



# International Commission on Stratigraphy Subcommission on Cambrian Stratigraphy

## ANNUAL REPORT 2018

### 1. TITLE OF CONSTITUENT BODY

#### International Subcommission on Cambrian Stratigraphy

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### 2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

#### 2.a. Mission Statement

The Subcommission is the primary body for facilitation of international communication and scientific cooperation on Cambrian stratigraphy.

#### 2.b. Goals

The two principal goals of the Subcommission are:

- 1) To develop a global stage-level and series-level chronostratigraphic classification of the Cambrian System.
- 2) To complete and publish regional and global correlation charts for the Cambrian System.

#### 2.c. Fit within IUGS Science Policy

The objectives of the Subcommission fall within three main areas of IUGS policy:

- 1) The development of an internationally agreed scale of chronostratigraphic units, fully defined by GSSPs where appropriate (stages and series), and related to a hierarchy of units (zones) to maximize relative time resolution within the Cambrian Period.
- 2) Establishment of frameworks and systems to encourage international collaboration in understanding the evolution of the Earth during the Cambrian Period.
- 3) Working towards an international policy concerning conservation of geologically and paleontologically important sites such as GSSPs.

### 3. ORGANISATION

#### 3.a. Interface with other international projects/groups

In August 2018, the Cambrian Subcommission (ISCS) held its annual meeting in association with the Ediacaran Subcommission (ISES) in Xi'an, China. The conference and the ISCS meeting attracted numerous Cambrian researchers, and approximately 100 talks and posters dealing with Cambrian stratigraphy, geochronology and palaeontology were presented. The annual meeting for 2019 will be held at the 3<sup>rd</sup> International Congress on Stratigraphy (STRATI 2019).

In 2019, the Cambrian Subcommittee will be involved in two other meetings: the 11<sup>th</sup> North American Paleontological Convention (NAPC), Riverside, California, and the International Meeting on the Ediacaran and Ediacaran–Cambrian Transition, Guadalupe, Extremadura, Spain.

The Cambrian Subcommittee is involved jointly with the Ordovician Subcommittee in *IGCP Project 653: The onset of the Great Ordovician Biodiversification Event*.

The Cambrian Subcommittee is working jointly with the Ediacaran Subcommittee on restudy of the Cambrian base. Members of both subcommittees comprise the membership of the Terreneuvian/Fortunian Working Group.

### **3.b. Nominated officers for 2016–2020**

*Chairman:* Loren E. Babcock (USA) [babcock.5@osu.edu](mailto:babcock.5@osu.edu)

*Vice-Chair:* Xingliang Zhang (China) [xzhang69@nwu.edu.cn](mailto:xzhang69@nwu.edu.cn)

*Secretary:* Per Ahlberg (Sweden) [per.ahlberg@geol.lu.se](mailto:per.ahlberg@geol.lu.se)

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

N/A

## **5. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2018**

- A proposal for the Wuliuan Stage (formerly provisional Stage 5) and the Miaolingian Series (formerly provisional Series 3) was forwarded to ICS in March 2018 for approval. The conterminous base of the Wuliuan Stage and the Miaolingian Series coincides with the FAD of the oryctocephalid trilobite *Oryctocephalus indicus*, and the proposed GSSP section, the Wuliu-Zengjiayan section, is at Balang Village in the Miaoling Mountains, eastern Guizhou, China. The GSSP proposal was ratified by the IUGS in June 2018.
- The Cambrian Subcommittee held its annual meeting in association with the Ediacaran Subcommittee (ISES) 12–16 August 2018 in Xi'an, China. The conference was entitled *International Conference on Ediacaran and Cambrian Sciences (ICECS 2018)*. Chief organizers for the conference were Yaoping Cai, Jian Han, Hong Hua, Kangjun Huanh, Jianni Liu, Xingliang Zhang (chair) and Zhifei Zhang. The Subcommittee sponsored one day-long session and one morning session devoted to Cambrian geology, stratigraphy and palaeontology. Several talks were devoted to primarily toward the base of the Cambrian System. Most of the major Cambrian stratigraphic issues remaining to be solved are in the lower half of the system, and the sessions were partly aimed at addressing potential solutions. Subcommittee members also delivered talks or posters on other topics dealing with Cambrian stratigraphy. An abstract volume and four field guides were published.
- The Subcommittee's webpage was updated in 2018. The webpage accounts for the many important changes that have occurred with respect to global chronostratigraphy of the Cambrian System, and includes updated contact information, upcoming meetings, lists of important publications, and other essential information.

