

## Personal Report

## A devoted scholar and enthusiastic mentor in Cenozoic paleobotany — in memory of Professor LI Haomin (1934–2022)

Professor Haomin Li, one of a few paleontologists who received formal academic training in Moscow during 1950s, devoted her entire professional life to exploration of Cenozoic floras at Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS) (Fig. 1). She was one of the founding members of the State Key Laboratory (formerly CAS Key Lab) of Palaeobiology and Stratigraphy in Nanjing. Haomin was born in Beijing, China, on December 31, 1934. She graduated from the Girls' High School attached to Beijing Normal University (now the Experimental High School with the same affiliation) in 1954. After one year of training in the Russian language at Beijing Russian College, she was selected by the Chinese Government and sent to Lomonosov Moscow State University in the former Soviet Union for her college education, a rare opportunity only open to the best students of her generation. In 1956, her sophomore year, she had the opportunity to meet with Professor Hsing Chien Sze (Xing-Jian Si), then director of NIGPAS, during his academic visit to Moscow. Professor Sze encouraged her to study Cenozoic plant fossils because China had no researchers working in this area at that time. Inspired by such a doyen in the field, Haomin decided to take up the challenge for Cenozoic plants. Researchers in this interdisciplinary field must understand taxonomy and systematics of both fossil and living plants. Despite these challenges and the cultural shock commonly experienced by foreign students, she managed to complete two term papers and her graduation thesis on Cenozoic plants in the following years. She graduated from the Department of Geology at Lomonosov Moscow State University in 1960, and immediately returned to China to join NIGPAS. She was one of a few pioneer woman paleobotanists in China.

Academically, Haomin made numerous and significant contributions to paleobotany in China. Before she returned from Moscow, there were only a handful of studies on the Chinese Cenozoic plants, most of which were solely conducted by foreign researchers (e.g., Colani, 1920; Florin, 1920; Endo, 1926; Depape, 1932; Chaney, 1933). The only exception was a study led by a Chinese plant taxonomist in

1940 (Hu and Chaney, 1940). In her five-decade long career at NIGPAS, Haomin, along with her colleagues, played a crucial role in building the Cenozoic paleobotany research in China (Li, 1965, 1978, 1979; Li and Guo, 1976, 1982; Guo and Li, 1979a, 1979b; Huang et al., 1982; Li et al., 1984, 1995; Li and Zheng, 1995; Liu et al., 1995, 1996). She led the early researches of many newly discovered Cenozoic floras in China, such as the middle Miocene Namling flora from the southern Tibetan Plateau (Li and Guo, 1976), the late Miocene Ninghai flora from Zhejiang, eastern China (Li and Guo, 1982; Li, 1984), the Oligocene Ningming flora from Guangxi, southern China (Li et al., 2003; Shi et al., 2014b), and the middle Miocene Zhangpu flora from Fujian, southeastern China (Li, 2009; Shi and Li, 2010). Those early works and the following investigations often involved extensive collection in the field, detailed taxonomic descriptions and comparisons, and careful paleoecological and paleobiogeographic interpretations. They revealed many world best known Cenozoic floras and remain important in Cenozoic paleobotanical studies today both at home and beyond.

In 1965, Haomin published her first peer-reviewed paper, *Paleogene plant remains from Chashanao of Hengyang Basin in Hunan*, in *Acta Palaeontologica Sinica*, China's prime paleontological journal (Li, 1965). Because of her Russian language skills, she served as an editorial assistant of the journal during the 1960s. She was one of the key contributors to an encyclopedic project of compiling Chinese Cenozoic plants, the product of which, *Cenozoic Plants from China*, was published in 1978 (WG CPC, 1978). This monograph is among the most cited, and remains the best source regarding the taxonomy and stratigraphic occurrences of Cenozoic plant megafossils across China. In 1976, Haomin and Professor Shuang-Xing Guo published a classic paper, entitled *The Miocene flora from Namling of Xizang* in *Acta Palaeontologica Sinica* (Li and Guo, 1976). This careful research yielded critical information on the fossil locality and constituent flora, which made quantitative paleoaltimetry reconstructions of the Tibetan Plateau possible by later researchers (Spicer et al., 2003).



Fig. 1. Professor Haomin Li at NIGPAS in 1992 before she went to Antarctica.

Supported by Brown Fellowship from Yale University, Haomin visited the US, and worked with the late Professor Leo Hickey on the leaf architectural analysis of the Hamamelidaceae during 1983–1984 (Li and Hickey, 1988). In 1984, she participated in the 2<sup>nd</sup> International Organisation of Palaeobotany Conference held in Edmonton, Canada and her academic work and herself became known to international colleagues afterwards. Upon her return from the US, she introduced leaf architectural analysis to her Chinese colleagues in both botanical and paleobotanical communities. She tirelessly promoted its application to a couple of woody angiosperm families, which are either systematically important or stratigraphically significant in the Cenozoic. She also successfully applied the approach in the studies of Cretaceous, Cenozoic, and extant angiosperm leaves (Guo et al., 1984; Li and Yang, 1984; Li et al., 1984, 1987; Zhou et al., 1990; Zhou and Li, 1994d; Wang and Li, 2000; Li and Chen, 2002; Li, 2003). A good example is her study of a tiny angiosperm leaf from the Early Cretaceous of Anhui in eastern China (Li, 2003). The leaf from Anhui has the most primitive venation of angiosperms and thus clearly represents an early-diverging member. She was also among the early researchers in China

investigating *in situ* pollen grains and leaf cuticles from the Cenozoic plant fossils (Li and Zheng, 1986; Liu et al., 1991).

