

Common orchid gives scientists hope in face of climate change

August 10 2010

A study led by scientists from the Royal Botanic Gardens, Kew's Jodrell Laboratory, which focuses on epigenetics in European common marsh orchids, has revealed that some plants may be able to adapt more quickly to environmental change than previously thought. The new study, published in *Molecular Biology and Evolution*, brings new hope to plant conservation.

Epigenetics comprises hidden influences upon gene functions that occur without a change in the DNA sequence, but are potentially inheritable, and it is a new field of research that is reshaping the way scientists look at the living world. This new evidence that environmental effects on gene activity can be 'remembered' is hugely significant. In the modern interpretation of Darwin's [theory of evolution](#), scientists previously thought that [genetic mutations](#) (permanent changes in DNA sequence) were the only source of new traits that could be handed down from generation to generation, causing changes to the way species react to their environment. This process of adaptation can take hundreds of years and is almost certainly too slow for plants to adapt to rapid climate change.

However, in this cutting-edge study on a group of marsh orchids, Kew scientists have found that epigenetic variation can significantly influence the adaptive potential of an individual species. In turn, this affects the evolutionary potential of a species at a much quicker rate than was previously thought.

This study focused on three recently formed species of delicate purple European marsh-orchids (*Dactylorhiza*) of hybrid origin, two of them occurring in the UK.(1). Despite having a highly similar genetic heritage, the three orchids differ considerably in ecological requirements, morphology, physical characteristics and distribution.

Dr Ovidiu Paun, lead researcher says, "In contrast to the genetic information, which is a more "closed" system, the environment can alter the epigenetic context of individual species, and this adaptive pathway is complementary to the currently accepted view on evolution. The results in the paper demonstrate that Darwinian selection acts on epigenetic variation in the same way as on the [genetic information](#) to result in adaptation and divergence between species within a small number of generations."

He continues, "Our results show the importance of the environment in altering inherited traits in these [orchids](#) and also contributing to biodiversity. The epigenetic level of natural variation can be adaptive and has the potential to be rapidly released, in a few generations, in contrast to genetic variation."

Adds Professor Mark Chase, Keeper of Kew's Jodrell Laboratory, " Our results are particularly relevant in the present context of widespread environmental challenges and give us more hope in the adaptive potential of organisms. It is not instantaneous, but it is much faster than what we thought previously.

"However, this also means that ex-situ conservation of threatened species, when individuals are removed from their original environment and are usually relocated to a botanical garden, is not the best strategy for their preservation, as it may delete any intrinsic epigenetic specificity. A much better solution remains their conservation in the wild."

More information: Paun O., Bateman R. M., Fay M. F., Hedren M., Civeyrel L., Chase M. W. 2010. Stable epigenetic effects impact adaptation in allopolyploid orchids (Dactylorhiza: Orchidaceae). *Molecular Biology and Evolution* 20 [Doi:10.1093/molbev/msq150](https://doi.org/10.1093/molbev/msq150)

Provided by Royal Botanic Gardens Kew

Citation: Common orchid gives scientists hope in face of climate change (2010, August 10) retrieved 23 April 2024 from <https://phys.org/news/2010-08-common-orchid-scientists-climate.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.