## 6. SUMMARY OF INCOME AND EXPENDITURES IN 2018

### INCOME

|                           |            |
|---------------------------|------------|
| Carried forward from 2017 | \$ 0.00    |
| ICS Allocation            | \$ 3000.00 |
| SUBTOTAL 2018 income      | \$ 3000.00 |

### EXPENDITURE FROM 2018 BUDGET

|                                           |         |
|-------------------------------------------|---------|
| Contribution to officer's travel expenses | \$ 0.00 |
| SUBTOTAL 2018 expenditures                | \$ 0.00 |

To be carried forward to 2019 \$ 3000.00

## 7. BUDGET REQUESTS FROM ICS IN 2019

In order to accelerate the pace of work in establishing GSSPs within the Cambrian, we request a modest increase in funds from ICS as compared to previous years. This will be especially important in 2019 because of the need for Executive and Voting Members of the Subcommittee to be present at the NAPC in California (including an excursion to the Great Basin), STRATI 2019 in Italy (including an excursion to Sardinia) and the International Meeting on the Ediacaran–Cambrian Transition in Spain. At these meetings, we will have the opportunity to examine and discuss stratigraphic issues surrounding the remaining undefined stages and the base of the Cambrian GSSP. The meetings will also provide an opportunity to examine key sections in the Cambrian of western North America and southern Europe. The proposed increased funding is also targeted at field research on other key sections by Working Group members and young scientists.

### INCOME

|                      |            |
|----------------------|------------|
| Carry-over from 2018 | \$ 3000.00 |
|----------------------|------------|

### PLANNED EXPENDITURES FOR 2019

|                                                                |            |
|----------------------------------------------------------------|------------|
| Preparation for STRATI 2019 including excursion to Sardinia    | \$ 700.00  |
| Executive and VMs travel costs, Cambrian Subcommittee meetings | \$ 5000.00 |
| Support for two young scientists to attend meetings            | \$ 2000.00 |
| General office expenses                                        | \$ 100.00  |
| TOTAL 2019 PLANNED EXPENSES                                    | \$ 7800.00 |

ICS 2019 BUDGET REQUEST \$ 4800.00

## 8. OBJECTIVES AND WORK PLAN FOR NEXT YEAR (2019)

In 2019 the Cambrian Subcommittee will continue work toward defining GSSPs for its remaining provisional stages. The general plan is to arrive at a decision on how to define Stage 10 in 2018–2019 (two options: at the FAD of the agnostoid *Lotagnostus americanus* or at the FAD of the conodont *Eoconodontus notchpeakensis*); then to arrive at decisions on stages 2, 3, and 4 in subsequent years. In addition, the Subcommittee will continue examining issues surrounding definition of the Cambrian GSSP.

## **9. CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (2014–2018)**

- From 2014 to 2018 the Cambrian Stage Subdivision Working Group has made five reconnaissance visits to sections in association with international field conferences. Areas visited are Morocco and South China (2014), South Australia (2016), Newfoundland (2017), and China (2018).
- In association with each of the field conferences, regional and/or global correlation charts have been published in technical papers.
- The Cambrian Subcommittee has devised a plan for subdividing the Cambrian System into four series and 10 stages. The two lower series will embrace two stages each, and the upper two series will embrace three stages each. Through 2007, two series (Terreneuvian and Furongian) and four stages (Fortunian, Drumian, Guzhangian, and Paibian) had been ratified. Since that time, two stages have been ratified, the Jiangshanian in 2011 and the Wuliuan in 2018.
- Beginning with the Jiangshanian Stage, the Cambrian Subcommittee has been interested in establishing ASSPs. An ASSP for the Jiangshanian was approved in 2012.

