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Zoologisches Forschungsmuseum Koenig

The Honeybee originated in Asia – social behavior helped to colonize vast areas of the globe

It was long debated among scientists, where on the globe the Western Honeybee *Apis mellifera* had its evolutionary origin. Thus far, Africa was thought to be a plausible origin, but the data were incomplete. Led by Kathleen Dogantzis and Amro Zayed from York University (Canada), an international team of scientists including Dr. Eckart Stolle from the Leibniz Institute for the Analysis of Biodiversity Change (LIB) in Bonn (Germany), now used comprehensive genomic analyses and could show that the Honeybee originated in Asia and from there colonized Africa and Europe. The results were recently published in the journal Science Advances.

Closing the knowledge gap of the origin of the Honeybee is important to understand the evolution of this globally important pollinator. The analysis of 251 genomes from 18 Honeybee subspecies yielded new results. The Western Honeybee originated about 8 million years ago in Asia and split into several lineages about 2-5 million years ago. While one group of related lineages colonized the Arabic Peninsula and then Africa, Europe was colonized later in two additional and independent expansions about 1 to 2 million years ago, before the current European subspecies evolved 140 – 280 thousand years ago.

Interestingly, a large fraction of the genetic changes is concentrated in genomic “hot spots”. Within these hot spots 145 genes showed subspecific genetic changes across all Honeybee subspecies, indicative of natural selection. Many of these genes were involved in the regulation of social behavior and the development of new worker or colony traits, thus may have facilitated the enormous distribution range of the Honeybee.

Therefore, the hypothesis that the Honeybee originated in Asia and from there expanded into Africa and Europe was supported. Today, there are about ten Honeybee species, most of which occur only in Asia. In Europe and most of Africa, there is only a single species, the Western Honeybee *A. mellifera*.

The results of the here cited study are based on phylogenetic, biogeographic and demographic analyses, and importantly a comprehensive modern genomic analysis of genetic diversity and natural selection across the entire genome.

Source:

Thrice out of Asia and the adaptive radiation of the western honey bee.

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About the LIB

The LIB is dedicated to researching biodiversity and its changes, the results of which are disseminated to the wider society in an educational manner. In order to better understand the current mass extinction of flora and fauna, researchers are looking for connections and causes of – often – man-made changes. The goal is to develop solutions for the preservation of ecosystems and species in order to maintain the basis of current life.

About the Leibniz-Association

The Leibniz Association combines 96 independent research institutes. Their focus ranges from the natural, engineering, and environmental sciences to the humanities and the business, space, and social sciences. The Leibniz institutes focus on relevant social, economic, and ecological issues. They perform knowledge-oriented and applied research (also among the cross-disciplinary Leibniz research alliances), are or support scientific infrastructures, and offer research-based services..



Figure caption:
„Our“ honeybee, *Apis mellifera*
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