Report of the 12th symposium on Mesozoic Terrestrial Ecosystems, August 16–20, 2015, Shenyang, China

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Abstract

The 12th symposium on Mesozoic Terrestrial Ecosystems (MTE-12) was held in the historical city of Shenyang, northeast China in August 16–20, 2015. A total of 150 participants from 18 countries including Australia, Austria, Belgium, France, Germany, India, Japan, Korea, Malaysia, Mongolia, New Zealand, Nigeria, Pakistan, Philippines, Russia, UK, USA, and China joined the symposium. The 3rd Workshop of the UNESCO-IUGS International Geoscience Programme was held accompanied with the MTE-12. The scientific sessions were held on August 16–18 at the Liaoning Mansion Hotel, Shenyang, which included 4 plenary lectures, 89 oral presentations, and 37 poster presentations. A proceeding issue will be published in the geoscience journal of Global Geology. About 70 participants attended the field excursion in western Liaoning Province. During the two-day field excursion, we visited Early Cretaceous "Jehol Biota" in Beipiao City (Sihetun Village and Huangbanjigou Village), Jurassic "Yanliao Biota" in Daxishan Village, the Bird Fossil National Geopark of Chaoyang, and the Paleontological Museum of Jizangtang. The symposium is co-organized by Shenyang Normal University, Paleontological Museum of Liaoning, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, China University of Geosciences (Beijing), and Jilin University.

Key words: MTE-12, IGCP608, Shenyang, western Liaoning, Jehol Biota, Yanliao Biota.

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Introduction

The Symposium on Mesozoic Terrestrial Ecosystems (MTE) is a sucessful and continuous international symposium which has been held in many countries over 30 years. The purpose of the symposium on MTE is to promote the exchange of ideas about the evolution of life in terrestrial environments during the 190 million years of the Mesozoic. The symposium has contributed to figure out the Mesozoic terrestrial ecosystem in diverse aspects. The first Symposium on MTE was held in Paris, in September, 1978. The 12th Symposium followed the highly successful 11th symposium on MTE held in 2012 in Kwangju, Korea.

The 12th symposium on MTE was held in historical city of Shenyang, northeast China in August 16–20, 2015. The symposium is co-organized by Shenyang Normal University, Paleontological Museum of Liaoning (PMOL), Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (CAS), China University of Geosciences (Beijing), and Jilin University. The chairman of the MTE-12 is SUN, G. who is the Director of PMOL and the Vice-President of the Palaeontological Society of China.

This symposium focused on a series of scientific sessions and symposia to display new research progress relating to the Mesozoic terrestrial ecosystems. In the meantime, the 3rd Workshop of the UNESCO-IUGS International Geoscience Programme was held accompanied with the MTE-12. A total of 150 participants from 18 countries including Australia, Austria, Belgium, France, Germany, India, Japan, Korea, Malaysia, Mongolia, New Zealand, Nigeria, Pakistan, Philippines, Russia, UK, USA, and China joined the symposium. The symposium included three-day scientific sessions and two-day field excursion. During the scientific sessions, researchers presented their achievements either in oral or in poster presentations. Besides, the presenters obtained useful comments through the discussion. During the field excursion, participants visited to western Liaoning Province, including Beipiao (the sites of *Sinosauripteryx prima* and the earliest known angiosperm *Archaefructus liaoningensis*), Jianchang (the site of the oldest known feathered dinosaur *Achiornis huxleyi*), famous museums, and geopark in Liaoning.

This report introduces the organization of the symposium, the scientific sessions, and the excursion in western Liaoning Province.

Organization of the symposium

The symposium was sponsored and carried out by the following committees.

