RBM Partnership To End Malaria

31 January 2019

The Repellent Road Map.

Jason H. Richardson, IVCC

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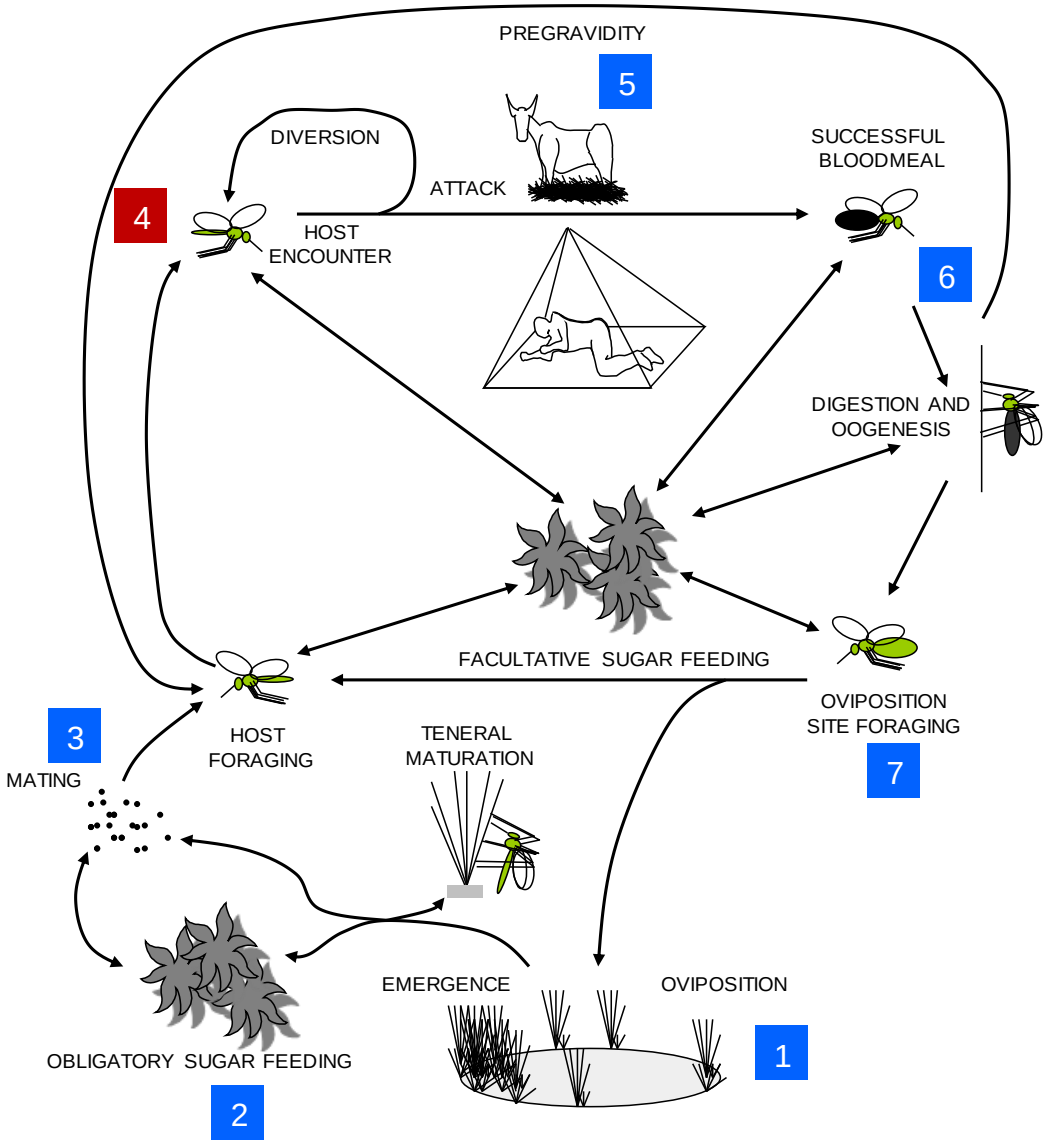
Bite Prevention Tools Road Map.

Spatial protection with volatile pyrethoids

Jason H. Richardson, IVCC

Opportunities for Vector control product development



1. Environmental management and larvicide application
2. Insecticide and paratransgenic bacteria application to natural sugar sources, toxic sugar baits
3. Pheromone trapping and release of genetically modified or sterile males, space spraying
4. **Prevent host contact**
5. Zooprophylaxis, insecticide-treated cattle and odor-baited traps, endectocides
6. Adult contamination with biological and chemical agents which may be autodisseminated
7. Environmental management forcing increasing foraging mortality, ovitraps

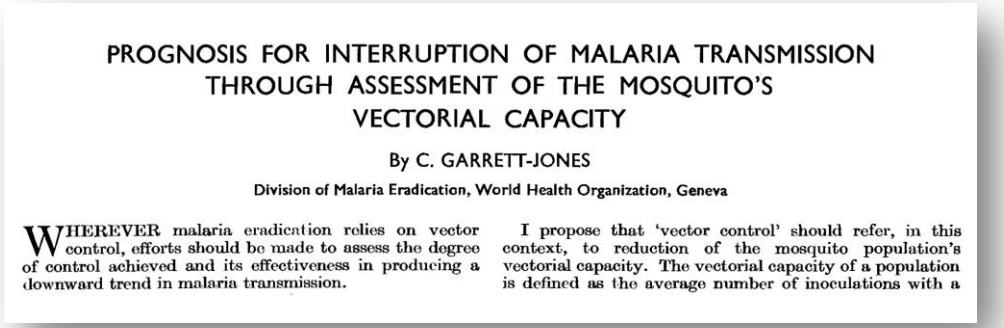
Adapted from Ferguson et al 2010

Bite prevention tools and Vectorial Capacity

Topical Repellents, Bite Proof Clothing, Repellent Clothing, passive emanators, etc – all work in the same way.

