Acta Geologica Sinica (English Edition), 2019, 93(supp.2): 286–287

Eocene Sporopollen Biostratigraphy in Tüna, Yadong, Tibet

ZHANG Wenyuan[1, 2], LI Guobiao[1, 2, *], YAO Youjia[1, 2], LI Yuewei[1, 2, 3], WANG Tianyang[2], LI Xinfa[2], LI Qi[2], XIE Dan[3], SHI Wei[1, 2], GUO Baojie[1,2] and KANG Yahui[1, 2]

[1] *State Key Laboratory of Environmental Geology and Biogeology, China University of Geosciences, Beijing 100083, China*
[2] *School of Earth Sciences and Resources, China University of Geosciences, Beijing 100083, China*
[3] *Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China*

Citation: Zhang et al., 2019. Eocene Sporopollen Biostratigraphy in Tüna, Yadong, Tibet. *Acta Geologica Sinica* (English Edition), 93(supp.2): 286–287.

Abstract: The Tibetan Plateau was caused by the collision between the India plate and the Asian plate. The study of the late evolution history of the Tibetan Tethys and the determination of its closure time can provide an important and direct basis for the study of the collision process between India and Asia (Li and Wan, 2003a). A successive Cretaceous-Paleogene shallow sea stratigraphic sequence developed in southern Tibet (Wan, 1990; Ding, 2003; Li and Wan, 2003a, 2003b; Li et al., 2003, 2005a, 2005b, 2007; Niu et al., 2016; Zhang and Li, 2017; Han et al., 2019; Li and Wan, 2019). The Paleogene marine strata are well outcropped in southern Tibet, which yielded abundant microfossils (Ding, 2003; Li and Wan, 2003a, 2003b; Li et al., 2003, 2005a, 2005b, Li et al., 2019).

The Tüna Reservoir section is located in ~2.5 km west of the Tűna, Yadong, southern Tibet. The Zhepure Formation of this section is mainly composed of microfossils-bearing shale and limestone (Niu et al., 2016; Zhang et al., 2017). The detailed study was carried out on the sporopollen biostratigraphy of the Sandy-shale Member of the Zhepure Formation in the Tüna Reservoir section and 23 species of 18 sporopollen genera were identified. The identification of sporopollen was mainly based on such data as Song et al. (1999) and Yang et al. (2013). The main elements of the sporopollen assemblage from the Zhepure Formation include *Celtispollenties minor*, *Crytomeriapollenites largus*, *Cruciferaeipites elegans*, *Echinosporis baculatus*, *Graminidites pseudograminens*, *Lygodiumsporites maximus*, *Sapindaceidites concavus*, *Taxodiaceaepollenites hiatus* etc.

Four sporopollen assemblage zones were recognized as follows (from bottom to top):

1. *Sapindaceidites concavus-Lygodiumsporites maximus*

Fig. 1. Scanning electron micrographs of Eocene Sporopollen in the Gulupu section.
1. *Dicellaesporites aculeolatus*; 2. *Taxodiaceaepollenites hiatus*; 3. *Graminidites pseudograminens*; 4. *Sapindaceidites concavus*; 5. *Staphlosporonites lanceolatus*; 6. *Monolites micispinosus*; 7. *Lygodiumsporites maximus*; 8. *Crytomeriapollenites largus*; 9. *Podocarpidites elongates*; 10. *Taxodiaceaepollenites hiatus*; 11. *Chenopodipollis microporatus*; 12. *Multicellaesporites ovatus*; 13. *Celtispollenties minor*; 14. *Deltoidospora microlepioidites*; 15. *Ephedripites huanghuaensis*; 16. *Ephedripites* (*Distachyapites*) *fusiformis*; 17. *Pinuspollenites pesudopeuceformis*; 18. *Taxodiaceaepollenites hiatus.*

* Corresponding author. E-mail: liguobiao@cugb.edu.cn

assemblage zone. The representative elements of this assemblage zone are *S. concavus* and *L. maximus.* Other important elements include *Taxodiaceaepollenites hiatus*, *Crytomeriapollenites largus*, *Echinosporis baculatus, Ephedripites* (*Distachyapites*) *fusiformis*, *Pinuspollenites pesudopeuceformis*, *Celtispollenties minor*, *Sequoiapollenities polyformosus*, *Graminidites pseudograminens* and *Gothanipollis latliproctus* etc. The age of this assemblage zone is roughly early Eocene.

2. *Taxodiaceaepollenites hiatus-Graminidites pseudograminens* assemblage zone. The representative elements of this assemblage zone are *T. hiatus* and *G. pseudograminens.* Other important elements include *Podocarpidites elongates*, *Multicellaesporites ovatus*, *Cycadopites pachydermus* and *Ephedripites huanghuaensis* etc. The age of this assemblage zone is roughly Early-Middle Eocene.

3. *Echinosporis baculatus-Celtispollenties minor* assemblage zone. The representative elements of this assemblage zone are *E. baculatus* and *C. minor*. Other important elements include *Taxodiaceaepollenites hiatus, Ephedripites* (*Distachyapites*) *fusiformis*, *Chenopodipollis microporatus*, *Dicellaesporites aculeolatus*, *Monolites micispinosus* and *Sequoiapollenities polyformosus* etc. The age of this assemblage zone is roughly middle Eocene.

