

Response of shell growth patterns of an intertidal bivalve *Phacosoma japonicum* to the Holocene climatic change in Japan

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It has been well known that latitudinal distribution patterns of shallow marine mollusks around the Japanese Islands have been changed episodically during the Holocene time in response to the climatic changes. For example, mollusk species now distributed in south of Honshu expanded their distributions to the coast of eastern Hokkaido during the Holocene Climate Optimum ('Jomon Transgression Period'), ca. 5,500-6,500 years ago (Matsushima, 1984). However, little was investigated for the biotic response of a given species to the Holocene climatic changes at daily to year-level time resolution.

In this study, we examined the temporal change of daily and annual shell growth patterns of *P. japonicum* in Tokyo Bay, central Japan during the last 8,000 years on the basis of sclerochronological analysis of selected fossil specimens whose C^{14} ages were determined by an acceleration mass spectrometer. This species records lunar day and annual increments in the internal shell sequence, the latter of which is easily recognized by the presence of a clear growth cessation mark formed during winter (winter break) at its margins (Miyaji et al., 2007). Previous works have shown that modern populations around the Japanese coast exhibit a clear latitudinal variation in the daily and annual shell growth patterns, and that northern populations have a longer life span, a shorter growth interval within a given age, and a larger daily shell growth rate than southern populations (Tanabe and Oba, 1988; Sato, 1994).

Our analysis revealed that the shell growth curves at the hinge plate for the specimens of warmer climatic period around 5,400-6,500 cal yr BP and for those of cooler climatic periods ca. 6800, 1440 and 480 cal yr BP are respectively comparable to the shell growth curves of modern specimens from Seto Inland Sea, Kagoshima Bay, and western Hokkaido. Furthermore, the length of annual growing interval and the mean lunar day growth rate at age 3 in the specimens of warmer climatic period are longer and smaller than those in the specimens of cooler climatic periods. Our study strongly postulates that the daily and annual shell growth patterns of *P. japonicum* have been changed episodically in response to the Holocene climatic changes.