Cambrian of the Barrandian area and the International Subcommission on Cambrian Stratigraphy

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The Barrandian area south-west of Prague is a classical area of Lower Palaeozoic palaeontology and stratigraphy. Palaeontological research has a tradition of more than 230 years and the area is well known to geologists, particularly because three Silurian and Devonian GSSPs have been located here. Because of its long research history and the key role in Lower Palaeozoic stratigraphy and palaeontology, collections of fossils from here have been restudied and revised and localities have often been visited by scientists from around the world.

In the last decades Prague hosted several international meetings focussed on Devonian, Silurian and Ordovician stratigraphy. Comparing to that, Cambrian sequences with a rich invertebrate fauna were internationally nearly invisible. It could be explained by a dominant deposition of unfossiliferous clastics with only a short marine ingression in the 'middle' Cambrian and the following low potential for a long-distance correlation (Geyer *et al*. 2008).

The Workshop of the ICS (International Commission on Stratigraphy) organised at the Charles University, Prague in May 2010 brought Shanchi Peng (Vice-Chair of ICS and Chair of the International Subcommission on Cambrian Stratigraphy) on the idea to realize the Field Conference of the Cambrian Stage Subdivision Working Group also in Prague.

This thematic series of sixteen papers published in this issue of the *Bulletin of Geosciences* arises from 'The 15th Field Conference of the Cambrian Stage Subdivision Working Group, International Subcommission on Cambrian Stratigraphy' held in Prague, Czech Republic from 4 to 11 June 2010 with excursions to the Barrandian area of the Czech Republic and Frankenwald and Saxony of Germany.

The contributions covered by this thematic issue of the *Bulletin of Geosciences* are ordered broadly in terms of the stratigraphy, being supplemented by papers focused on systematic palaeontology.

A focus paper by Peng & Babcock summarizes the chief accomplishments reached by the International Subcommission on Cambrian Stratigraphy and reviews the recent progress toward defining the bases of remaining provisional stages and series.

Absence of rapidly evolving and widespread organisms in early Cambrian is discussed by Yuan *et al.*, who propose an alternative correlation for the Cambrian Series 2. The authors propose to correlate the oldest trilobite *Parabadiella* and *Tsunyidiscus* in South China with the oldest trilobite *Abadiella* in Australia, *Profallotapis* in Siberia and *Eofallotaspis* in Morocco.

The 'Lower–Middle' Cambrian Boundary Working Group has selected two trilobite horizons to consider for definition of this boundary. The first proposal is the FAD (first appearance datum) of *Oryctocephalus indicus*, the second candidate is the FAD of *Ovatoryctocara granulata*. Three following papers discuss this stratigraphical level.

Naimark *et al.* provided a comprehensive revision of three species and two subspecies of the trilobite genus *Ovatoryctocara* Tschernyscheva, 1962 established in Siberia.

The paper by Sundberg *et al.* focuses on changes in trilobite faunas at the potential GSSP of the base of Cambrian Stage 5/Series 3 at the Wuliu-Zengjianyan section in south China. Detailed collections from the Wuliu Quarry spaning approximately 4.5 m across the potential boundary show that the faunas of the *Ovatoryctocara* cf. *granulata-Bathyonotus holopygus* and the *O. indicus* zones changed in a 20 cm of a relatively barren interval within the Kaili Formation. This faunal turnover is not associated with a lithologic change and thus the section would be a good location for the GSSP of the base of Cambrian Stage 5/Series 3. The studied section in the Wuliu Quarry provided a rich non-trilobite fauna, including tubular shells, brachiopods, molluscs, echinoderms and sponges, as well as algae, acritarchs, and trace fossils.

The paper by Geyer & Peel presents a comprehensive study of moderately diverse trilobite faunas of the Henson Gletscher Formation in North Greenland covering the Cambrian Series 2–Series 3 boundary interval. Critical analyses of key trilobite species for the base of Cambrian Series 3 confirmed that the level with *Oryctocephalus indicus* the trilobite species regarded frequently as the best possible indicator for the global Cambrian Series 2–Series 3 boundary cannot be located precisely on a number of Cambrian palaeocontinents. It has not been detected in the Henson Gletscher Formation with certainty. The authors recommend the utilization of the *Ovatoryctocara granulata* level to define the base of the Cambrian Series 3 and Stage 5 on a global scale. They also conclude that the Molodo River section in northeastern

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Siberia and the Balang section in Guizhou, P.R. of China, currently provide the best perspectives for placement of the GSSP.

Peel & Ineson present palaeontological data from six outcrops in the early Cambrian Sirius Passet Lagerstätte of North Greenland. Together with the earlier papers on articulated hyoliths (Peel 2010) and arthropods (Peel & Stein 2009) it is already third contribution on this extraordinary fauna published in this journal in the last two years.

Difficulties how to correlate different palaeogeographic provinces in the case of a lack of shared genera and species are elaborated by Gozalo *et al.* The review of earlier data combined with new information gathered from the Iberian Chains are used to argue that the bases of *Pardailhania hispida* trilobite zone and *Ptychagnostus atavus* agnostoid zone are approximately equivalent. FAD of *Pardailhania hispida* is proposed to mark the beginning of the Drumian Stage in Spain (Cantabrian Mountains, Demanda Mountains and Iberian Chains), France (Montagne Noire), Italy (Sardinia), Turkey (Amanos and Sultan Mountains), and probably also in Morocco (Antiatlas). This paper represents a complementary study of the recently published contribution by Álvaro *et al.* (2010).

