2014 PROGRESS REPORT OF THE TASK GROUP TO ESTABLISH THE MOSCOVIAN–KASIMOVIAN AND KASIMOVIAN–GZHELIAN BOUNDARIES

Chairman Katsumi Ueno
Katsumi Ueno[1] and Task Group
[1]Department of Earth System Science, Fukuoka University,
Fukuoka 814-0180, Japan
E-mail: katsumi@fukuoka-u.ac.jp

Introduction

In the 2014 fiscal year, the search continued for an index within an evolutionary lineage for definition of the base of the Kasimovian. For that boundary, the use of the FAD of the conodont *Idiognathodus heckeli* Rosscoe & Barrick, 2013 shows great potential and is being tested prior to final approval. The first appearance datum (FAD) of a conodont has been formally selected for defining the base of the Gzhelian Stage (Heckel *et al*., 2008; Villa *et al*., 2009) and the search for a suitable section for the GSSP continued.

MOSCOVIAN-KASIMOVIAN BOUNDARY

As potential marker events for defining the base of the Kasimovian Stage, Villa and task group (2008) proposed using the FADs of the conodont *Idiognathodus sagittalis* Kozitskaya, 1978 or *Idiognathodus turbatus* Rosscoe & Barrick, 2009a. Their occurrence (near base of Khamovnikian Substage, the second substage of the Kasimovian in current definition) is approximately one substage higher than the traditional base of the Kasimovian (base of Krevyakinian Substage). A new option, discussed below, is to use the first occurrence of *Idiognathodus heckeli* Rosscoe & Barrick, 2013, which is closer to the traditional base.

Progress in North America

Rosscoe & Barrick (2013) documented in detail the morphological transition from *Idiognathodus swadei* Rosscoe & Barrick, 2009a to *Idiognathodus heckeli* Rosscoe & Barrick, 2013 (the transitional form) to *I. turbatus* in the North American Midcontinent succession. The steps in this lineage occur in the offshore-marine intervals within a succession of successive cyclothems resulting from eustasy (Rosscoe & Barrick, 2009b). Rosscoe & Barrick suggested that using the FAD of *I. heckeli*, the precursor species to *I. turbatus*, would be more appropriate for boundary definition than use of *I. turbatus*, because it will bring the stage base closer to the traditional base of the Kasimovian.

Progress in South China

The morphological transition discussed above also occurs in the condensed, deep-water (comprises limestone slope turbidites) Naqing (Nashui) section of southern Guizhou province in South China. A conodont evolutionary lineage of *Idiognathodus swadei – I. heckeli – I. turbatus* was established in the Moscovian–Kasimovian boundary interval of the Naqing section, southern Guizhou province (Qi *et al*., 2013). *I. heckeli*, with a complete eccentric groove on the platform, was named by Rosscoe and Barrick (2013) based on materials from North America, and was suggested to be a suitable bio-marker for the base of the Kasimovian. The Naqing section was studied intensively during the last five years and the exact FADs of *I. turbatus* and *I. heckeli* established on bed-by-bed collections. The documentation of this lineage containing *I. heckeli* in the limestone-dominant Naqing section, which appears to lack substantial breaks resulting from either erosion or nondeposition, makes it a good potential candidate section for the GSSP at the base of the Kasimovian.

The conodont and fusulinid biostratigraphy of the nearby Narao section, deposited in somewhat shallower slope settings than the Naqing section, is being intensively studied.

Progress in Russia

During 2014, Alekseev and Goreva continued their studies of the *Idiognathodus turbatus* and *I. sagittalis* as a possible markers for the base of the Kasimovian Stage. Their lineages are diverse, but mainly evolving in relatively deepe water settings, as in the Stsherbatovka section in Oka–Tsna Swell (Ryazan Region, Russia). Alekseev and Goreva started describing conodonts from the Afanasievo section and Perkhurovo and Ilinsky Pogost bore-holes, which cover together the lower half of the Kasimovian in its type area in the Moscow Basin. They plan to show the Afanasievo section as the Kasomovian Neostratotype during a field trip of the August 2015 XVIII ICCP in Kazan. At this moment, they considered that the mid-Khamonvnikian Substage is the best potential level for the fixation of the base-Kasimovian boundary.

KASIMOVIAN-GZHELIAN BOUNDARY

After fixing the base of the Gzhelian Stage by using the first appearance datum of the conodont *Idiognathodus simulator* (Ellison, 1941) *s.s.* in its potential lineage *Idiognathodus eudoraensis* - *I. simulator* (Heckel *et al*., 2008; Villa *et al*., 2009), the task group is directing research toward selecting a section for the GSSP.

