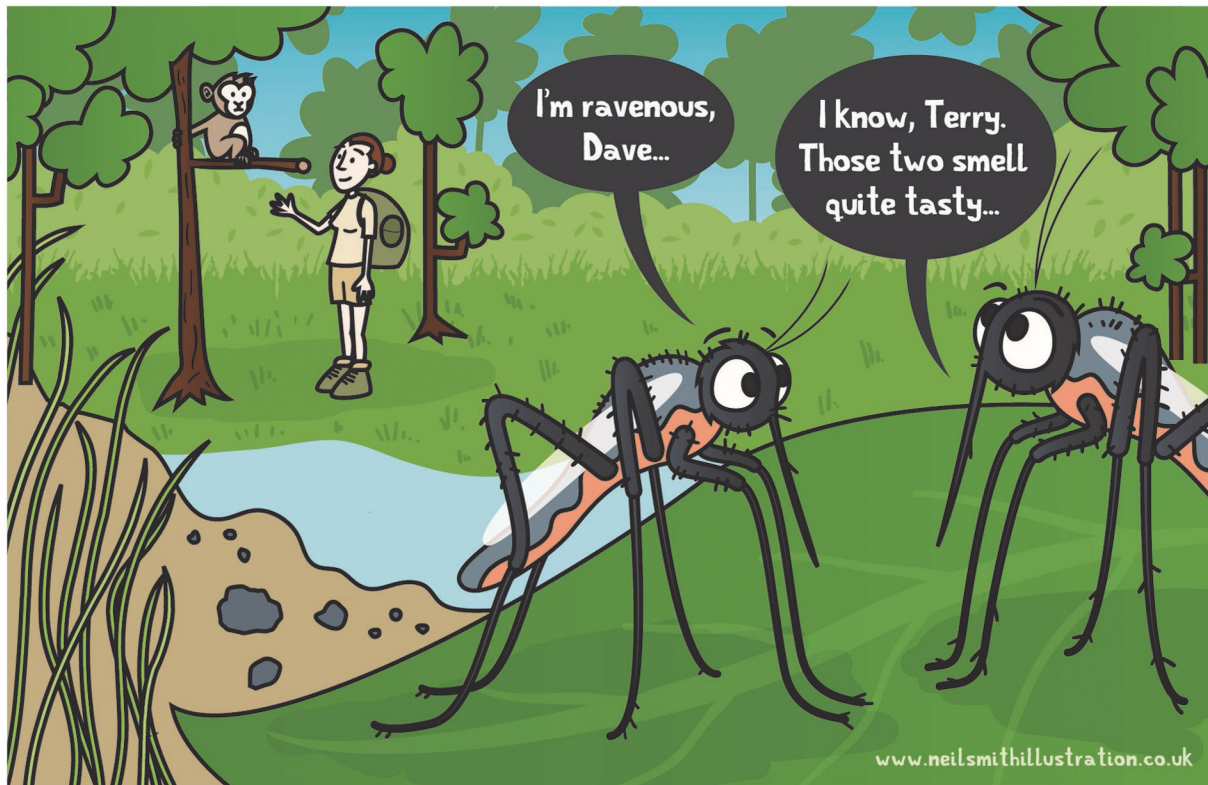


## INSIDE JEB

## Mosquitoes not bothered that humans smell different from apes



We have daubed ourselves with perfume for millennia, yet even when our aroma is concealed, blood-sucking pests still pinpoint juicy individuals. 'We have studied why one person is more attractive to mosquitoes than another and we have shown that the odours produced by bacteria on the skin play an important role', says Niels Verhulst, from the University of Zürich, Switzerland. But now Verhulst and colleagues from Wageningen University and Research, The Netherlands, and Zürich are turning their attention to the odours of some of our closest relatives: primates. As human populations are coming into increasing contact with wildlife displaced by habitat destruction – raising the risk that disease could skip from one species to another – Verhulst wondered how similar apes and humans smell from the perspective of disease-spreading mosquitoes.

Verhulst swabbed the forearms of captive western lowland gorillas, bonobos, chimpanzees and ring-tailed lemurs in zoos across The Netherlands, as well as chimps in the Democratic Republic of Congo, to collect samples of the bacteria colonising the animals' skins and their odours. In addition, he asked 15 male volunteers to avoid spicy food, alcohol, showering and hygiene products before collecting their skin odours and bacteria, while also collecting samples from local cows for comparison. Alexander Umanets then analysed the bacteria while Berhane Weldegergis investigated the individual components that comprised each animal's odour. Next, Jeroen Maas and Tessa Visser asked *Anopheles coluzzi* mosquitoes (which prefer to dine on humans) and *Anopheles quadriannulatus* (which have a preference for animals) which odour they preferred when offered the choice between human odour and one

of the animal scents, to get a true sense of the odours' similarities from the insect's perspective.

Although the humans had the smallest variety of bacteria colonising their skin, their bacterial lodgers were more similar to those of the other primates than those of the cows. And when the team compared the animals' scent cocktails, each was clearly unique, but the lemur's odour was more similar to that of the human volunteers; 'something we did not expect', says Verhulst. Comparing the mosquitoes' preference for the human scent over cow odour, the team found that *A. coluzzi* were more partial to human odour, while *A. quadriannulatus* gravitated to the cow scent. However, the *A. coluzzi* mosquitoes were equally attracted to all of the primate odours, even ours, despite the differences between the primate and human scent cocktails.

‘Apes do not smell like humans,’ says Verhulst, although he suggests that we may share some key odour components with our ape cousins, which could make us smell quite similar for mosquitoes.

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**Verhulst, N. O., Umanets, A., Weldegergis, B. T., Maas, J. P. A., Visser, T. M., Dicke, M., Smidt, H. and Takken, W.** (2018). Do apes smell like humans? The role of skin bacteria and volatiles

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