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## Selecting the best brachiopod biomineral archive of the Wuchiapingian climate change

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The Late Permian was a time interval characterized by extreme environmental perturbations, culminating with the Siberian Traps-related gas emissions and the subsequent global warming and ocean acidification, which produced the most severe mass extinction of the Phanerozoic (Dal Corso et al., 2022). Evidence of these perturbations are recorded in fossil archives, as pristine brachiopod shells (Garbelli et al., 2017). Here, we show shell microstructural variations and stable isotopes profiles recorded by specimens of *Araxilevis intermedius* (Abich, 1878), a large-sized and thick-shelled brachiopod species abundant in the Upper Permian of Iran. Nine specimens of *A. intermedius* were selected from several Wuchiapingian beds of the Hambast Formation in the Abadeh Section and of the Julfa Formation in the Ali Bashi Mountains Main Valley section (Iran), following the correlation by Viaretti et al. (2021). Prior to the isotope analysis different screening tests were performed on the brachiopod shells from both sections: Scanning Electron Microscope microstructural analysis, cathodoluminescence (CL) and trace elements analyses. Specimens of *A. intermedius* are characterized by a three-layered shell, comprising a secondary layer of cross-bladed laminae and a tertiary columnar layer; the primary layer is not preserved. The specimens from the Hambast Formation of Abadeh show a partially altered shell, whereas those from the Julfa Formation of the Ali Bashi Mountains show a well-preserved microstructure, despite CL analysis indicating that all the specimens were non-luminescent, both the microstructurally well-preserved and the altered ones. After having checked the shell preservation, 12 to 29 powder samples were collected from the longitudinal shell section of each pristine specimen of *A. intermedius* using a sclerochronological approach. This method allowed to investigate the seasonal environmental changes recorded by the brachiopod shells of *A. intermedius* from Iran and to test if this species of the Class Strophomenata, abundant in this time interval also outside Iran, can be considered a good archive for paleoclimatic and paleoenvironmental reconstructions in the Late Permian.

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