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The oral repellent – Whatever happened to it?

Dear Editor,

The oral repellent – whatever happened to it?

Arthropod-borne diseases are endemic in many regions of the world with insect habitat expanding due to global temperature changes. Enormous amounts of money have been invested for decades in research and development of vector control and personal protection measures, yet, despite small successes, millions around the world still suffer or die from vector-borne diseases, such as malaria, dengue fever, leishmaniasis, Zika, chikungunya and many more. Consequently, travellers, scientists, missionaries, expats, and military personnel leaving for such destinations are at risk of infection and often diagnosed on return [1]. The reason for infection rests on the shortcomings of the two main control measures: 1) vector control, and 2) personal protection [2]. Table 1 presents a small sample of such shortcomings from a long list presented elsewhere [2].

The question of what attracts arthropods, and especially mosquitos, to humans in the first place has a long history leading to the equally long contemplated theory that it might be possible to ingest something to render us unattractive to bloodsuckers in general. Peculiar experimentations failed to find an answer. In the 1930s, brimstone and treacle seemed to offend South African mosquitos, but work was discontinued [3]. In the 1960s, the US Defence Forces searched for a substance to address the many deployment-days lost to vector-borne diseases [4], but no results were achieved. Bizarre trials ingesting and injecting repellents, coffee, smelly fruit and more, also failed. It is easy today to be smug about those early attempts with only basic equipment and limited knowledge of mosquito physiology available at the time.

Luckily for us, rapidly evolving technology, and recent groundbreaking insights into the complicated mosquito chemo-sensation [5] could provide a fresh anchor for innovative research to find the illusive magic substance. An oral preparation, perhaps to be taken sometime before and then throughout the trip, much like malaria prophylaxis, would not only protect the individual but also interrupt the cycle of microbe-uptake by the vector from an infected person. On a larger scale, an oral compound could address many tropical and neglected tropical diseases when administered with tried-and-tested methods of mass distribution. Clearly, not being bitten would be the ideal vector-control strategy.

In addition, vector-control measures impacting on non-target species including on animal and human health would become obsolete. One-Health often favours human health over the supposed equal importance of the health of animals and the environment. Not exterminating target and non-target insects at a time when insect populations are in steep decline would not only improve human health considerably, but insects could recuperate to fulfil their many roles preserving life on this planet.

Table 1
Selected shortcomings of vector control and personal protection measures.

Shortcomings of vector control measures	
Physical	- Impact on aquatic and surface non-target species - Limited to no use in large or natural habitats
Environmental	- Potential replacement by other vectors - Natural habitat and all oviposition sites impossible to remove
Chemical	- Severe impact on aquatic and surface non-target species - Resistance requires increasingly higher dosage
Biological	- Invasion of 'control/predator'-species - Locally restricted
Genetic	- Potential unplanned consequences - Absence of community participation
Shortcomings of personal protection measures	
Impregnated material	- May not coincide with insects' activity cycle - Loss of bio-efficacy
Spatial protection	- Impact on non-target species - Respiratory health impact
Topical repellents	- Practical problems: abrasion, wash-off, sunscreen, and more - Care required with DEET

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Declaration of competing interest

No competing interests

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