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# Bodyguard or unfair competitor: Is the African elephant a modifier of predator-prey relationships at waterholes?

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## Abstract

In natural communities, modifications of interspecific interactions (e.g. competition or predation) are difficult to investigate. Large mammalian communities of African savannas are ideal to assess such interaction modifications, particularly near waterholes where numerous species aggregate. Here, we assessed the role of the African elephant as a modifier of predator-prey interactions, in Hwange National Park, Zimbabwe, characterized by one of the highest elephant population density. Previous studies investigating competition for access to water between elephants and other herbivores revealed an aggregation of some herbivore species to elephants when water becomes scarce, contrarily to expectations under a competition hypothesis. Here, we considered two alternative hypotheses to explain this pattern. (i) The "bodyguard hypothesis" suggests that elephants reduce the perceived predation risk of other herbivores because of the mobbing behaviour of elephants toward predators, making closeness to elephants beneficial for other herbivores. Using behavioural experiments with lion roaring playbacks as stimuli of predator presence and video recording of herbivore behavioural responses ( $n = 32$ ), we assessed the effect of elephant presence on herbivore aggregation and vigilance behaviour. Whereas vigilance levels increased after lion roaring, no effect of elephant presence on aggregation and vigilance of herbivores was detected. (ii) The "water quality hypothesis" suggests that heterogeneity in water quality inside waterholes drives the aggregation of elephants and herbivores in places where water quality is the highest. Based on physicochemical variables to assess water quality combined with measures of distances between herbivores and areas of good-quality water ( $n = 315$ ), we investigated the effect of elephant presence on access to good-quality water. Our results support the heterogeneity of water quality inside waterholes but did not suggest any effect of elephant presence on the drinking behaviour or water quality selection by herbivores. We discussed these results and the potential role of African elephants as interaction modifiers.

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