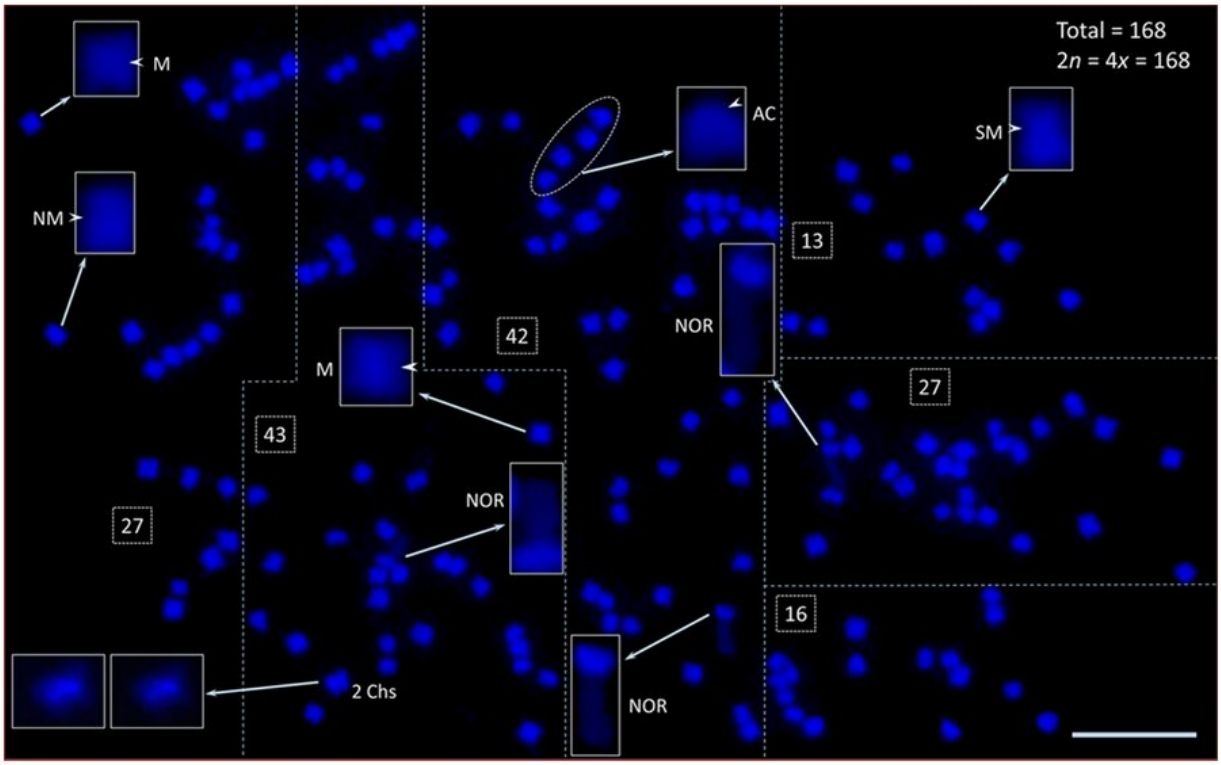
Genetics of the tree of life

August 27 2020



Revealed with fluorescent probes, the chromosomes of the African baobab tree glow like jewels. Its nucleolar organizing region is massive - larger than any other plant species.

The African baobab tree has 168 chromosomes in total. USDA researchers used fluorescent probes to see the genetic components of individual chromosomes within the cells. Credit: Islam-Faradi, Sakhanokho & Nelson

The African baobab tree (*Adansonia digitata*) is called the tree of life. Baobab trees can live for more than a thousand years and provide food,

livestock fodder, medicinal compounds, and raw materials. Baobab trees are incredibly significant. However, there are growing conservation concerns and until now, a lack of genetic information.

The African baobab tree has 168 chromosomes—critical knowledge for further genetic studies, conservation, and improvement for agricultural purposes. The findings were published in the journal *Scientific Reports*. Previous studies estimated that the tree has between 96 and 166 chromosomes.

"We were able to unequivocally count the chromosomes," says Nurul Faridi, a USDA Forest Service research geneticist who co-led the study with Hamidou Sakhanokho, a USDA Agricultural Research Service research geneticist.

The researchers used fluorescent probes to see the genetic components of individual chromosomes within the cells—which glow like jewels.

The analysis also revealed that the tree has a massive nucleolus organizer region (NOR). Relative to the main chromosome body, this region appears larger than that of any other plant species. During certain stages of the cell cycle, nucleoli form at the NORs. The nucleoli are essential for ribosome assembly and protein synthesis in eukaryotes and are an important feature that differentiates eukaryotes from prokaryotes.

"These genetic findings are foundational and will make genetic conservation of the African baobab tree more efficient and effective," says Dana Nelson, a coauthor and project leader of the Southern Research Station's genetic unit. "This research is also a precursor for tree breeding programs seeking to improve baobab for silvicultural applications."

More information: Nurul Islam-Faridi et al, New chromosome

number and cyto-molecular characterization of the African Baobab (Adansonia digitata L.) - "The Tree of Life", *Scientific Reports* (2020). DOI: 10.1038/s41598-020-68697-6

Provided by USDA Forest Service