Because of her achievements in Cenozoic plants recovered from across China, Haomin was designated to lead China's research on the fossil plants collected by the National 3<sup>rd</sup> and 4<sup>th</sup> Antarctic scientific expeditions from the Eocene Fossil Hill Formation at King George Island, Antarctica since 1988. She published a number of the papers (Li and Song, 1988; Li and Shen, 1990; Li, 1991, 1992, 1993, 1994; Zhou and Li, 1994a, 1994b, 1994c; Shi et al., 2020), one of which, entitled *Early Tertiary Fossil Hill flora from Fildes Peninsula of King George Island, Antarctica*, is the most influential. All these papers are essential references for Antarctic paleobotany studies. In 1992, Haomin was recruited as a member of China's 9<sup>th</sup> Antarctic scientific expedition team. As the most senior team member, she spent three months in King George Island, collecting fossils at the Fossil Hill and other localities (Fig. 2). She was the first Chinese woman paleontologist to visit the polar region. Although the limited logistic support in the field posed a great challenge to her, this Antarctica expedition turned out to be an unforgettable experience for her life.



Fig. 2. Professor Haomin Li collecting fossils at King George Island, Antarctica in February, 1993.



Haomin retired in 1995 but remained active as an emeritus professor at NIGPAS. She continued to work on plant fossils from Antarctica and other localities, and was as productive as ever. In 2007, she collaborated with her former student Zhe-Kun Zhou on the fossil leaves of Nothofagaceae from the early–middle Eocene Fossil Hill flora of King George Island, Antarctica, which was published in *Science in China Series D: Earth Sciences* (Li and Zhou, 2007). In 2014, she expanded her interest and reconstructed the paleoclimate of the early–middle Eocene Fossil Hill flora using the leaf physiognomic method with her colleagues (Jacques et al., 2014). Their research indicates a warm, humid temperate climate with strong seasonality in temperature and precipitation, and a summer monsoon prevailed in King George Island during the early–middle Eocene. Another crucial work that Haomin had done after her retirement was the discovery and description of winged fruits of Dipterocarpaceae from the middle Miocene of Zhangpu, southeastern China, which is a key family in pantropical rain forests today (Shi and Li, 2010; Shi et al., 2014a). A subsequent study confirmed that the middle Miocene Zhangpu flora represents a megathermal seasonal rainforest, the first time being confirmed in the fossil record in China (Wang et al., 2021).

Broad dissemination of research results is critical to building public trust, particularly in the STEM (science, technology, engineering, and mathematics) fields. Paleobotany is a field with a great potential for outreach but only requiring a moderate effort from paleobotanists. Reflecting her lifetime trip experience to the Antarctica, Haomin published a series of travelogue essays on her month-long voyage to Antarctica and her field work in King George Island around China's Great Wall Antarctic Station, in a Chinese popular science magazine *Evolution*. These reflections were written in a plain and unpretentious language full of fun, and thus attracted tremendous public interest. The Shanghai Scientific & Technical Publishers then invited her to publish an anthology, entitled *A Paleobotanist's Voyage to Antarctica*, in which she gave a vivid account of her five-month trip as a geologist explorer under severe climate conditions in Antarctica (Li, 2011). The book was so popular that it had inspired many young readers to contemplate paleontology as a potential career.

Haomin's achievements are also attested by the long list of honors and awards she had received. In 1988, she was awarded the 1<sup>st</sup> Yin Zaxun Prizes of Stratigraphy and Palaeontology, China's most prestigious palaeontological award, to credit her landmark contributions to the understanding of Cenozoic plants in China. She received the Natural Science Award of the Chinese Academy of Sciences (1994), and the Science & Technology Prize of Jiangsu Province (2010). In her honor, three fossil plants were named, viz. *Cladrastis haominiae* Jia and Zhou (Leguminosae) from the Paleogene Maguan flora of Yunnan, southwestern China (Jia et al., 2021), *Menispermites haominiae* Huang (Menispermaceae) from the middle Eocene Jianglang flora of central Tibet, southwestern

China (Del Rio et al., 2021), and *Canarium haominiae* Yin, Wu, Wang and Shi (Burseraceae) from the middle Miocene Zhangpu flora of Fujian, southeastern China (Yin et al., in press).

Haomin passed away peacefully on February 20, 2022 at home surrounded by her family in Nanjing, at the age of 88. China sadly lost one of its prominent paleobotanists and we lost a beloved colleague and mentor. She will be forever remembered for her remarkable contributions to understanding Cenozoic plant fossils in East Asia and Antarctica as well as her humanistic compassion, modesty and honesty, warm heartedness and selflessness, and distinguished literary talent.

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