Progress in Russia

For the base of the Gzhelian, conodonts from the Usolka section (South Urals) is being studied in detail by Guzel Sungatullina (Kazan Federal University, Russia). The section was once proposed as a potential candidate of GSSP for the base of the Gzhelian Stage (Davydov *et al*., 2008). Later the boundary interval became covered by soil and vegetation and was poorly exposed in 2009 when members of the SCCS inspected it. In 2013-2014, the Moscovian – basal Gzhelian interval at Usolka was newly exposed and about 70 new conodont samples collected. Because the rocks are siliceous, the processing of samples for conodonts is proceeding slowly, but the first results show that conodont zones similar to those established in the Moscow Basin are recognizable in the Usolka section. In this section, the basal Gzhelian contains forms close to *Idiognathodus simulator*, but its ancestor *I. eudoraensis* has not been found. Alexander Alekseev expects the results of Gusel's study to be sufficient to propose using the Usolka section as a potential GSSP candidate for the base of the Gzhelian. The Usolka section will be demonstrated during a field trip of XVIII International Congress on the Carboniferous and Permian in 2015.

Progress in South China

Detailed investigations on conodonts across the Kasimovian–Gzhelian boundary interval in the Naqing section and nearby Narao section in southern Guizhou was conducted by Wang Qiulai and Qi Yuping in 2014. Many additional conodont specimens were obtained from new collections from both sections. The conodont fauna from Narao is enriched and more diverse than that of the Naqing section. In the Naqing section, *I. simulator* first appears in 255.55-255.75 m level and ranges upwards in a 3 m thick stratigraphic interval with its possible morphological variations. The underlying 1.5 m thick interval (254~255.55 m level), previously considered to be barren, yielded some small conodont specimens, thereby enabling the recognition of a continuous evolutionary lineage from *I. eudoraensis* to an unnamed new species, then to *I. simulator* in the section. Recently, Wang Qiulai (2013: unpublished Master thesis) established a new conodont succession across the Kasimovian–Gzhelian boundary of the Naqing section, including the *I. guizhouensis* Zone, *I. eudoraensis* Zone, *Streptognathodus zethus* Zone, *I. simulator* Zone, *I. nashuiensis* Zone, and *S. virgilicus* Zone in ascending order.

The Narao section contains abundant and diverse conodont specimens across the boundary interval. In that section, *I. simulator* first occurs at the 229.61 m level and ranges upwards in about a 4 m thick stratigraphic interval. Qi and his colleagues are going to continue with detailed studies in the coming years to better understand both conodont and fusulinid evolutionary changes across the Kasimovian–Gzhelian boundary interval in the Narao section. Sedimentologic and stable-isotope geochemical investigations are being done by Chen Jitao and Isabel Montanez on both the Moscovian–Kasimovian and Kasimovian–Gzhelian boundary intervals in the Naqing and Narao sections.

References

DAVYDOV, V.I., CHERNYKH, V.V., CHUVASHOV, B.I., SCHMITZ, M. & W.S. SNYDER (2008): Faunal assemblage and correlation of Kasimovian-Gzhelian Transition at Usolka Section, Southern Urals, Russia (a potential candidate for GSSP to define base of Gzhelian Stage). ─ *Stratigraphy*, **5**: 113-136.

ELLISON, S.P. (1941): Revision of the Pennsylvanian conodonts. ─ *Journal of Paleontology*, **15**: 107-143.

HECKEL, P.H., ALEKSEEV, A.S., BARRICK, J.E., BOARDMAN, D.R., GOREVA, N.V., ISAKOVA, T.I., NEMYROVSKA, T.I., UENO, K., VILLA, E. & D.M. WORK (2008): Choice of conodont *Idiognathodus simulator* (sensu stricto) as the event marker for the base of the global Gzhelian Stage (Upper Pennsylvanian Series, Carboniferous System). ─ *Episodes*, **31**: 319─325.

KOZITSKAYA, R.I., KOSENKO, Z.A., LIPNYAGOV, O.M. & T.I. NEMIROVSKAYA (1978): Carboniferous conodonts of Donets Basin. ─ *Kiev: Naukova dumka*, 134 p.

Qi, Y.P., Barrick, J.E. and Hu, K.Y., 2013. The *Idiognathodus turbatus* conodont lineage in the Naqing section, South China, and the base of the global Kasimovian stage. *In*: Lucas, S.G., DiMichele, W., Barrick, J.E., Schneider, J.W. and Spielmann, J.A. (eds.), The Carboniferous-Permian Transition. New Mexico Museum of Natural History and Science, Bulletin, 60: 328.

