xiao, C. Zhou, H. Bao, A. J. Kaufman, K. Huang, P. W. Crockford, Y. Liu, and H. Ma, 2018, Transient marine euxinia at the end of the terminal Cryogenian glaciation. *Nature Communications*, 9: 3019. doi: 10.1038/s41467-018-05423-x.
40. Li, Chao, Meng Cheng, Maoyan Zhu and Timothy W. Lyons. Heterogeneous and dynamic marine shelf oxygenation and coupled early animal evolution. *Emerging Topics in Life Sciences*, 2018, 2(2):279-288. DOI: 10.1042/ETLS20170157
41. Linnemann, U., Ovtcharova, M., Schaltegger, U., Gärtner, A., Hautmann, M., Geyer, G., Vickers-Rich, P., Rich, T., Plessen, B., Hofmann, M., Zieger, J., Krause, R., Kriesfeld, L., Smith, J. (2018): New high-resolution age data from the Ediacaran–Cambrian boundary indicate rapid, ecologically driven onset of the Cambrian explosion. *Terra Nova*: DOI: 10.1111/ter.12368
42. Litvinova, T. V. and V. N. Sergeev. 2018. Biogenic Microstructures in Stromatolites of the Baikal–Patom Highland: Results of Complex Study, *Lithology and Mineral Resources*, Vol. 53, No. 2, pp. 159–169
43. Liu, A.G., Matthews, J.J., McIlroy, D., Narbonne, G.M., Landing, E., Menon, L.R. and Laflamme, M. (2018) International Symposium on the Ediacaran–Cambrian Transition (ISECT) 2017 15–29th June 2017, Newfoundland, Canada. *Episodes*, 41(2), 129-133
44. Liu, A.G., Matthews, J.J., McIlroy, D., Narbonne, G.M., Landing, E., Menon, L.R. and Laflamme, M. (2018) Geobiology of the Ediacaran-Cambrian Transition: ISECT 2017. *Can. Jour. Earth Sci.* 55, v-vi. doi: 10.1139/cjes-2018-0244
45. Lyons, T.W., Droser, M.L., Lau, K.V., and Porter, S.M. (2018). Early earth and the rise of complex life. *Emerging Topics in Life Sciences*, v. 2, pp. 121-124. DOI: 10.1042/ETLS20180093
46. MacGabhann, B.A., Schiffbauer, J.D., Hagadorn, J.W., Van Roy, P., Lynch, E.P., Morrison, L., and Murray, J. Resolution of the earliest metazoan record: Differential taphonomy of Ediacaran and Paleozoic fossil molds and casts. *Palaeogeography, Palaeoclimatology, Palaeoecology* 513: 146–165.
47. Miao, L., Moczyłowska, M., Zhu, S., Zhu, M., 2018. New record of organic-walled, morphologically distinct microfossils from the late Paleoproterozoic Changcheng Group in the

- Yanshan Range, North China. *Precambrian Research*, <https://doi.org/10.1016/j.precamres.2018.11.019>
48. Mills, D.B., Francis, W.R. and Canfield, D.E. (2018) Animal origins and the Tonian Earth system. *Emerging Topics in Life Sciences* 2, 289-298.
 49. Mills, D.B., Francis, W.R., Vargas, S., Larsen, M., Elemans, C.P., Canfield, D.E. and Wörheide, G. (2018) The last common ancestor of animals lacked the HIF pathway and respired in low-oxygen environments. *Elife* 7, e31176.
