

Take a shortcut to become a new species?

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The diversity of life surrounding us is mostly a product of the very slow process of Darwinian evolution by natural selection. It can take many thousands of generations before a new species evolve from a common precursor, progressively developing new adaptations to the unique environment they gradually specialize for. But there is an alternative “shortcut” which is basically grounded in a fundamentally reverse process – fusion and admixture of the genetic material from two already formed species and subsequent formation of a new, intermediate one. This process has got the name “hybrid speciation” and can often be observed in plants whereas it is less known for animals.

For amphibians, hybridization was found to be way more common than for other groups of vertebrates. The European water frogs are one of the instances for this rare evolutionary pattern with at least 3 known taxa of hybrid origin. Within this thesis I investigated one more potential case of hybridization: the frogs from the arid planes of Central Asia.

I found that this region is inhabited by a couple of separate frog lineages, which correspond geographically to the two main river basins; one of them represents yet undescribed species. Reconstructions of the past geography of Central Asia together with genetic data point at the presumable time when these two species started to separate to be ca. 5 million years ago. Later on, they met in the interfluvium of these rivers and started to hybridize.

In general, this hybridization appeared to be quite limited. However, in the foothills on the eastern edge of this region, which is quite an unusual type of habitat for frogs, I found populations which inherited their complete paternal genome from one species and the maternal from the other one. This brought about a question: whether these populations could be unique in terms, for example, of their ecology. To answer this I applied modeling, which showed that these frogs indeed differ from both parent species and live in an environment, which is unlikely to be populated by any of them. I suggest that this could be a special case of hybrid speciation, which happened not by genetic admixture, but rather complementation of the parental species.

There are a few similar cases from different groups of amphibians and at least one example of two European water frog species that speak in favor of this hypothesis.