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Climate-mediated cooperation promotes niche expansion

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The ability to form complex, cooperative societies may explain why humans and social insects have come to dominate the earth. The shift from being a habitat specialist to a generalist as a result of being cooperative is thought to underlie the ecological dominance by these group-living species, yet this social conquest hypothesis has proven difficult to test empirically. Here we examine the ecological consequences of cooperation by quantifying the fitness values of cooperative (large groups) and non-cooperative (small groups) phenotypes in burying beetles (*Nicrophorus nepalensis*) along an elevational and temperature gradient. The primary benefit of cooperative breeding behavior in beetles is to jointly prepare carcasses more rapidly than their primary competitor, flies. We experimentally created large and small groups along the temperature gradient and manipulated levels of interspecific competition by heating carcasses to increase fly activity. Cooperative groups had similarly high breeding success at all temperatures and elevations, whereas non-cooperative groups only bred successfully at intermediate elevations. Moreover, cooperative groups had relatively higher breeding success than non-cooperative groups at lower elevations where climates are warmer and higher interspecific competition with flies reduces the fitness of small groups. Together, these results suggest that cooperative groups performed as thermal generalists and non-cooperative groups as thermal specialists. Ultimately, studying the ecological consequences of cooperation may not only help us to understand why so many species of social insects have conquered the earth, but also to determine how climate change will affect the success of these and other social species, including our own.