In terms of Vectorial Capacity they all affect *ma*

(Note: at higher concentrations, some compounds are also insecticidal, thus affecting *p)*



PROGNOSIS FOR INTERRUPTION OF MALARIA TRANSMISSION THROUGH ASSESSMENT OF THE MOSQUITO'S VECTORIAL CAPACITY

By C. GARRETT-JONES

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WHEREVER malaria eradication relies on vector control, efforts should be made to assess the degree of control achieved and its effectiveness in producing a downward trend in malaria transmission.

I propose that 'vector control' should refer, in this context, to reduction of the mosquito population's vectorial capacity. The vectorial capacity of a population is defined as the average number of inoculations with a

Box 1. Vectorial capacity

$$C = \frac{ma^2 b\, p^n}{-\log_e p}$$

C	New infections disseminated from a single infectious human
m	Number of vectors per person
a	The probability that a vector feeds on a host (host preference)
b	Vector competence
ma	The number of bites per person per day
p	Probability of a vector surviving 1 day
n	The incubation period of the parasite
p^n	Proportion of mosquitoes surviving the incubation period of the parasite
$-\log_e p$	Duration of the vector's life after surviving parasite incubation

REVIEW Open Access

Spatial repellents: from discovery and development to evidence-based validation

Nicole L Achee[1*], Michael J Bangs[2], Robert Farlow[3], Gerry F Killeen[4], Steve Lindsay[5], James G Logan[5], Sarah J Moore[5], Mark Rowland[5], Kevin Sweeney[6], Steve J Torr[7], Laurence J Zwiebel[8] and John P Grieco[1]

Malaria Journal 2012

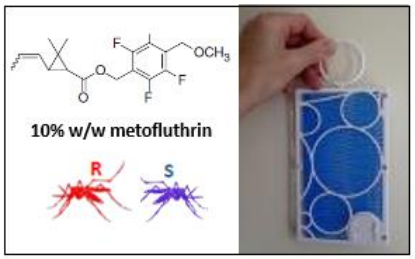
Table 2 Key components of a spatial repellent critical path of development (SRCPD)

	Key components of a SRCPD
1	Proof-of-Principle: demonstrating a spatial repellent will impact disease at the community level
2	Correlating entomological endpoints with reduction in infection incidence rates using repellent tools
3	Measuring the impact of diversion of repelled vectors to untreated sources under varying transmission dynamics
4	Defining the limitations of spatial repellency in both susceptible and insecticide resistant vector populations
5	Developing standardized protocols and measures for the evaluation of vector behavior modification as it relates to host-feeding following exposure to spatial repellents (i.e., host-seeking, feeding, resting, and oviposition) to identify long-term effects of spatial repellents
6	Engagement and recruitment of industry and academic partners to adopt standardized protocols and measures for the screening of chemical AIs to include spatial repellency
7	Identifying the underlying genetic/neurobiological basis of vector behaviors to provide insight into the rationale design of new repellents

The R&D pipeline for volatile pyrethroid “spatial repellent” products

Funder	Project (Lead org)	Product	AI	Use
BMGF	Epi Trial (Notre Dame)	Shield	transfluthrin	area
IVCC	Push-Pull (Wageningen & IHI)	Eave panels + suna trap	transfluthrin	area
Unitaid	Epi Trial (Notre Dame)	Shield v2?	transfluthrin	area
US DoD	Ento Field trial (Notre Dame)	PIRK	transfluthrin	area
US DoD	Ento Field trial (WRAIR)	PIRK	transfluthrin	area
US DoD	Ento Ph I/II (Gear Jump Tech)	device for uniforms	?	wearable
US DoD	Ento Ph I/II (USDA-CMAVE)	Boot laces	?	wearable
USAID	Ento Ph II (IHI)	Sandals	transfluthrin	wearable
USAID	Ento Ph II (LSTM/IHI)	Hessian panels	transfluthrin	area
USAID	Ento Ph II (QIMR)	Mozzy Mesh	metofluthrin	area
SCC	Various	--	metofluthrin	--
Bayer	Various	--	transfluthrin	--
SCJ	Various	multiple	meto & trans	various
Others?				

The R&D pipeline for volatile pyrethroid "spatial repellent" products



PRODUCTS IN THE USAID ZIKA GRAND CHALLENGE PROGRAM

Coil | Liquid electric | Mat | Aerosol | Burn paper

SC JOHNSON'S COMMERCIALLY AVAILABLE SPATIAL REPELLENTS

SCJ SHIELD, NT&T PIRK, HESSIAN EAVE RIBBONS

Bite prevention tools – Key gaps

Consensus on testing guidelines and standardized screening methods

Evidence**:** Studies to provide epidemiological evidence of public health impact for various TPPs (indoor and outdoor; static and mobile)

Identifying and developing new actives

RBM Partnership
To End Malaria

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Thank you, find out more visit rollbackmalaria.org @RollBackMalaria

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