Letter
Rapid Anthropocene Speciation Reveals Pull of the Recent: A Response to Thomas

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Evolutionary biologists have long recognized that evidence of increased species diversification rates in recent versus fossil records may simply reflect better sampling of contemporary biodiversity, a bias they have termed the ‘Pull of the Recent’ [1,2]. Estimates of speciation in geological time necessarily incorporate both speciation and extinction, as only species that persisted long enough to leave fossil or genetic traces will be included. By contrast, estimates of recent speciation rates do not incorporate extinction because of the lag between speciation and extinction, thus inflating contemporary estimates of speciation relative to geological estimates. There are several reasons why the proposition of increased plant speciation rates as a result of human-driven hybridization in the Anthropocene [3] cannot be distinguished from a Pull-of-the-Recent artifact arising from greater sampling effort and ease of detection of contemporary hybrids. First, extant hybrid taxa are better sampled than taxa from earlier geological periods, potentially underestimating geological rates of hybridization. For example, ancient hybridization events may be obscured where hybrid lineages displace one or both of their parents, leading to an underestimate of speciation rates [4]. Similarly, molecular tools may fail to identify a history of hybrid origin if sufficient time has elapsed for hybrids to acquire novel alleles through point mutations [5]. Furthermore, the intensity with which contemporary hybrids have been recorded in the British Isles is among the highest in the world, casting doubt that sampling effort might be similar over geological time periods [6]. Second, while many recent hybrids described in contemporary floras are still extant, there has been insufficient time to adequately assess their likely long-term persistence. Limited evidence from the British flora indicates that one-third of the new hybrid species recorded since 1700 have become extinct in the wild [3]. The history of plant diversification could be littered with such transient speciation events, yet such taxa would leave no trace in either the paleoecological or molecular record. Most contemporary plant hybrids are expected to become extinct within relatively few generations given that their geographic range is usually restricted, they depend on transient, early successional habitats, and/or they rely on continued propagule input from source populations such as gardens or crops [7]. Third, while hybridization is one mechanism for speciation, species persistence is also thought to require polyploidization and/or subsequent ecological differentiation between the hybrid and its parent taxa [8]. Many new hybrids lack ecological or genetic isolation from one or more parents and even where introgression is uncommon, rare hybrids can suffer from frequency-dependent reproductive failure when found in proximity to parent taxa [9]. Contemporary observation of rates of speciation via hybridization are simply too limited in time to assess the long-term future of many recent hybrids and undoubtedly lead to overestimates of speciation compared with the turnover of taxa observed over longer time scales. Fourth, a further driver of the Pull of the Recent is the vagaries of contemporary taxonomic practice, which is especially debated when addressing the status of contemporary interspecific hybrids (e.g., chromosome races vs species) and the relative importance of morphological or molecular characterization [10]. A current trend for splitting taxa, particularly those of hybrid origin, would increase observed rates of speciation. Finally, some hybrids may threaten endangered plant species and their net effect may not be an increase in species but rather a decline [11,12]. Thus, any conclusions regarding the consequences of human-driven increases in rates of plant hybridization on the generation of new species need not only to account for an artifact of the Pull of the Recent but also to consider the long-term outcomes of new hybrids on plant extinctions.

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References