***Sponsors*:**

National Natural Science Foundation of China (NSFC)

Palaeontological Society of China (PSC)
International Geoscience Program of UNESCO-IUGS (IGCP)
China Fossil Protection Foundation (CFPF)
General Office of National Paleontological Expert Committee

***Organized by*:**

Shenyang Normal University (SNU)
Paleontological Museum of Liaoning (PMOL)
Nanjing Institute of Geology and Palaeontology, CAS (NIGPAS)
China University of Geosciences, Beijing (CUG, Beijing)
Jilin University (JU)

***Co-organized by*:**

Fossil Protection Bureau of Liaoning Province, China
Key Lab for Evolution of Past Life in NE Asia, Ministry of Land & Resources, China
Key Lab for Evolution of Past Life & Environment in NE Asia, Ministry of Education, China
Key Lab of Palaeontology Evolution & Palaeoenvironmental Change of Liaoning, China
Base of Introducing Talents of Discipline to Universities on Evolution of Past Life (Proj. 111, China)

***Honorable Chairmen*:**

LI Tingdong, Academician CAS, Chinese Academy of Geosciences, Beijing
ZHOU Zhonghe, Academician CAS, Institute of Vertebrate Paleontology and Paleoanthropology
WANG Chengshan, Academician CAS, China University of Geosciences, Beijing
CHAI Yucheng, Vice Director, Earth Science Division, NSFC, Beijing
YANG Qun, Director, NIGPAS, President of PSC, Nanjing
LIN Qun, President of SNU, Shenyang

***Chairman*:**

SUN Ge, Director of PMOL; Vice-President of PSC

Scientific sessions

The scientific sessions were held on August 16–18 at the Liaoning Mansion Hotel, Shenyang. These scientific sessions included 4 plenary lectures, 89 oral presentations, and 37 poster presentations. A proceeding issue will be published in the geoscience journal Global Geology.

Most of the participants registered in the Liaoning Mansion Hotel in the evening of 15 August. After registration, they received the Programme, the Abstract (Fig. 1), a notebook, a pen, a T-shirt, a handbag, and some brochures about the PMOL. The T-shirt is well designed with the picture of emblem of the MTE-12.



Fig. 1. Photo of the Programme (left) and the Abstracts (right) of the 12th Symposium on Mesozoic Terrestrial Ecosystems.



Fig. 2. Opening ceremony in the hall of Liaoning Mansion Hotel.

The scientific sessions are introduced as follows:

1. Opening ceremony

In the morning of 16 August, the opening ceremony (Fig. 2) was held in a big hall (first floor) of the Liaoning Mansion Hotel. The symposium started with an opening address by Sun, G. (Chairman of MTE-12) and two welcome addresses by Lin, Q. (President of Shenyang Normal University) and Ma, Y. (Vice-Director of Bureau of Land & Resources, Liaoning, Shenyang). They expressed their warmly welcome for all the participants and presented best wishes for the future research. Then followed five invited speeches by Li, T. D. (Academician, Chinese Academy of Sciences, Chinese Academy of Geological Sciences), Dilcher, D. L. (Academician, US, Indiana University, Bloomington), Kirillova, G. (Institute of



Fig. 3. Group photograph after the opening ceremony.

Tectonics & Geophysics, Russian Academy of Sciences, Russia), Martin, T. (University of Bonn, Germany), and Ando, H. (Leader of IGCP608, Ibaraki University, Japan). Four plenary lectures were presented by Zhou, Z. H. (Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences), Dilcher, D. L. (Indiana University, USA) & Sun, G. (Shenyang Normal University, China), Wan, X. Q. & Wang, C. S. (China University of Geosciences, Beijing, China), and Spicer, R. A. (Open University, UK). A group photograph (Fig. 3) was taken at the garden of the Liaoning Mansion Hotel after the opening ceremony.

