Genetic mix could benefit colonising plants and animals

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Caribbean Lizard low

(Phys.org) —Recently evaluated evidence suggests that organisms bred from different genetic lines have evolutionary advantages over more closely related members of the same species when colonising new environments.

In a paper published in *Trends in Ecology and Evolution*, scientists at the University of Southampton and the United States Environmental Protection Agency reviewed all of the available literature on genetic admixture. Admixture occurs when previously separate populations of the same species come into contact with one another and breed. The offspring of these two groups contain genetic traits from both populations, which could provide both short and long-term benefits, but also disadvantages.

The paper concludes that when admixture increases fitness, it can lead to larger and more productive populations with a lower likelihood of extinction, and ultimately increase the chance of further expansion.

It had been suggested that genetic admixture can produce evolutionary drawbacks, as genetic traits of the mixed population may not be as suited to the local environment as those of the native population. However, as the population spreads further afield into new areas or as conditions change in the natural environment, due to factors such as climate change, the mixed offspring may have traits that work to their advantage in the new surroundings, making them more likely to succeed in the survival of the fittest. In addition, admixture can aid the emergence of evolutionary novelties or new genotypes not found in parental populations.

One of the most widely recognised benefits of admixture is heterosis, the superiority of hybrids over their parents. Heterosis can be important during colonisation, as it might help the establishment of migrants and prevent the negative effects of inbreeding and genetic bottlenecks.

Dr Marc Rius from the University of Southampton, who co-authored the study with John Darling of the United States Environmental Protection Agency, said: "These genetic phenomena can all have a variety of positive influences on fitness, ranging from benefits that are independent of selective environments to those that are specific to the novel environments encountered by colonising populations. The primary long-term benefit of admixture is to increase overall population genetic variance, resulting in a heightened capacity to respond to selective pressures."

The paper examined studies of both plant and animal species where geographical barriers, such as rivers, have been removed or overcome, allowing separate populations to breed. However, the present review highlights the scarcity of research in this area and calls for further study.

Dr Rius added: "There is a need to test whether admixed populations are more likely to become successful colonisers than nonadmixed

populations. Such research will be particularly important in disentangling the effects of admixture and nongenetic factors on colonisation success."

More information: How important is intraspecific genetic admixture to the success of colonising populations? Marc Rius, John A. Darling. *Trends in Ecology & Evolution*, Volume 29 , Issue 4 , 233 - 242. dx.doi.org/10.1016/j.tree.2014.02.003

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