ROSSCOE, S.J. & J.E. BARRICK (2009a): Revision of *Idiognathodus* species from the Desmoinesian-Missourian (Moscovian-Kasimovian) boundary interval in the Midcontinent Basin, North America. ─ *Palaeontographica Americana*, **62**: 115─147.

ROSSCOE, S.J. & J.E. BARRICK (2009b): *Idiognathodus turbatus* and other key taxa of the Moscovian-Kasimovian boundary interval in the Midcontinent region, North America. ─ *Newsletter on Carboniferous Stratigraphy*, **27**: 21─25.

ROSSCOE, S.J. & J.E. BARRICK (2013): North American species of the conodont genus *Idiognathodus* from the Moscovian-Kasimovian boundary composite sequence and correlation of the Moscovian-Kasimovian stage boundary. *In*: LUCAS, S.G., DIMICHELE, W., BARRICK, J.E., SCHNEIDER, J.W. & J.A. SPIELMANN (eds.), The Carboniferous-Permian Transition. ─ *New Mexico Museum of Natural History and Science*, Bulletin, **60**: 354─371.

VILLA, E., ALEKSEEV, A.S., BARRICK, J.E., BOARDMAN, D.R., DJENCHURAEVA, A.V., FOHRER, B., FORKE, H., GOREVA, N.V., HECKEL, P.H., ISAKOVA, T.I., KOSSOVAYA, O., LAMBERT, L.L., MARTÍNEZ-CHACÓN, M.L., MÉNDEZ, C.A., NEMYROVSKA, T.I., REMIZOVA, S., SAMANKASSOU, E., SÁNCHEZ DE POSADA, L.C., UENO, K., WAHLMAN, G. & D.M. WORK (2009): Selection of the conodont Idiognathodus simulator (Ellison) as the event marker for the base of the global Gzhelian Stage (Upper Pennsylvanian, Carboniferous). ─ *Palaeoworld*, **18**: 114─119.

VILLA, E. & Task Group (2008): Progress report of the task group to establish the Moscovian-Kasimovian and Kasimovian-Gzhelian boundaries. ─ *Newsletter on Carboniferous Stratigraphy*, **26**: 12─13.

Members of the Moscovian–Kasimovian and Kasimovian–Gzhelian boundaries Task Groups

Chairman: Katsumi Ueno, Japan, katsumi@fukuoka-u.ac.jp, specialty – fusulinoideans; Alexander S. Alekseev: Russia, aaleks@geol.msu.ru, specialty – conodonts; James E. Barrick: U.S.A., Jim.Barrick@ttu.edu, specialty – conodonts; Darwin R. Boardman: U.S.A., amm0001@okstate.edu, specialty – multitaxial biostratigraphy and sequence stratigraphy; Valery V. Chernykh: Russia, Chernykh@igg.uran.ru, specialty – conodonts; Vladimir I. Davydov: U.S.A., Vdavydov@boisestate.edu, specialty – fusulinoideans and radiometric dating; Alexandra Dzhenchuraeva: Kyrgyzstan, djenchuraeva@yahoo.com, specialty – foraminifers;
Holger Forke: Germany, holger.forke@gmx.de, specialty – fusulinoideans; Nataliya V. Goreva: Russia, Goreva@ginras.ru, specialty – conodonts; Philip H. Heckel: U.S.A., philip-heckel@uiowa.edu, specialty – sedimentology, sequence stratigraphy and biostratigraphy; Tatiana N. Isakova: Russia, isakova@ginras.ru; Olga Kossovaya: Russia, olga_kossovaya@vsegei.ru, specialty – corals; Lance L. Lambert: U.S.A., LLambert@utsa.edu, specialty – conodonts; C. A. Mendez: Spain, cmendez@geol.uniovi.es; Tamara I. Nemyrovska: Ukraine, tnemyrov@mail.ru, specialty – conodonts; Yuping Qi: Peoples Republic of China, ypqi@nigpas.ac.cn, specialty – conodonts; Svetlana T. Remizova: Russia, stremizova@yandex.ru; Steven J. Rosscoe: U.S.A., srosscoe@hsutx.edu, specialty - conodonts; Elias Samankassou: Switzerland, elias.samankassou@unifr.ch; L. C. Sánchez de Posada: Spain, lposada@geol.uniovi.es; Javier Sanz-López: Spain, jasanz@udc.es, specialty – conodonts; Elisa Villa: Spain, evilla@geol.uniovi.es, specialty – foraminifers; Gregory Wahlman: U.S.A., gregwahlman@aol.com, specialty – sedimentology; David M. Work: U.S.A., david.work@maine.gov, specialty – ammonoids