2. Oral and poster presentations

The oral presentations started from the afternoon of 16 August till the noon of 18 August. The MTE-12 arranged 9 scientific sessions: M-1 Biodiversity of the Mesozoic terrestrial ecosystems, M-2 Mesozoic geology and environmental changes, M-3 Mesozoic tectonics and sedimentary mineral resources, M-4 Evolution of dinosaurs and origin of birds, M-5 Mesozoic plants and their diversity, M-6 Mesozoic climatic and environmental changes, M-7 Cretaceous ecosystem in Asia and Pacific (Workshop of IGCP608), M-8 Vertebrate key-faunas of the Mesozoic, and M-9 Mesozoic fossil footprints. According to the close connection, M-3 was integrated into M-2. M-4 and M-8 gathered together with the topic of Mesozoic evolution of vertebrates and origin of aves. The 89 oral presentations included in 7 sessions mentioned above (including 18 keynote lectures, separately 7 in M-1; 14 in M-2, 3; 16 in M-4, 8; 20 in M-5; 5 in M-6; 4 in M-7, and 10 in M-9) were given in 3 meeting rooms in the 7th floor of the Liaoning Mansion Hotel (Fig. 4). The schedule for each meeting room was shown in the Programme and a paper pasted on the front door of the meeting room. Researchers can attend freely as they like. There were about 10–40 participants in each session (Fig. 4A). Keynote was 30 minutes (including discussion part) and the normal speech was 15 minutes. Every half a day, there was a 30-minute tea break during the oral presentation for the participants to enjoy fruits, cakes, and some drinks. During these breaks, researchers discussed and talked with each other friendly. A total of 37 posters



Fig. 4. Scientific sessions in Liaoning Mansion Hotel. **A.** Oral presentation in session M-5 Mesozoic Plants and Their Diversity; **B.** Poster corner in the hall of the 7th floor of the hotel; **C.** The best oral presentation award to Yoshino, K.; **D.** The best oral presentation award to Li, X.; **E.** Participants from Niigata University, Yoshino, K., Sakai, Y., Matsuoka, A. and Li, X. from left to right; **F.** Yoshino, K. during the oral presentation; **G.** Sakai, Y. during the oral presentation; **H.** Business meeting of the IGCP608.

were presented in the hall outside of the meeting rooms in the afternoon of 17 August (Fig. 4B).

During the symposium, it was decided that the MTE-13 would be held in Bonn, Germany in 2018. Nine best oral presentation awards and seven best poster presentation awards were given to students from Russia, Korea, Belgium, Japan, Malaysia, and China. Yoshino, K. and Li, X. received the best oral presentation awards (Figs. 4C, 4D).

Matsuoka, A. and 3 graduate students (Yoshino, K., Sakai, Y. and Li, X.) from Niigata University, Japan participated in the MTE-12 (Fig. 4E). Yoshino, K. and Sakai, Y. attended the M-5 session and gave oral presentations. The titles were as follows: Palynoflora during the Campanian/Maastrichtian boundary interval in Songliao Basin, NE China (by Yoshino, Fig. 4F); New late Early Cretaceous fossil plants from the Tetori Group in central Japan and their paleaoclimatic implications (by Sakai, Fig. 4G). Matsuoka, A. and Li, X. gave presentations in the M-2, 3 session. The titles were as follows: Jurassic–Cretaceous boundary sequences in Japan and their implication for biochronological correlation (by Matsuoka); Method of observing microfossil-bearing clasts in the neritic-terrestrial conglomerate: advantages, significance and applications (by Li).

3. The accompanied IGCP608 workshop

The IGCP608 (2013–2017) is an international symposium supported by International Geoscience Programme (IGCP) of UNESCO (United Nations Educational, Scientific and Cultural Organization) and IUGS (the International Union of Geological Sciences). It focuses on Cretaceous ecosystems and their responses to paleoenvironmnetal changes in Asia and the western Pacific. The IGCP608 has been promoting communication at the level of geoscience among various Asian countries, including some countries outside of Asia. IGCP608 Project Leaders are Ando, H. (Department of Earth Sciences, Ibaraki University, Japan), Wan, X. Q. (School of Geosciences and Resources, China University of Geosciences, China), Cheong, D. (Department of Geology, College of Natural Sciences, Kangwon National University, Korea), and Bajpai, S. (Birbal Sahni Institute of Palaeobotany, Lucknow, India). The 3rd International Meeting of IGCP608 was held jointly with the MTE-12. It was held as a special session (M-7) (Fig. 4H) in the morning of 18 August. Four oral presentations including 2 keynotes by Ando, H. and Wan, X. Q. were given. Other presentations involved in IGCP608 were separated into other sessions based on their topics.

