

Cooperative species can invade harsher environments

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Through cooperation, animals are able to colonise harsher living environments that would otherwise be inaccessible, according to a new study from Lund University in Sweden, together with researchers in England and USA. The research community has long believed this was the other way around - that species in tough environments had to cooperate to survive. As a result the established view of why animals cooperate is turned upside-down.

Some [species](#) of birds cooperate closely in the rearing of offspring. The older siblings appear to selflessly help their parents rear the youngest brood. This phenomenon is most common in species that live in [harsh environments](#), where the climate is hot and rain is scarce.

For a long time, researchers believed that the harsh conditions have forced individuals to help because they can't breed on their own. It seems, however, the opposite is true – that the cooperation evolves first, and this gives species a chance of successfully invading and surviving in more barren places.

"Cooperation appears to be an important prerequisite to colonisation of arid habitats," says Charlie Cornwallis, biologist at the Faculty of Science at Lund University.

Together with evolutionary scientists at Oxford and Columbia, he conducted a large-scale analysis of the breeding behaviour of 5,000 species and coordinated this information on the environments where

species live and their evolutionary history.

After extensive data analysis came the surprising answer: cooperative rearing of offspring arose in species in fairly benign environments where the birds are not subjected to particularly challenging temperatures or a shortage of water. Instead of the environment, it seems the key to cooperation evolving is that breeding females are relatively monogamous, ensuring helpers and offspring share genes.

Only after cooperative breeding has become established are the birds able to invade and colonise areas where the living conditions are much harsher. Species where helping is rare are not able to colonise such challenging environments, the study shows.

"The same principle – that is, cooperation helps overcome ecological barriers – may apply to other species as well, and not only birds. For example, [cooperation](#) between symbiotic bacteria and their hosts can result in the exploitation of novel resources, and the division of labour between cells in organisms can lead to new ways of coping with the environment," concludes Charlie Cornwallis.

More information: Charlie K. Cornwallis et al. Cooperation facilitates the colonization of harsh environments, *Nature Ecology & Evolution* (2017). [DOI: 10.1038/s41559-016-0057](https://doi.org/10.1038/s41559-016-0057)

Provided by Lund University

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