

Elevation increases in moth assemblages over 42 years on a tropical mountain

Abstract

Physiological research suggests that tropical insects are particularly sensitive to temperature, but information on their responses to climate change has been lacking—even though the majority of all terrestrial species are insects and their diversity is concentrated in the tropics. Here, we provide evidence that tropical insect species have already undertaken altitude increases, confirming the global reach of climate change impacts on biodiversity. In 2007, we repeated a historical altitudinal transect, originally carried out in 1965 on Mount Kinabalu in Borneo, sampling 6 moth assemblages between 1,885 and 3,675 m elevation. We estimate that the average altitudes of individuals of 102 montane moth species, in the family Geometridae, increased by a mean of 67 m over the 42 years. Our findings indicate that tropical species are likely to be as sensitive as temperate species to climate warming, and we urge ecologists to seek other historic tropical samples to carry out similar repeat surveys. These observed changes, in combination with the high diversity and thermal sensitivity of insects, suggest that large numbers of tropical insect species could be affected by climate warming. As the highest mountain in one of the most biodiverse regions of the world, Mount Kinabalu is a globally important refuge for terrestrial species that become restricted to high altitudes by climate warming. © 2009 by The National Academy of Sciences of the USA.