Cretaceous Flower Hunting in Eastern Asia

Masamichi Takahashi
Department of Environmental Sciences
Niigata University, Japan.

15 March 2011

Geology Lecture Hall, University of Malaya, Kuala Lumpur

Abstract: Flowering plants (angiosperms) consisting of more than 350,000 living species dominate the vegetation of most terrestrial ecosystems. The origin and early evolution of angiosperms had remained as an abominable mystery in evolutionary biology in the last twenty-five years. Recent paleobotanical studies of the early fossil history of angiosperms have, however, been revolutionized with the discovery of small and well-preserved three-dimensional fossil flowers (mesofossils) from Cretaceous between 125 and 65 million years before present. The mesofossils that are usually preserved as charcoal from ancient forest fires provide unrivalled insights into the structure, biology and evolutionary relationships of ancient angiosperms. The paleobotanical studies have greatly increased the quantity and quality of information available about the structure and relationships of Cretaceous flowers.

Our research is documenting the early evolutionary history of flowering plants through the study of fossil flowers, fruits and seeds that are preserved as charcoal in some Cretaceous fossil localities in Japan and Mongolia. For the past ca. 15 years we have been studying small Cretaceous fossil flowers, fruits and seeds using scanning electron microscopy and synchrotron radiation X-ray microtomography (SRXTM). SRXTM is an important new tool that we can use to study fossil plants to obtain data on internal structure without destroying the specimens. The goal of this research is to document the early fossil history of flowering plants and investigate how flower structure and plant diversity has evolved through time.

The Kamikitaba plant mesofossil assemblage, the first and unique record of mesofossil preservation from eastern Asia, was isolated from carbonaceous, black, poor-sorted sandy siltstone (Late Cretaceous; early Coniacian, ca. 89 million years before present) in Fukushima Prefecture, Japan. The assemblage includes well-preserved angiosperm flowers, fruits, seeds, leaf fragments and wood. We are now extending the Cretaceous Flower Hunting Project to Mongolia and Southeastern Asia.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 37, No. 1, January-March 2011