 50. Muscente, A.D., Boag, T.H., Bykova, N., and Schiffbauer, J.D. Environmental disturbance, resource availability, and biologic turnover at the dawn of animal life. *Earth-Science Reviews* 177: 248–264
 51. Muscente, A. D., A. D. Czaja, J. Tuggle, C. Winkler, and S. Xiao, 2018, Manganese oxides resembling microbial fabrics and their implications for recognizing inorganically preserved microfossils. *Astrobiology*, 18: 249-258. doi: 10.1089/ast.2017.1699
 52. Myrow, P.M., Hughes, N.C., and McKenzie, N.R., 2018, Reconstructing the Himalayan margin prior to collision with Asia: Proterozoic and lower Paleozoic geology and its implications for Cenozoic tectonics, in Treloar, P.J., and Searle, M.P., eds., *Himalayan Tectonics: A Modern Synthesis*: Geological Society of London, Special Publication 483, doi.org/10.1144/SP483.10
 53. Myrow, P.M., Lamb, M.P., and Ewing, R., 2018, Rapid sea level rise in the aftermath of Snowball Earth: *Science*, v. 360, p. 649-651
 54. Okubo, J.; Muscente, A.D.; Luvizotto, G.L.; Uhlein, G.J.; Warren, L.V. 2018. Phosphogenesis, aragonite fan formation and seafloor environments following the Marinoan glaciation. *PRECAMBRIAN RESEARCH*. , 311: 24 - 36
 55. Ouyang, Qing, Chuanming Zhou, Shuhai Xiao, Zhe Chen, Yefei Shao, 2019. Acanthomorphic acritarchs from the Ediacaran Doushantuo Formation at Zhangcunping in South China, with implications for the evolution of early Ediacaran eukaryotes. *Precambrian Research*, 320: 171-192
 56. Palacios, T., Jensen, S., Barr, S.M., White, C.E., and Myrow, P., 2018, Organic-walled microfossils from the Ediacaran–Cambrian boundary stratotype section, Chapel Island Formation and Random Formation, Burin Peninsula, Newfoundland, Canada: Global correlation and significance for the evolution of early complex ecosystems: *Geological Journal*, v. 53, p. 1728-1742
 57. Padel, M., Clausen, S., Álvaro, J.J. & Casas, J.M. (2018). Review of the Ediacaran-Lower Ordovician (pre-Sardic) stratigraphic framework of the Eastern Pyrenees, southwestern Europe. *Geologica Acta*, 16 (4), 339-355.
 58. Padel, M., Álvaro, J.J., Casas, J.M., Clausen, S., Poujol, M. & Sánchez-García (2018). Cadomian volcanosedimentary complexes across the Ediacaran-Cambrian transition of the Eastern Pyrenees, southwestern Europe. *International Journal of Earth Sciences*, 107, 1579-1601
 59. Pang, K., Q. Tang, L. Chen, B. Wan, C. Niu, X. Yuan, and S. Xiao, 2018, Nitrogen-fixing heterocystous cyanobacteria in the Tonian Period. *Current Biology*, 28: 616-622. doi: 10.1016/j.cub.2018.01.008
 60. Qi, Changshi, Chao Li*, Sarah E. Gabbott, Xiaoya Ma, Luhua Xie, Wenfeng Deng, Chengsheng Jin, Xian-Guang Hou. Influence of redox conditions on animal distribution and soft-bodied fossil preservation of the Lower Cambrian Chengjiang Biota. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 2018, 507: 180-87.
 61. Reid, L.M, García-Bellido, D.C. and Gehling, J.G. 2018. An Ediacaran opportunist? Characteristics of a juvenile *Dickinsonia costata* population from Crisp Gorge, South Australia. *Journal of Paleontology*, in press, 1–10. doi: 10.1017/jpa.2017.142.
 62. Reis, L. I.; Warren, L.V. ; Okubo, J.; Simoes, M. G.; Quaglio, F.; Arrouy, M. J.; Netto, R. G. 2018. Discs and discord: the paleontological record of Ediacaran discoidal structures in the

- South American continent. *Journal of South American Earth Sciences. In Press*
63. Retallack, G.J., 2018b. The Devonian Problematicum *Protonympha* as another post Ediacaran vendobiont. *Lethaia* 51, 406-423.
 64. Retallack, G.J. 2018, *Dickinsonia* steroids not only in animals. *Science* 361, 1246 eletter: <http://science.sciencemag.org/content/361/6408/1246/tab-e-letters>
 65. Retallack, G.J., 2019a. Interflag sandstone laminae, a novel fluvial sedimentary structure with implication for a Ediacaran paleoenvironments. *Sedimentary Geology* 379, 60-76
 66. Scheller, E.L., Dickson, A.J., Canfield, D.E., Korte, C., Kristiansen, K.K., Dahl, T.W. (2018) [Ocean redox conditions between the Snowballs–geochemical constraints from Arena Formation, East Greenland.](#) *Precambrian Research* 319, 173-186
 67. Sergeev, V. N. 2018, The Biostratigraphic Paradox of Precambrian Cyanobacteria: Distinguishing the Succession of Microfossil Assemblages and Evolutionary Changes Observed among Proterozoic Prokaryotic Microorganisms. *Paleontological Journal*, Vol. 52, No. 10, pp. 1148–1161.
