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Sclerochronology of Holocene oyster shells *(Crassostrea gigas)* from the West Coast of Bohai Sea, China

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Sclerochronology, the study of periodic increments in skeletal organisms, can decipher the life history and environmental records preserved in fossil shells. Although there have been a number of studies that apply isotopic analyses to shells in open ocean and fresh water, investigations for brackish environments are rare. One of the common inhabitants in estuaries is the *Crassostrea* oyster. Kirby et al. (1998) demonstrated a close correspondence between the ligamental increments of convex and concave bands and yearly δ^{18}O cycles; Andrus and Crowe (2000) found a close correspondence between translucent growth bands on the cross-section of the hinge and yearly δ^{18}O cycles. They conclude that the morphological features on hinge and growth bands on the cross-section are formed annually and can be used to determine accurately age and growth rate in this species. However, Surge et al. (2001) could not find that these morphologic features have seasonal significance in the *C. virginica* shells. Therefore, these concave ridges are not reliable independent proxies of seasonality. These studies were carried out with *C. virginica* shells; none was studied with nature *C. gigas*, which was widely distributed along the Pacific coastal area. *C. gigas* has been introduced from its native home to all over the world, ranging from North America to Australia and Europe; it has become an important commercial harvest in many of these places.

Buried Holocene oyster shells of *C. gigas* were sampled from a huge buried oyster reef on the West of Bohai Sea, China. One of these shells was selected for high resolution micro-sampling and stable isotope analyses testing the assumption that *C. gigas* ligamental increments are annual in nature. We analyzed 236 consecutive samples from the shell to show that morphologic features both on hinge and cross-section are annual by comparing them to the δ^{18}O profiles. We tested the assumption that the morphologic features of *C.gigas* are delineated by convex tops and concave bottoms on hinge and corresponding translucent growth bands on cross-section. The shell has 13.5 ligamental increments, based on 13.5 convex bands and 13 concave bottoms on hinge. Convex tops correspond to δ^{18}O minima (summers), whereas concave bottoms correspond to δ^{18}O maxima, which were formed during the low temperature of winter in the study area. We demonstrate that the ligamental increments of convex tops, concave bottoms and translucent growth bands in the studied *C. gigas* shell are suitable indicators of annual growth increments. The life spans, growth rates, and the timing of death can be determined from the ligament increments and isotope profiles of buried oyster shells.