Ecological Consequences of a Millennium of Introduced Dogs on Madagascar

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Introduced predators currently threaten endemic animals on Madagascar through predation, facilitation of human-led hunts, competition, and disease transmission, but the antiquity and past consequences of these introductions are poorly known. We use radiocarbon and stable carbon and nitrogen isotope data from the bone collagen of introduced dogs (Canis familiaris) and endemic fosa (Cryptoprocta spp.) in central and southern Madagascar to test for competition between introduced and endemic predators. Isotopic evidence indicates little overlap in diet between ancient dogs and fosa in these regions but leaves open the possibility that dogs competitively exclude fosa. Radiocarbon dates confirm that dogs have been present on Madagascar for at least a millennium and suggest that they briefly co-occurred with the island's extinct megafauna, which included giant lemurs, elephant birds, and pygmy hippopotamuses. Dogs share a mutualism with pastoralists who also at least occasionally hunt, and this is reflected in deposits at several Malagasy paleontological sites that contain dog and livestock bones along with butchered bones of extinct megafauna and extant lemurs. Dogs on Madagascar have had a wide range of diets during the past millennium, but relatively high stable carbon isotope values suggest few individuals relied primarily on forest bushmeat. The absence of distinct dietary differences between dogs from archaeological and paleontological sites may reflect the absence of discrete feral populations. Our data suggest that dogs were part of a suite of animal introductions beginning over a millennium ago that coincided with widespread landscape transformation and megafaunal extinction.