Study shows African savannah able to support large number of herbivores due to distinct diets

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Acacia savanna, Taita Hills Wildlife Sanctuary, Kenya. Credit: Christopher T Cooper/Wikipeida.

(Phys.org)—A team of researchers with affiliations to Princeton

University and the Smithsonian Institution has found what they believe to be the answer to how it is that the African savannah is able to support such a wide variety of herbivores. In their paper published in *Proceedings of the National Academy of Sciences*, the group describes their field study, their analysis of their findings and what it may mean for conservation efforts in Africa.

We humans have known for a long time that the African savannah is able to support a very large variety of plant eating animals, which at first blush, appears to go against the rules of evolution—the more dominant ones should take over, causing a reduction in diversity. But that has not happened, and until now, no one really knew why. To find out, the researchers traveled to Kenya where they subsequently began a field study—it consisted of driving around the savannah and watching animals graze, when one of a particular type defecated, they raced over and collected the specimen for later analysis. The types of animals the team studied included dik-dik, wildebeest, Grevy's zebra, plains zebra, Cape buffalo and elephants, a group that made up approximately 99 percent of the herbivores living in the area under study.

Back in their lab, the team analyzed approximately 300 samples, using a technique called DNA metabarcoding—that allowed them to identify the exact plants that the animal had eaten.

In analyzing the results, the team found that grazing was much more specific for the animals than simply preferring grass to leaves—they actually focused on particular plant species. Zebras, for example, tended to prefer the taller grass species, while wildebeest preferred those that were shorter. Similarly, dik-diks focused on lowest hanging leaves, while impalas ate the leaves a little higher up, and giraffes ate those that we much higher. But what was most interesting was the lack of overlap—each animal type kept to its favorites, thus, there was little competition between the animals for the food they were after, and that,

the team claims, is why the African savannah is able to support such a wide variety of herbivores.

The researchers believe their findings should aid conservation efforts in the savannah and might also help those who keep such animals in captivity.

More information: DNA metabarcoding illuminates dietary niche partitioning by African large herbivores, Tyler R. Kartzinel, *PNAS*, DOI: 10.1073/pnas.1503283112

Abstract

Niche partitioning facilitates species coexistence in a world of limited resources, thereby enriching biodiversity. For decades, biologists have sought to understand how diverse assemblages of large mammalian herbivores (LMH) partition food resources. Several complementary mechanisms have been identified, including differential consumption of grasses versus nongrasses and spatiotemporal stratification in use of different parts of the same plant. However, the extent to which LMH partition food-plant species is largely unknown because comprehensive species-level identification is prohibitively difficult with traditional methods. We used DNA metabarcoding to quantify diet breadth, composition, and overlap for seven abundant LMH species (six wild, one domestic) in semiarid African savanna. These species ranged from almost-exclusive grazers to almost-exclusive browsers: Grass consumption inferred from mean sequence relative read abundance (RRA) ranged from >99% (plains zebra) to