Exploring phylogeographic congruence in a continental island system

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A prediction in phylogeographic studies is that patterns of lineage diversity and timing will be similar within the same landscape under the assumption that these lineages have responded to past environmental changes (biotic and abiotic) in comparable ways. Eight invertebrate taxa from four different orders were included in this study of mainland New Zealand and Chatham Islands lineages, to explore their response to past geophysical events. These comprised two orthopteran genera: one an endemic forest-dwelling genus of cave weta (Rhaphidophoridae, Talitropsis) and the other a grasshopper (Acrididae, Phaulacridium) that inhabits open grassland; four genera of Coleoptera including carabid beetles (Mecodema), stag beetles (Geodorcus), weevils (Hadramphus) and click beetles (Amychus); the widespread earwig Anisolabis (Dermaptera) that is common on beaches in New Zealand and the Chatham Islands, and an endemic and widespread cockroach genus Celatoblatta (Blattodea). Mitochondrial DNA was used to reconstruct phylogeographic hypotheses for comparison among samples. Strikingly, despite a maximum age of ~4 million years for the Chathams there is no concordance among the examined taxa. They varied in the extent of genetic divergence and partitioning between Chatham and mainland populations with some Chatham lineages represented by island endemicity and others by haplotype sharing with the mainland. These diverse patterns suggest that combinations of intrinsic (taxon ecology) and extrinsic (extinction and dispersal) factors can result in apparently very different biogeographic outcomes.