 68. Shang, X., Moczydłowska, M., Liu, P., Liu, L. 2018. Organic composition and diagenetic mineralization of microfossils in the Ediacaran Doushantuo chert nodules by Raman and petrographic analyses. *Precambrian Research* 314, 145–159
 69. Shi, Wei, Chao Li, Genming Luo, Junhua Huang, Thomas J. Algeo, Chengsheng Jin, Zihu Zhang, and Meng Cheng. Sulfur isotope evidence for transient marine-shelf oxidation during the Ediacaran Shuram Excursion. *Geology*, 2018, 46(3):267-270. DOI:10.1130/G39663.1.
 70. Sun, H., Smith, M.R., Zeng, H., Zhao, F., Li, G., Zhu, M., 2018. Hyoliths with pedicles illuminate the origin of the brachiopod body plan. *Proc. R. Soc. B*, 285: 20181780. <http://dx.doi.org/10.1098/rspb.2018.1780>
 71. Sun, H., Malinky, J.M., Zhu, M., Huang, D., 2018. Palaeobiology of orthothecide hyoliths from the Cambrian Manto Formation of Hebei Province, North China. *Acta Palaeontologica Polonica*, 63:87-101
 72. Tarhan, L.G., Droser, M.L., Cole, D.B. and Gehling, J.G., 2018, Ecological expansion and extinction in the late Ediacaran: weighing the evidence for environmental and biotic drivers. *Integrative and Comparative Biology*, v. 58, p. 688-702
 73. Tarhan, L.G., Planavsky, N.J., Wang, X., Bellefroid, E.J., Droser, M.L. and Gehling, J.G., 2018, Late-stage ‘ferruginization’ of the Ediacara Member (Rawnsley Quartzite, South Australia): Insights from uranium isotopes: *Geobiology*, v. 16, p. 35-48
 74. Tostevin, R., Clarkson, M.O., Gang, S., Shields, G.A., Wood, R.A., Bowyer, F., Penny, A.M., and Stirling, C.H. 2018. Uranium isotope evidence for an expansion of anoxia in terminal Ediacaran oceans. *Earth Planetary Science Letters*
 75. Vaziri, S.H. and Laflamme, M. 2018. Lithostratigraphy and sedimentary environment of the Precambrian Kushk Series of Central Iran. *Canadian Journal of Earth Sciences*, 55 (11): 1284-1296
 76. Vickers-Rich, P. with Rozanov, A. Yu., 2018. *The Great Russian Dinosaurs Exhibition. A Joint Australian-Russian Venture 1993-1997 at a Time of the USSR-Russian Republic Transition. A Time of Stress on Science.* PrimeSCI!, Swinburne University of Technology, NewArtWorx, Melbourne: 302pp
 77. Vickers-Rich, Patricia, Sara Soleimani, Farnoosh Farjandi, Mehdi Zand, Ulf Linnemann, Mandy Hofmann, Siobhan A. Wilson, Raymond Cas, and Thomas H. Rich. (2018) "A preliminary report on new Ediacaran fossils from Iran." *Alcheringa: An Australasian Journal of Palaeontology* 42, no. 2: 230-243
 78. Vorobeva V. G. and V. N. Sergeev. 2018 *Stellarossica* gen. nov. and the Infragroup *Keltmiides* infragroup. nov.: Extremely Large Acanthomorph Acritarchs from the Vendian of Siberia and the East European

- Platform. *Paleontological Journal*, Vol. 52, No. 5, pp. 563–573
79. Wang, X., Jiang, G., Shi, X., Peng, Y., and Morales, D. C., 2018, Nitrogen isotope constraints on the early Ediacaran ocean redox structure: *Geochimica et Cosmochimica Acta*, v. 240, p. 220-235.