The 4th IGCP608 was decided to be held in Trofimuk Institute of Petroleum Geology, Nobosibirsk, Russia in 2016 during the symposium.

4. The visit to the Paleontological Museum of Liaoning

In the afternoon of 18 August, all the participants of the scientific sessions visited the Paleontological Museum of Liaoning (PMOL) (Fig. 5A). The PMOL, the largest



Fig. 5. Visit to the Paleontological Museum of Liaoning (PMOL). **A.** Front view of the PMOL; **B.** Group photograph of some participants in the Hall of Dinosaurs; **C.** Sun, G. gave introductions for the participants; **D.** Workshop which produces models of dinosaur.

paleontological museum in China, was approved by Liaoning Provincial Government and was co-constructed by Department of Land and Resources of Liaoning Province (DLRL) and Shenyang Normal University (SNU) since 2006. The "Jehol Biota", "Yanliao Biota", early birds, early angiosperms, and ancient human beings in Liaoning are exhibited in the 8 halls of the museum. A group photograph was taken in the Hall of Dinosaurs (Fig. 5B). The chairman of the MTE-12, Sun, G., gave a specific introduction to the museum and its scientific research (Fig. 5C). The PMOL is located in SNU. In SNU, there is also a workshop to produce the models of dinosaurs (Fig. 5D). After two-hour visit, delegates attended the business conference in the PMOL.

5. Performance

In the evening of 16 August, a performance was held in the hall of the Liaoning Mansion Hotel. Peking Opera Drama "The Goddess Chang's Fly to the Moon" performed by Xiao, D. (Chief of Mei Lanfang's Art Research Institute, SNU). The drama was Master Mei Lanfang's performance lost for a century. The Chinese Instruments Quintet "Jasmine Fragrant" and "Guests from Afar, Please Stay" were happy and smooth melodies with nationalistic style (Fig. 6A). Traditional Peking Opera "Pass the Four Gates" was a famous story about a war



Fig. 6. Performance in the evening of 16 August. **A.** Chinese Instruments Quintet; **B.** Traditional Peking Opera; **C.** Researchers went to the stage to express their appreciate for actors; **D.** Participants enjoyed the performance.

in the Song Dynasty (Fig. 6B). Peking Opera Dance "The King of Qin Ordered Soldiers for War" and Solo Dance "A Touch of Red" were also very impressive. The performance displayed the deep roots and huge charm of Chinese traditional culture. Participants enjoyed and gave high compliments (Figs. 6C, 6D). The performance was organized by Shenyang Normal University and Paleontological Museum of Liaoning.

Field excursion in western Liaoning Province

After the scientific session in the Liaoning Mansion Hotel, 78 participants (54 foreigners) joined a two-day field excursion in western Liaoning Province (Fig. 7). In this excursion, they visited Early Cretaceous "Jehol Biota" in Beipiao City (Sihetun Village and Huangbanjigou Village), Jurassic "Yanliao Biota" in Daxishan Village, the Bird Fossil National Geopark of Chaoyang, and Paleontological Museum of Jizangtang.

The organizers provided famous local sausage, duck's eggs, fruit, and bread as two-day lunch for the participants because of the tight schedule. The organizers also provided hummers for the field excursion. The field excursion will be introduced according to the stops.



Fig. 7. Field excursion in western Liaoning Province. **A.** Group photograph at the Jizantang Fossil Museum; **B.** Outcrop that has yielded *Sinosauropteryx prima*; **C.** China Sihetun Paleontological Museum; **D.** Outcrop that has produced *Archaefructus liaoningensis*; **E.** Fossil Excavation Site in the Liaoning Chaoyang Bird Fossil National Geopark; **F.** Petrified Wood Forest; **G.** Jizantang Fossil Museum; **H.** Outcrop that has included *Anchiornis huxleyi*; **I.** Outcrop that has contained *A.huxleyi*. It is stratigraphically above outcrop of H. (H, I: Strata are exposed below white broken line).

