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Japanese asteroid studies in the century after the discovery of the Hirayama families

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A number of studies relating to asteroids have been conducted by Japanese astronomers in the century since the discovery of asteroid families by Kiyotsugu Hirayama in 1918. The true concept of the "asteroid family" was recognized correctly by a few eminent astronomers like Brouwer (1950) in the astronomical community worldwide by the 1970s. The Hirayama's monumental discovery likely stimulated research activities on the dynamics of asteroids after WWII in Japan, as represented by the Kozai mechanism (Kozai (1962)).

Kitamura (1959) performed the pioneering work on the physical nature of asteroids, in 1959. He obtained the 2-band colors of 42 asteroids by using a photomultiplier and compared to the proper orbital elements of asteroid families, the reflectance spectra of nine meteorites, and some rock minerals. He concluded that the observed asteroid colors showed no correlation with their proper elements, and both the colors of asteroids and meteorites were quite similar as a whole.

Starting in the 1920s, Suzuki & Nagashima (1938) had started primitive impact experiments of rock samples, and in 1975, Fujiwara *et al.* (1977) initiated modern impact experiments, which soon became an important mean for investigating the origin of asteroid families and collisional phenomena in the Solar System.

Recent research outcomes are listed as follows.

• the discovery of a great number of meteorites in Antarctica by the Japanese expedition team (Yanai & Kojima (1986)),

• the asteroid discovery race by Japanese amateur asteroid hunters during the 1980s – 2000s, especially, T. Kobayashi who independently discovered more than 2000 new asteroids,

• an experimental solution for the space weathering in asteroid reflectance spectra (Sasaki *et al.* (2001))

• the establishment of the Institute of Space and Astronautical Science (ISAS) and its achievements in the asteroid mission to the asteroid Itokawa by the Hayabusa spacecraft in 2005 (e.g., Fujiwara *et al.* (2006)), and

• survey observations of sub-km-sized asteroids and faint Trojan asteroids using the 8.2m Subaru telescope equipped with a wide-field CCD camera (e.g.,Yoshida & Nakamura (2005), Yoshida & Nakamura (2007)).

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