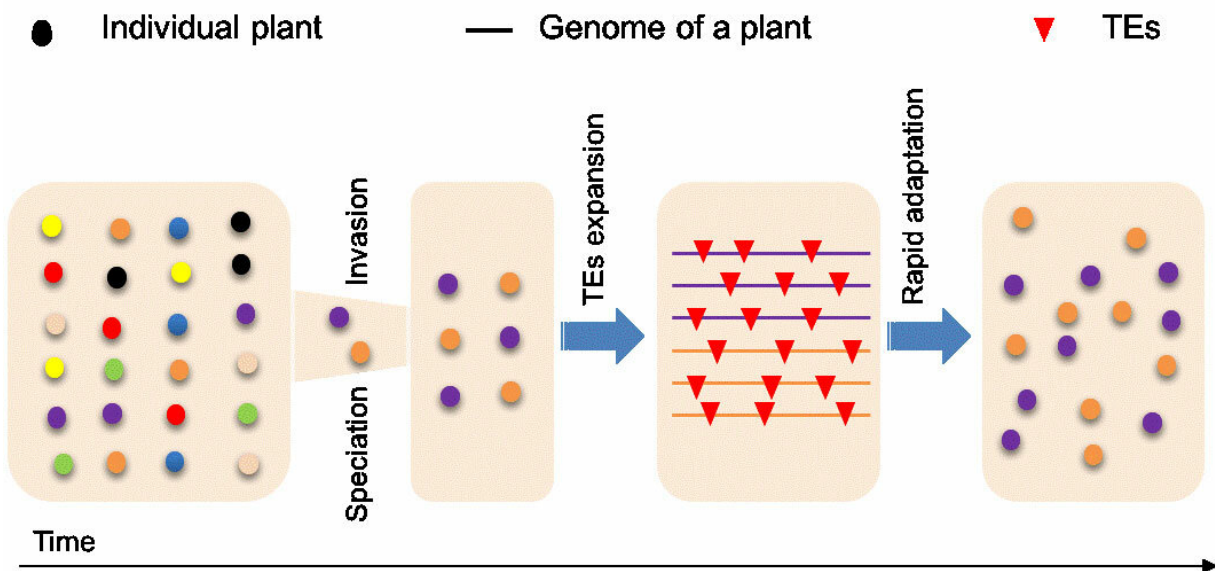


Expansion of transposable elements offers clue to genetic paradox

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Expansion of transposable elements explains genetic paradox of biological invasion. Credit: IBCAS

Species often experience a genetic bottleneck that diminishes genetic variation after speciation or introduction into a new area. Though bottlenecks in population size always reduce fitness and evolutionary potential, introduced species often become invasive. This is known as the genetic paradox of invasion.

Now, a research group led by Prof. Guo Yalong from the Institute of

Botany of the Chinese Academy of Sciences (IBCAS), together with SONG Ge, and Sureshkumar Balasubramanian from the School of Biological Sciences, Monash University, Australia, has revealed that [transposable element](#) (TE) insertions could potentially help species with limited genetic variation adapt to novel environments.

To evaluate how TE insertions drive rapid phenotypic variation and help plants adapt to new environments, the researchers compared an annual and inbreeding forb (Brassicaceae), *Capsella rubella*, to its outcrossing sister species *Capsella grandiflora*.

They found that transposable elements (TEs) are highly enriched in the gene promoter regions of *C. rubella* compared with its outcrossing sister species *C. grandiflora*.

Interestingly, they found that a number of polymorphic TEs in *C. rubella* are associated with changes in [gene expression](#), including TEs inserted into the FLOWERING LOCUS C gene, which is one of the key determinant genes of flowering time.

Intriguingly, the accessions with TE insertion are early flowering and distributed in the southernmost habitat of this species, around the Mediterranean region. This region has a Mediterranean climate and is characterized by high precipitation, warm winters, and dry, hot summers.

These results indicate that the [genetic variation](#) caused by the expansion of TEs can help species quickly adapt to new habitats. Its influence on adaptive traits could account for the genetic paradox of biological invasion to some extent.

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More information: Xiao-Min Niu et al, Transposable elements drive rapid phenotypic variation in *Capsella rubella*, *Proceedings of the National Academy of Sciences* (2019). [DOI: 10.1073/pnas.1811498116](https://doi.org/10.1073/pnas.1811498116)

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