1. The first day

Two tour buses headed for western Liaoning Province in the morning of 19 August. After 5-hour drive, the participants arrived at Sihetun Village in Beipiao City which is a state-level natural protection area. The participants observed the Yixian Formation which has yielded Early Cretaceous "Jehol Biota" including feathered dinosaur *Sinosauropteryx prima*. Firstly, the participants observed and collected samples from the outcrop composed of lacustrine sediments (Fig. 7B). They consist mainly of whitish gray tuffaceous mudstone. Conchostracan and insect fossils are abundant in the outcrop. Then, the participants moved to the China Sihetun Paleontological Museum (Fig. 7C). This museum is built to protect and display dinosaur and bird fossil-bearing horizons. In addition, plant, arthropod, fish, amphibian, reptile, dinosaur, pterosauria, and bird fossils obtained in western Liaoning Province were in the exhibition rooms. After one-hour stay, the participants moved toward the next site.

The second stop was an outcrop of the Yixian Formation in Huanbanjigou Village (Fig. 7D). This site is very famous for the discovery of the earliest angiosperm *Archaefructus liaoningensis*. The lithological feature is similar to the first outcrop. Unfortunately, we met with heavy rain at this stop. Therefore, most of us just observed the outcrop without trying to find fossils.

After the outdoor activity, the participants arrived at the Bird Fossil National Geopark of Liaoning Chaoyang which was built for spreading scientific knowledge. In this time, we visited the Fossil Excavation Site which keeps the vertebrate-bearing horizons (Fig. 7E) and the Petrified Wood Forest that exhibits many silicified woods (Fig. 7F). After visiting these sites, the participants visited the Paleontological Museum of Chaoyang located in the geopark.

In the evening, we moved to the Jizantang Fossil Museum (Figs. 7A, 7G). This museum has not only exhibition rooms but also workshop to produce craft products with silicified wood. In the museum, the staff provided fish fossil bearing rocks. Visitors could experience the interest of finding fossils in the park of the museum instead of in the field. Participants also enjoyed this activity and brought back the fish fossils they found.

After the first day's excursion, the participants stayed at the Fusidun International Hotel. In suppertime, government leader of Chaoyang City and Sun, G. expressed their welcome and appreciation to the participants on the stage of the dining room.

2. The Second Day

In the morning of 20 August, the participants left for Jianchang County. After 3 hour-drive, we arrived at Daxishan Village within the county. The participants observed the middle Jurassic Tiaojishan Formation. This formation yielded the earliest feathered dinosaur *Anchiornis huxleyi*. Normally, most part of the Tiaojishan Formation was covered by

surface soil and recent plants. Outcrops were dug out by local citizens before this field excursion (Figs. 7H, 7I). As a result, the participants could observe the Tiaojishan Formation successively. This formation is composed of lacustrine sediments. They consist of mudstone, arkose sandstone, greywacke, and tuff. The section is subdivided into 29 lithostratigraphic units. *Anchiornis huxleyi* appeared in the lower unit composed of blackish gray mudstone with yellow tuff (Fig. 7H) and the upper unit that consists of grayish green sandy mudstones and tuffaceous fine-grained sandstones (Fig. 7I).

This field excursion was planned and guided by Sun, G. (Shenyang Normal University/ Paleontological Museum of Liaoning), Wang, Y. D. (Nanjing Institute of Geology and Palaeontology), Wan, X. Q. (China University of Geosciences (Beijing)), and Zhang, H. G. (Shenyang Normal University/Paleontological Museum of Liaoning). During the two-day field excursion, we observed a variety of fossils of the Cretaceous "Jehol Biota" and Jurassic "Yanliao Biota". Also, we noticed the effort from the government to protect the heritage of the Earth and display to the public at the meantime.

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