The International Subcommission on Cambrian Stratigraphy made a decision to place the base of Stage 10 at the FAD of the agnostoid *Lotagnostus americanus* or another fossil. The base of the Stage 10 is discussed in four contributions.

Lazarenko *et al.* propose the Khos-Nelege section located in the north-eastern Siberian Platform, Western Yakutia, Russia as the Global Standard Stratotype Section and Point (GSSP) for the base of the 'Cambrian Stage 10'. The proposed GSSP coincides with the FAD of *L.* (*L.*) *americanus* at 339 m above the base of the Ogon'or Formation. Lazarenko *et al.* follow the recent revision of *Lotagnostus* (*Lotagnostus*) *americanus* by Peng & Babcock (2005), who designated it as an easily recognizable agnostoid taxon. The first appearance of *L.* (*L.*) *americanus* has been recognized from all major Cambrian continents, including Baltica, Laurentia, Avalonia, South China and Australia.

In the following contribution, Westrop *et al*. deal with taxonomy of the genus *Lotagnostus*, including *L.* (*L.*) *americanus* in great details. In agreement with Rushton (2009), they do not follow the broad view of this species as proposed by Peng & Babcock (2005). They concluded, that four distinct species could be distinguished in Laurentia, other two in Avalonia and next three species in China.

Miller *et al.* propose the name Lawsonian Stage for the 'Cambrian Stage 10'. Its base is defined at the FAD of the euconodont *Eoconodontus notchpeakensis*, 3 metres above the base of the Red Tops Member of the Notch Peak Formation at the Steamboat Pass section in the House Range, western Utah, USA. The associated high-amplitude, negative, carbon-isotope excursion, the HERB Event, known in the *Eoconodontus notchpeakensis* Subzone is elaborated in the next contribution by Landing *et al.*

García-Bellido *et al.* describe well preserved material of a new species of *Crumillospongia mureroensis* sp. nov. from uppermost early Cambrian rocks of the Murero Lagerstätte, Valdemiedes Formation, NE Spain. The demosponge genus *Crumillospongia* has been recorded from the Burgess Shale of Canada and cited from localities in the United States and South China.

Skovsted *et al.* discussed recent findings of fused sclerite composites of the problematic cone- to spine-shaped fossil *Stoibostrombus crenulatus* in new collections from the central Flinders Ranges of South Australia. New specimens corroborate the earlier interpretation of *Stoibostrombus* spines as dermal sclerites, *e.g*. parts of a complex scleritome. It is suggested that hard parts of *Stoibostrombus* were secreted by an ecdysozoan animal closely related to palaeoscolecid worms.

Liu *et al.* suggest a carnivorous feeding habit for one of the well known the damesellid trilobite *Neodrepanura premesnili* from the Kushan Formation in North China. Description of the butterfly-shaped hypostome and the wide doublure was made posssible by the recently discovered complete exoskeleton and some additional materials of this species.

Two distinct types of exoskeletal abnormalities, triangular or asymmetrical V- to W-shaped breaks on margins of isolated sclerites and shortened thoracic pleural spines in complete or nearly complete individuals are reported in paradoxidid trilobites by Zamora *et al.* One new ichnotaxon, *Mandibulichnus serratus* ichnogen. et ichnosp. nov., is erected for serrated breakage of the margins of isolated trilobite sclerites produced by active predation or scavenging. The material comes from 'middle' Cambrian from Purujosa in the Iberian Chain, NE Spain. Some of these breaks recall abnormalities observed on the agnostoid arthropod of comparable age (Fatka *et al.* 2009).

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Conference excursion participants in front of the Joachime Barrande bust at Skryje. Standing, from the left: Oldřich Fatka (Charles University Prague, Czech Republic), Per Ahlberg (Lund University, Sweden), Rodolfo Gozalo (Universitat de València, Spain), Li Jun (Nanjing Institute of Geology and Palaeontology, Chinese Academy of Science, Nanjing, China), Shanchi Peng (Nanjing Institute of Geology and Palaeontology, Chinese Academy of Science, Nanjing, China), Yuanlong Zhao (Guizhou University, Guiyang City, China), Elena Naimark (PIN RAS, Moscow, Russia), Jin Peng (Guizhou University, Guiyang, China), Lyudmila Boldushevskaya (RN-KrasnoyarskNIPIneft, Krasnoyarsk, Russia), Gappar Yergaliev (Institute of Geological Sciences, Almaty, Kazakhstan), Jinliang Yuan (Nanjing Institute of Geology and Palaeontology, Chinese Academy of Science, Nanjing, China), Adrienne Jago (University of South Australia, Mawson Lakes, Australia), Ed Landing (New York State Museum, Albany New York, USA), Jim Jago (University of South Australia, Mawson Lakes, Australia), Fredrick Terfelt (University of Cambridge, Cambridge, Britain), Vyacheslav Zhemchuznikov (Joint Stock Company "Geostan", Almaty, Kazakhstan), John Peel (Uppsala University, Uppsala, Sweden), Tatyana Pegel (Siberian Research Institute of Geology, Novosibirsk, Russia), Gerd Geyer (Bayerisches Landesamt für Umwelt, Geologischer Dienst, Hof, Germany, and Uppsala University, Uppsala, Sweden), Shulei Peng (Nanjing Institute of Geology and Palaeontology, Chinese Academy of Science, Nanjing, China).
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