



Evolutionary GPS to Untangle the Evolution of Mites and Ticks

A new genomic study untangles the long-standing evolutionary puzzle of mites and ticks, revealing how parasitism arose and diversified over 100 million years. By tracing ancient gene and chromosome changes, the research offers vital clues for predicting origin of parasitism and strengthening One Health strategies in a changing climate.

Hyderabad, 7th Jan, 2026: The eerie world of mites and ticks is as diverse as it is mysterious. They might look like insects to an untrained eye. But they fall in the broad category of arachnids – they have two body segments and eight legs. From the microscopic dust mites in our homes to the blood-sucking ticks on our pets and in forests, these creatures are omnipresent, occupying almost every environment on Earth. Several of them are parasitic; some of the most infamous ones cause scabies, lumpy skin disease, galls on plants, among others, incurring heavy livestock and crop losses globally. Scientists want to predict their disease-causing abilities from their genomes. Evolutionarily close arachnids transmit similar pathogens. However, there have been very few attempts to understand the evolution of arachnid genomes.



In a recently published [study](#) led by Dr. Siddharth Kulkarni, a Ramanujan faculty member at CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad along with three undergraduate students from IISER, Thiruvananthapuram, the team investigated 90 different arachnid genomes to find signatures of their ancient evolutionary relationships. This is the largest dataset of arachnid genomes studied so far.

Mapping the Evolutionary GPS Coordinates of Chromosomes

The research didn't just look at gene composition; it looked at the physical order of genes on a chromosome whose movements can be tracked, as if an evolutionary GPS. "Think of it like a deck of cards. Over millions of years, the cards (genes) get shuffled. But if you find two different groups of mites that have the exact same 'hand' of cards in the same order, you know they share a common ancestor", said Dr. Kulkarni.

Their analyses confirmed two major findings: There are two distinct groups, independently originating from different ancestors. They are called 'Acariformes' (includes most mites) and 'Parasitiformes' (includes ticks and remaining mites). This study is a major step in solving the notorious knot reconstructing the relationships between arachnids like camel spiders, mites, marine horseshoe crabs, etc., which have remained stubbornly unclear.

Mapping their interrelationships can help researchers predict the spread of known infections and identify potential new vectors before outbreaks occur. Because ticks and mites move easily between wildlife, livestock, and humans, this knowledge will support early warning systems and targeted vector control. As climate change and land-use shifts alter the distribution of these tiny arachnids, studying their networks across ecosystems is key to protecting human, animal, and environmental health.