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Isotopic traces of Mesozoic air in dinosaur tooth enamel

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Understanding the relationship between surface temperature and atmospheric CO_2 levels is crucial for comprehending not only Earth's past but also its future climate. The triple oxygen isotope composition ($\Delta'^{17}O$) of atmospheric O_2 provides valuable insights into pCO_2 (1–3). However, only a few materials retain traces of atmospheric $\Delta'^{17}O$ (4). We examined the $\Delta'^{17}O$ values of unaltered tooth enamel from Late Jurassic and Late Cretaceous dinosaurs by means of laser fluorination. Dinosaurs inhaled air O_2 with anomalous $\Delta'^{17}O$, which left an isotopic fingerprint in their tooth enamel. Our analysis revealed low $\Delta'^{17}O$ values in the enamel, which we interpret to indicate significantly lower $\Delta'^{17}O$ levels in the Late Jurassic and Late Cretaceous atmospheric O_2. This discovery is discussed in relation to atmospheric pCO_2, variations in gross primary production, and factors of animal physiology.

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