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How Carnations Conquered Europe

By Lauren Schenkman
ScienceNOW Daily News
28 January 2010

The humble carnation in your Valentine's Day bouquet may be cheap, but it rivals the most exotic of tropical plants in evolutionary spectacle. New research reveals that the flower's 300 species emerged at a record rate. Many of these varieties arose in Europe, suggesting that the continent may have been more of an evolutionary hot spot than scientists thought.

When biologists think of places that generate new species at a furious rate, they think of exotic locales. Hawaii's isolation and complex geography, for example, has given rise to about 23,000 indigenous species, whereas the rich resources and year-round warmth of South America's rainforests have produced countless others.

"There's a general idea that Europe is a bit of a more boring place," says Luis Valente, a botany graduate student at Spain's Royal Botanic Gardens in Madrid. At first, Valente thought no differently. But then he noticed that Europe had an unusually high number of carnation species: nearly a third of the world's varieties.

So Valente and colleagues at the Royal Botanic Gardens, Kew, and botanists from several countries, spent 2 years collecting DNA from both living plants and herbarium samples of more than 100 species of the carnation genus, known as *Dianthus*. Based on the age of a fossil of *Dianthus*'s closest ancestor, a 45-million-year-old caryophyllaceae tree unearthed in Tasmania in 2003, the researchers calculated that the genus first appeared as early as 7 million years ago. Comparing DNA sequences among carnation species revealed the rest of the story.

At first, new branches of the carnation family tree appeared slowly and tentatively. Then, sometime between 1.3 million and 2 million years ago, carnation speciation exploded. Europe seems to have been the hot spot, with a whopping 80 new species emerging in the Mediterranean Basin. Even by conservative estimates, the carnation's bloom outpaced the fastest-branching families of plants and flowers from New Zealand, the Cape of South Africa, and even the Andes, one of the most biologically diverse spots on the planet, the team [reports](#) online this week in the *Proceedings of the Royal Society B*.

Valente says he isn't sure why carnations suddenly boomed, but he notes that the profusion coincides with a well-known climate shift that rocked Europe 2 million years ago. During this time, the once-humid Mediterranean Basin dried out, creating the mild, rainy winters and hot, dry summers now typical of countries such as Spain, Italy, and Greece. Valente speculates that whereas other plant species died out, *Dianthus* already had had some of the traits that today help it flourish in arid climates. Additionally, the basin's complex terrain might have fostered speciation, he says.

"This is a novel finding for European flora," says Doug Soltis, an expert in botany and plant evolution at the University of Florida in Gainesville. The study, he says, demonstrates that the painstaking task of recreating evolutionary family trees for genera with large numbers of species is well worth the effort. Europe may be home to much more rapid diversification of species than we thought, says Soltis. "It makes you wonder how many other examples of this there will be."

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