

Temporal collections to study invasion biology

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August 23, 2023

Abstract

Biological invasions represent an extraordinary opportunity to study evolution. This is because accidental or deliberate species introductions have taken place for centuries across large geographical scales, in natural and anthropogenic environments. Until recently however, the utility of invasions as evolutionary experiments has been hampered by the limited information on the makeup of populations that were part of earlier invasion stages. Now, developments in ancient and historical DNA technologies, as well as the quickening pace of digitization for millions of specimens that are housed in herbaria and museums globally promise to help overcome this obstacle. In this review, we first introduce the types of temporal data that can be used to study invasions, highlighting the timescale captured by each approach, and their respective limitations. We then discuss how ancient and historical specimens as well as data available from prior invasion studies can be used to answer questions on mechanisms of (mal)adaptation, rates of evolution, or community-level changes during invasions. By bridging the gap between contemporary and historical invasive populations, temporal data can help us connect pattern to process in invasion science. These data will become increasingly important if invasions are to achieve their full potential as experiments of evolution in nature.

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