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EVOLUTION

An elephantine split

The difference between Asian and African elephant species is clear, but the genetic relationship between elephant populations that live in different habitats on the same continent had not been explored thoroughly. Now, Kenyan and US researchers propose that African elephants from the savannah and the tropical forests are two separate species. Roca *et al.* base their claim on the extent of DNA sequence divergence between two subpopulations of African elephant and estimate that the two populations diverged ~2.5 million years ago.

Elephant specialists have long noted the morphological differences between savannah- and forest-dwelling African elephants. Additionally, mitochondrial DNA analyses had indicated significant differences between the two populations. Intrigued by these reports, Roca and colleagues collected biopsy samples from 195 forest and savannah elephants from all over Africa, and also from seven Asian elephants, and looked at the extent of sequence divergence among and between them. Their analysis of the coding and non-coding regions of four nuclear genes revealed that, whereas there were nine genetically fixed nucleotide differences between Asian and African elephants, there were five fixed site differences between forest and savannah elephants. This could mean that the two subpopulations diverged ~2.5 million years ago — half of the divergence time between the Asian and African species.

Regardless of the geographical distances between forest elephants, they always clustered together in phylogenetic analyses of the sequence data, and separately from the savannah groups. Similarly, savannah elephants from geographically very distant subpopulations could not be distinguished genetically. Although the authors found evidence of one localized hybrid zone between savannah and forest elephants, the general lack of interbreeding indicates a behavioural reinforcement of reproductive isolation between these two populations.

Sequence analysis also showed that forest elephants are more genetically diverse. On closer inspection of the savannah data, Roca *et al.* saw evidence for a recent founder effect, indicating that savannah elephants have experienced a bottleneck, followed by rapid population expansion. Correlating this observation with fossil data, the authors propose that this expansion coincided with the extinction of *Elephas iolensis* — the then predominant elephant species — at the end of the Pleistocene era.

Roca *et al.* propose that from now on African elephants should be considered as two species: *Loxodonta africana* — the savannah species, and *Loxodonta cyclotis* — the forest species. If adopted, this distinction will have important implications for elephant conservation — instead of one endangered species there would be two, and management and protection of their distinct habitats would have to be re-addressed.

Magdalena Skipper

References and links

ORIGINAL RESEARCH PAPER Roca, A. L. *et al.* Genetic evidence for two species of elephant in Africa. *Science* **293**, 1473–1477 (2001)

