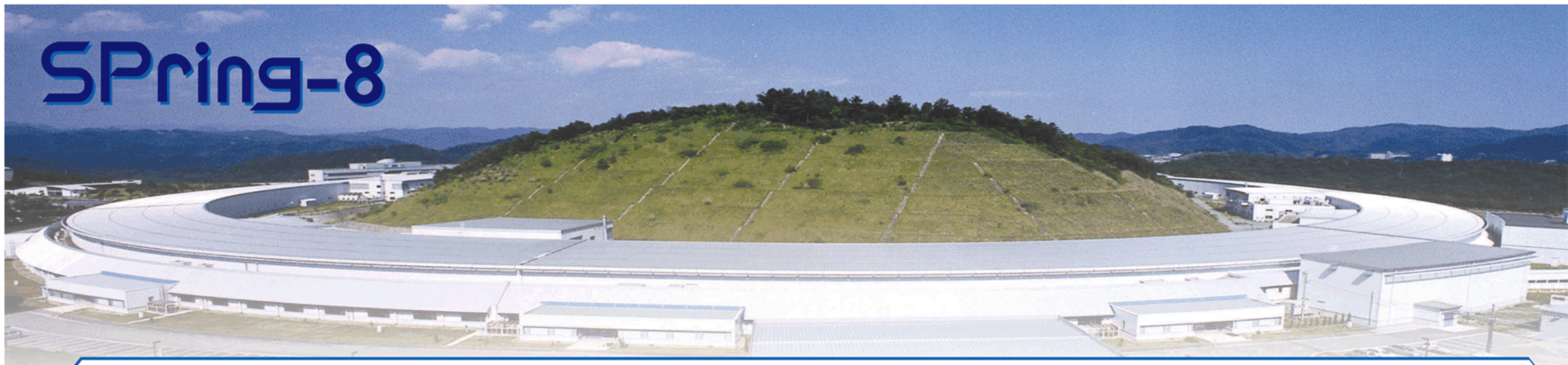

Medical and Imaging I Beamline, BL20B2

This beamline is intended for medical applications, and various imaging techniques, including microradiography, microtomography and refraction-contrast imaging, are applicable in the X-ray energy range of 5-113 keV. The main optics is a fixed-exit double crystal monochromator. The X-ray beam, produced by the bending magnet, passes through the experimental hall surrounding the storage ring and enters the biomedical imaging center. Experiments are performed in the experimental hall or, alternatively, the biomedical imaging center.

Fossil Flower Blooms at SPring-8!

One of the most important developments in plant paleontology over the past thirty years has been the wealth of new information that has emerged on the fossil record of flowering plants. Today flowering plants (angiosperms) dominate global vegetation and even though they appear relatively late in the evolutionary history of life on Earth, they have diversified to move than 350,000 living species: considerably more than the species of all other groups of land plants combined.

Most surprising, and especially important, among this new information has been the discovery and study of exquisitely preserved fossil flowers from between 135 and 65 million years before present: the time when angiosperms were undergoing their initial diversification. These flowers, which are usually small (ca 0.5 mm -5 mm) and preserved as lignified compressions as well as charcoal from ancient forest fires, provide unrivalled insights into the structure, biology and evolutionary relationships of ancient angiosperms.

Recently there has been increased interest in using X-ray microtomography (XRMT) to obtain a new level of detail from ancient angiosperm flowers. Frequently there are only one or a few specimens available for study, and XRMT has become a useful new tool for obtaining details of internal structure without the need for destructive analysis. For example, XRMT of fossil flower buds provides complete information on floral structure with sepals, petals, stamens and carpels all perfectly preserved. Similarly XRMT of small fruits provides information on the number and arrangement of the fossil seeds they contain. Recent work at SPring-8 has focused on 80 million year old fossil flowers from northeastern Japan and eastern North America[1]. The results have been spectacular and promise to open up new levels of insight into the evolution of flowers and flowering plants from the age of dinosaurs. (By courtesy of Professor Peter R. Crane, University of Chicago)

[1] Masamichi Takahashi, Else Marie Friis, Kentaro Uesugi, Yoshio Suzuki, and Peter R. Crane; International Journal of Plant Sciences (IJPS) **169** (7), 908-917 (2008).

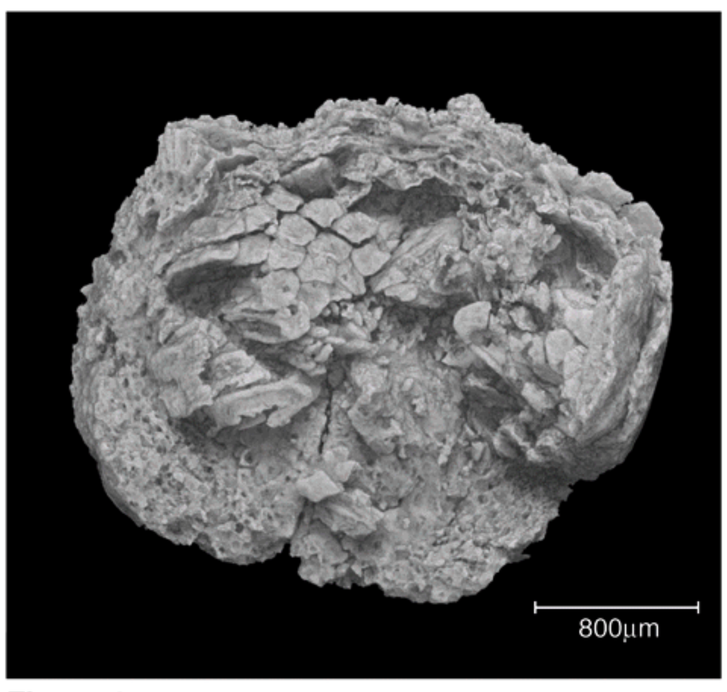

Figure 1

Figure 2

Figure 1
Cretaceous fossil flower from Futaba Group (~89 Myr BP), Japan. Fossil flower imaged by X-ray microtomograph (micro-CT) system at BL20B2 Beamline in SPring-8[1]. Scale bar = 800μm. (By courtesy of Professor Masamichi Takahashi, Niigata University, and Professor Peter R. Crane, University of Chicago)

Figure 2
Reconstructed illustration of Cretaceous fossil flower based on the CT images by BL20B2 Beamline in SPring-8[1]. Illustration by Fumiko Sugizaki. (By courtesy of Professor Masamichi Takahashi, Niigata University, and Professor Peter R. Crane, University of Chicago)