4. *Crytomeriapollenites largus-Cruciferaeipites elegans* assemblage zone. The representative elements of this assemblage zone are *C. largus* and *C. elegans*. Other important elements include *Taxodiaceaepollenites hiatus*, *Echinosporis baculatus*, *Monolites pachydermus*, *Staphlosporonites lanceolatus* and *Deltoidospora microlepioidites* etc. The age of this assemblage zone is roughly late Eocene.

Based on the sporopollen data in the study area, it is suggested that the age of the Sandy-shale Member of the Zhepure Formation in Tüna should be middle to late Eocene, which indicates that the final extinction of the Neo-Tethys Ocean should occur in late Eocene.

Key words: Eocene, Tethys, sporopollen, biostratigraphy, Tüna, Yadong

Acknowledgments: This work is granted by the National Natural Science Foundation of China (Grant No. 41272030), the IGCP679, and the National Basic Research Program of China (Grant No. 2012CB822001).

References

Aitchison, J.C., Ali, J.R., and Davis, A.M., 2007. When and where did India and Asia collide? *Journal of Geophysical Research: Solid Earth*, 112, B05423.

Han Yi, Li G.B., Li Y.W., Li X.F., Wang T,Y., Xie D., Zhao S.N., Zhao J., Zhang J.L., Li Q., Chen Y. and Li N., 2019. Late Cretaceous-Early Paleogene Foraminiferal Biostratigraphy in Xishan, Gamba, Southern Tibet, China. (English Edition), 93 (supp. 1): 106–108.

Li G.B. and Wan X.Q., 2019. 2018 Report from the Chinese Working Group of IGCP 608. (English Edition), 93(supp. 1): 116–118.

Li G.B. and Wan X.Q., 2003a. Eocene microfossils in southern Tibet and the final closing of the Tibet-Tethys. *Journal of Stratigraphy*, 27(2): 99–108 (in Chinese with English abstract).

Li G.B. and Wan X.Q., 2003b. Eocene ostracoda from Gamba, Xizang(Tibet). *Acta Palaeontologica Sinica*, 43(3): 400–406 (in Chinese with English abstract).

Li G.B., Wan X.Q., Ding L., Liu W.C., and Gao, L.F., 2003. The Paleogene foreland basin and sedimentary responses in the southern Tibet: Analysis on sequence stratigraphy. *Acta Sedimentology Sinica*, 22(3): 455–464.

Li G.B., Wan X.Q., Jiang G.Q., Hu X.M., Goudemand, N., Han H. D., and Chen X., 2007. Late Cretaceous foraminiferal faunas from the Saiqu "mélange" in southern Tibet: *Acta Geologica Sinica* (English Edition), 81(6): 917–924.

Li G.B., Wan X.Q., and Liu W.C., 2005a. Micropaleontology and basin evolution of Paleogene in southern Tibet. Beijing: Geological Publishing House. 156p. (in Chinese with English abstract).

Li G.B., Wan X.Q., Liu W.C., Liang D.Y., and Yun H., 2005b. Discovery of Paleogene marine stratum along the southern side of Yarlung Zangbo suture zone and its implications in tectonics. Science in China Series D: Earth Sciences, 48: 647–661.

Niu X.L., Li G.B., and Wang T.Y., 2016. Paleogene calcareous algae and sedimentary environmentin Tüna area of Yadong in southern Tibet. *Geoscience*, 30(4): 863–870 (in Chinese with English abstract).

Song Z. C., Zheng Y. H., Li M. Y., Zhang Y. Y., Wang W. M., Wang D. N., Zhao C. B., Zhou S. F., Zhu Z. H., Zhao Y. N., 1999. Fossil Spores and Pollen of China, The Late Cretaceous and Tertiary Spores and Pollen. Science Press. 1-910, plates 1-207 (in Chinese with English abstract).

Tapponnier, P., Pelzer, G., and Armijo R. 1986. On the mechanics ofthe collision between India and Asia. In: Coward M P & Ries A C eds. Collision tectonic. Geological Society of London, SpecialPublication 19: 115–157.

Wan X.Q., 1990. Eocene larger foraminifera from Tibet. *Revista Espanola de Micropaleontologia*, 22(2): 213–238.

Wang C.S., L, X.H., and Hu X.M., 2003, Age of Initial Collision of India with Asia: Review and Constraints from Sediments in southern Tibet. *Acta Geologica Sinica*, 77: 16–24 (in Chinese with English abstract).

Yang Z. J. and Yang Q. H., 2013. Sporopollen Analysis Principle and Method. Beijing: Geology Press. 1-158.

Zhang W.Y. and Li G.B., 2017. The discovery of Eocene charophytes from Duina, Yadong, southern Tibet, China. *Acta Micropalaeontologica Sinica*, 34(4): 360–368 (in Chinese with English abstract).

About the first author

ZHANG Wenyuan, female, born in 1994 in Daqing City, Helongjiang Province; a PhD student in China University of Geosciences (Beijing). She is now interested in the study on Mesozoic and Cenozoic palaeontology and stratigraph**y.** Email: 597500569@ qq.com; phone: +86 15210122053.

About the corresponding author

LI Guobiao, male, born in 1968 in Wugang City, Hunan Province; PhD; graduated from China University of Geosciences; professor at the school of Earth Sciences and Resources, China University of Geosciences (Beijing). He is now interested in the study on palaeontology and stratigraphy. Email: liguobiao@cugb.edu.cn.; phone: +86 13552818921.