

Towards a fuller understanding of mosquito behaviour: use of electrocuting grids to compare the odour-orientated responses of *Anopheles arabiensis* and *An. quadriannulatus* in the field

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Abstract. The epidemiological role of and control options for any mosquito species depend on its degree of 'anthropophily'. However, the behavioural basis of this term is poorly understood. Accordingly, studies in Zimbabwe quantified the effects of natural odours from cattle and humans, and synthetic components of these odours, on the attraction, entry and landing responses of *Anopheles arabiensis* Giles (Diptera: Culicidae) and *Anopheles quadriannulatus* Theobald. The numbers of mosquitoes attracted to human or cattle odour were compared using electrocuting nets (E-nets), and entry responses were gauged by the catch from an odour-baited entry trap (OBET) relative to that from an odour-baited E-net. Landing responses were estimated by comparing the catches from E-nets and cloth targets covered with an electrocuting grid. For *An. arabiensis*, E-nets baited with odour from a single ox or a single man caught similar numbers, and increasing the dose of human odour from one to three men increased the catch four-fold. For *An. quadriannulatus*, catches from E-nets increased up to six-fold in the progression: man, three men, ox, and man + ox, with catch being correlated with bait mass. Entry responses of *An. arabiensis* were stronger with human odour (entry response 62%) than with ox odour (6%) or a mixture of cattle and human odours (15%). For *An. quadriannulatus*, the entry response was low (< 2%) with both cattle and human odour. *Anopheles arabiensis* did not exhibit a strong entry response to carbon dioxide (CO₂) (0.2–2 L/min). The trends observed using OBETs and E-nets also applied to mosquitoes approaching and entering a hut. Catches from an electrocuting target baited with either CO₂ or a blend of acetone, 1-octen-3-ol, 4-methylphenol and 3-n-propylphenol – components of natural ox odour – showed that virtually all mosquitoes arriving there alighted on it. The propensity of *An. arabiensis* to enter human habitation seemed to be mediated by odours other than CO₂ alone. Characterizing 'anthropophily' by comparing the numbers of mosquitoes caught by traps baited with different host odours can lead to spurious conclusions; OBETs baited with human odour caught around two to four times more *An. arabiensis* than cattle-baited OBETs, whereas a human-baited E-net caught less (~ 0.7) *An. arabiensis* than a cattle-baited E-net. Similar caution is warranted for other species of mosquito vectors. A fuller understanding of how to exploit mosquito behaviour for control and surveys requires wider approaches and more use of appropriate tools.

Key words. *Anopheles arabiensis*, *Anopheles quadriannulatus*, anthropophilic, electric nets, feeding behaviour, host odours, malaria vector, zoophilic, Zimbabwe.

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