 80. Wang, D., Ling, H., Struck, U., Zhu, X.-K., Zhu, M., He, T., Yang, B., Gamper, A., Shields, G.A., 2018. Coupling of ocean redox and animal evolution during the Ediacaran-Cambrian transition. *Nature Communications*, 9:2575. DOI: 10.1038/s41467-018-04980-5
 81. Wei, G.-Y., Planavsky, N.J., Tarhan, L.G., Chen, X., Wei, W., Li, D. and Ling, H.-F., 2018, Marine redox fluctuation as a potential trigger for the Cambrian explosion: *Geology*, v. 46, p. 587-590
 82. Witkosky, R., and Wernicke, B.P., 2018, Subsidence history of the Ediacaran Johnnie Formation and related strata of southwest Laurentia: Implications for the age and duration of the Shuram isotopic excursion and animal evolution: *Geosphere*, v. 14, no. 5, p. 2245–2276, doi.org/10.1130/GES01678.1
 83. Wood, R.A and Penny, A.M. 2018. Substrate growth dynamics and biomineralisation of an Ediacaran encrusting poriferan. *Proceedings Royal Society B*
 84. Wood, R. 2018. Exploring the drivers of early biomineralization. *Emerging Topics in Life Sciences*. Portland Press
 85. Wood, R., Bowyer, F., Penny, A. M., and Poulton, S. W. 2018. Did unstable redox terminate Ediacaran communities? *Precambrian Research*
 86. Xiao, S., do Carmo, D., Walde, D., Silva, A.M., Denezine, M. and Silva, A., 2018. Field workshop on the Ediacaran Corumba Group of southwestern Brazil. *EPISODES*, 41(3), pp.207-211.
 87. Xiao, S. and Q. Tang, 2018, After the boring billion and before the freezing millions: evolutionary patterns and innovations in the Tonian Period. *Emerging Topics in Life Sciences*, 2: 161-171. doi: 10.1042/ETLS20170165
 88. Yang, C., Li, X.H., Zhu, M., Condon, D.J., Chen, J., 2018. Geochronological constraint on the Cambrian Chengjiang biota, South China *Journal of the Geological Society*, 175:659-666. doi: 10.1144/jgs2017-103
 89. Ye, Q., J. Tong, Z. An, J. Hu, L. Tian, K. Guan, and S. Xiao, 2018, Carbonaceous compression microfossils from the upper Ediacaran Miaohu Member in South China. *Journal of Systematic Palaeontology*, doi: 10.1080/14772019.2017.1404499
 90. Yin, Z., Zhao, D., Pan, B., Zhao, F., Zeng, H., Li, G., Bottjer, D.J., Zhu, M., 2018. Early Cambrian animal diapause embryos revealed by X-ray tomography. *Geology*, 46:387-390. doi: 10.1130/G40081.1
 91. Zang, K., Zhu, K., Wood, R. A., Shi, Y., Gao, Z., and Poulton, S. W. 2018. Oxygenation of the Mesoproterozoic ocean and the evolution of complex eukaryotes. *Nature Communications*
 92. Zeng, H., Zhao, F., Yin, Z., Zhu, M., 2018. A new radiodontan oral cone with a combination of anatomical features from the early Cambrian Guanshan Lagerstätte, eastern Yunnan, South China. *Journal of Paleontology*, 92:40-48
 93. Zeng, H., Zhao, F., Yin, Z., Zhu, M., 2018. Morphology of diverse radiodontan head sclerites from the early Cambrian Chengjiang Lagerstätte, south-west China. *Journal of Systematic Palaeontology*, 16:1-37
 94. Zhang, F., S. Xiao, B. Kendall, S. J. Romaniello, H. Cui, M. Meyer, G. J. Gilleaudeau, A. J. Kaufman, and A. D. Anbar, 2018, Terminal Ediacaran oceanic anoxia and the decline of the Ediacara biota. *Science Advances*, 4: eaan8983. doi: 10.1126/sciadv.aan8983
 95. Zhang, Zihu, Chao Li*, Meng Cheng, Thomas J. Algeo, Chengsheng Jin, Feng Tang, Junhua Huang. Evidence for highly complex redox conditions and strong water-column stratification in an early Cambrian continental-margin sea. *Geochemistry, Geophysics, Geosystems*, 2018, 19: 2397–2410. DOI: 10.1029/2018GC007666
 96. Zhou, Chuanming, Xunlai Yuan, Shuhai Xiao, Zhe Chen, Hong Hua, 2018. Ediacaran integrative stratigraphy and timescale of China.

Science China Earth Sciences, 61, <https://doi.org/10.1007/s11430-017-9216-2>

97. Zhu, M., Yang, A., Yuan, J., Li, G., Zhang, J., Zhao, F., Ahn, S.-Y., Miao, L., 2019. Cambrian integrative stratigraphy and timescale of China. *Sci China Earth Sci*, 62: 25-60. <https://doi.org/10.1007/s11430-017-9291-0>
98. Zhuravlev, A. Yu. and Wood, R.A. 2018. Two phases to the Cambrian Explosion. *Scientific Reports*, **8**, Article number: 16656