# A technological 'leap' in the Edomite Kingdom during the 10th century BCE

September 18 2019

Excavations of ancient copper mines as part of Tel Aviv University's Central Timna Valley Project. Copper production technologies and the organization of the industry reflect the society responsible for this enterprise. Credit: E. Ben-Yosef and the Central Timna Valley Project

During the late 10th century BCE, the emerging Edomite Kingdom of the southern Levant experienced a "leap" in technological advancement, according to a study released September 18, 2019 in the open-access journal *PLOS ONE* by Erez Ben-Yosef of Tel Aviv University, Israel and colleagues. This finding supports the use of a "punctuated equilibrium" model for the development of ancient technology.

Punctuated equilibrium was originally proposed as a model for evolutionary change characterized by long-term stasis punctuated by short-lived episodes of rapid change, in contrast to a "gradualistic" model of slow and consistent change over time. In this study, Ben-Yosef and colleagues propose that the same theoretical model might be a useful tool for understanding the advancement of ancient technologies.

To test this hypothesis, the authors compiled an unparalleled dataset of over 150 samples of slag leftover from metallurgical technology in the Wadi Arabah region of the Levant in the Middle East, dating from 1300 to 800 BCE. Using copper content as a proxy for the efficiency of smelting techniques, they established a timeline of metallurgical advancement. The analysis revealed a long period of relatively gradual development across the region followed by a rapid "leap" to more efficient technology in the late 10th century BCE.

This case study provides support for the idea that ancient technologies could, in some cases, have developed through occasional "leaps" of rapid change. In this circumstance, the technological leap was an important part of the emergence of the Biblical Edomite Kingdom and the transition of this region from the Bronze Age into the Iron Age.

"Our study sheds new light on the emergence of the archaeologically-elusive biblical kingdom of Edom, indicating that the process started much earlier than previously thought" says Ben-Yosef. "That said, the study's contribution goes beyond the Edomite case, as it provides significant insights on ancient technological evolution and the intricate interconnections between technology and society. The results demonstrate that the punctuated equilibrium evolutionary model is applicable to ancient technological developments, and that in turn, these developments are proxies for social processes".

**More information:** Ben-Yosef E, Liss B, Yagel OA, Tirosh O, Najjar

M, Levy TE (2019) Ancient technology and punctuated change: Detecting the emergence of the Edomite Kingdom in the Southern Levant. *PLoS ONE* 14(9): e0221967.
doi.org/10.1371/journal.pone.0221967