## **10. OBJECTIVES AND WORK PLAN FOR THE NEXT FOUR YEARS (2019–2022)**

- The principal objective of the Subcommittee for 2019 is to narrow possibilities for horizons and GSSP stratotypes for the remaining undefined stages, which are provisionally identified as stages 2, 3, 4, and 10.
- The ISCS has developed a prioritized plan for formalizing definition of the remaining undefined GSSPs. The plan is:
  - 1) Provisional Stage 10 is expected to be defined next, but a decision on a GSSP is likely to be one or two years away.
  - 2) Following a decision on Stage 10, provisional stages 2, 3, and 4, are expected to be defined in rapid succession. A decision on the preferred GSSP horizon of any one of the three stages will restrict choices for the remaining two stages, so the ISCS is approaching work toward definition of the three stages as closely linked.
  - 3) A more long-term objective is re-examination of the Cambrian GSSP (Terreneuvian Series, Fortunian Stage). Imprecision in correlating the lower boundary of the Cambrian System has been encountered on all palaeocontinents, and the ISCS is now engaged in seeking a practical solution to remedy the problem (see Babcock, L.E. et al. 2014: Proposed reassessment of the Cambrian GSSP. *Journal of African Earth Sciences* 98, 3–10). A decision on how to proceed with the Cambrian GSSP is expected to be made following ratification of GSSPs for stages 2, 3, and 4.

## APPENDIX

### *Subcommission officers (2016–2020)*

*Chairman:* Loren E. Babcock (USA) [babcock.5@osu.edu](mailto:babcock.5@osu.edu)

*Vice-Chair:* Xingliang Zhang (China) [xzhang69@nwu.edu.cn](mailto:xzhang69@nwu.edu.cn)

*Secretary:* Per Ahlberg (Sweden) [per.ahlberg@geol.lu.se](mailto:per.ahlberg@geol.lu.se)

### *List of Voting Members (including officers) for 2016–2020*

- 1) Per Ahlberg, Lund, Sweden [per.ahlberg@geol.lu.se](mailto:per.ahlberg@geol.lu.se)
- 2) José-Javier Álvaro, Villeneuve d'Ascq, Spain [alvarobjj@cab.inta-csis.es](mailto:alvarobjj@cab.inta-csis.es), [jj.alvaro@csic.es](mailto:jj.alvaro@csic.es)
- 3) Loren E. Babcock, Columbus, Ohio, USA [babcock.5@osu.edu](mailto:babcock.5@osu.edu)
- 4) Gabriella Bagnoli, Pisa, Italy [bagnoli@dst.unipi.it](mailto:bagnoli@dst.unipi.it)
- 5) Duck K. Choi, Seoul, Korea [dkchoi@snu.ac.kr](mailto:dkchoi@snu.ac.kr)
- 6) Olaf Elicki, Freiberg, Germany [elicki@geo.tu-freiberg.de](mailto:elicki@geo.tu-freiberg.de)
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- 10) Pierre D. Kruse, Adelaide, Australia [archaeo.kruse@gmail.com](mailto:archaeo.kruse@gmail.com)
- 11) Linda B. McCollum, Cheney, Washington, USA [lmccollum@ewu.edu](mailto:lmccollum@ewu.edu)
- 12) Malgorzata Moczydlowska-Vidal, Sweden [malgo.vidal@pal.uu.se](mailto:malgo.vidal@pal.uu.se)
- 13) Elena B. Naimark, Moscow, Russia [naimark@paleo.ru](mailto:naimark@paleo.ru)
- 14) Tatyana V. Pegel, Novosibirsk, Russia [pegel@mail.ru](mailto:pegel@mail.ru)
- 15) Shanchi Peng, Nanjing, China [scpeng@nigpas.ac.cn](mailto:scpeng@nigpas.ac.cn)
- 16) Leonid Popov, Wales, UK [leonid.popov@museumwales.ac.uk](mailto:leonid.popov@museumwales.ac.uk)
- 17) Brian R. Pratt, Saskatchewan, Canada [brian.pratt@usask.ca](mailto:brian.pratt@usask.ca)
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- 21) Mark Webster, Chicago, Illinois, USA [mwebster@geosci.uchicago.edu](mailto:mwebster@geosci.uchicago.edu)
- 22) Xingliang Zhang, Xi'an, China [xzhang69@nwu.edu.cn](mailto:xzhang69@nwu.edu.cn)
- 23) Maoyan Zhu, Nanjing, China [myzhu@nigpas.ac.cn](mailto:myzhu@nigpas.ac.cn)
- 24) Anna Zylinska, Warsaw, Poland [anna.zylinska@uw.edu.pl](mailto:anna.zylinska@uw.edu.pl)

### *List of Working (Task) Groups and their officers*

1. WG on Stage 10 GSSP, chaired by Per Ahlberg (Sweden)
2. WG on Stage 4 GSSP, chaired by James B. Jago (Australia)
3. WG on Stage 3 GSSP, chaired by Xingliang Zhang (China)
4. WG on Stage 2 GSSP, chaired by Michael Steiner (Germany)
5. Cambrian GSSP, chaired by Zhu Maoyan (China)