A new cost-effective aspirator for adult mosquito collections

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Methods for adult mosquito collection

- Indoors vs Outdoors
- Passive vs Active
- Sampling vs Control



Differ in sensitivity, collect certain species, ages and physiological states

Battery-powered aspirators

- Resting adult population
- Most suitable method for indoors collections
- Unbiased estimation of species richness, abundance, sex ratio, feeding pattern
- "CDC-Backpack aspirator" (Clark et al. 1994)

Mosquito News September, 1983 Vol. 43, No. 3 THE "AFS SWEEPER," A BATTERY-POWERED BACKPACK MECHANICAL ASPIRATOR FOR COLLECTING ADULT MOSQUITOES¹

R. P. MEYER², W. K. REISEN², B. R. HILL² and V. M. MARTINEZ²

Inurnal of the American Mosquito Control Association, 10(1):119-124, 1994

USE OF THE "CDC BACKPACK ASPIRATOR" FOR SURVEILLANCE OF AEDES AEGYPTI IN SAN JUAN, PUERTO RICO

GARY G. CLARK, HILDA SEDA AND DUANE J. GUBLER



CDC-Backpack aspirator

Pros	Cons				
Unbiased collections	Heavy weight (12 kg)				
Bloodfed mosquitoes	Rigid and non-extendable				
Indoor/outdoor	Cost (\$499 to \$750)				
Estimates of richness					
High sensitivity					
High coverage					







Our development



Same aspiration capacity than CDC-Backpack aspirator smaller, lighter, cheaper and compatible with telescopic extension to access hard to reach locations







How was conceived?

- Collaboration with Jim McNelly
- Overwintering mosquitoes in CSOs
- •~5 m high ceilings
- Need for stratification of collections





Features

- Aspiration power did not differ from CDC-BP when tested at 0, 5 and 10 cm from collection cup.
- Weight: 0.88 kg
- 4 kg with battery
- Cost: \$45 aspirator
 \$25 pole
- Assemblage ~1h



Field test 1. Atlanta CSO tunnels

- Seven 10 m sections of the tunnels
- November 2008 March 2009
- Compared CDC-BP in lower (<1.5m) walls with Prokopack in upper wall and ceiling
- Low collections for paired comparison
- 132 mosquitoes (120 Females)
 - 40 Lower wall
 - 24 Upper wall
 - 68 Ceiling.

96.7% Culex pipiens complex



Field test 1. Atlanta CSO tunnels

 Monotonic reduction of mosquito collections.
 Natural mortality + absence of autogenous populations.



More mosquitoes in ceiling.



Field test 2. Iquitos, Peru

- Performance in indoor collections
- Paired trial between CDC-Backpack and Prokopack
- Aedes aegypti
- Randomly selected 71 houses







~ 10 minutes per aspirator per house.

Iquitos results

- Overall prevalence of total mosquitoes and Ae. Aegypti 1.1-2.1 times larger in PKP.
- PKP collected 4.5 times more *Mansonia sp.* (9/2), 4.2 times more *Ae. aegypti* (53/11), 2.3 times more *Culex pipiens* complex (1,079/475), and 1.3 times less *Culex (melanoconion)* sp. (26/33) than the CDC-BP.



Iquitos results

Table 1.	ганеа СБС-раскраск а	aspirator and rr	сокораск тозчи	to conections pe	ertormed in nouses	of the city of	iquitos, r'eru

	No.	All species ^a				Ae. aegypti					
Collection		% houses	s % houses positive only PKP	No. collected		ed	% houses	% houses	No. collected		
sequence ⁰	houses	positive only BP		BP	PKP low	PKP high	positive only BP	positive only PKP	BP	PKP low	PKP high
$BP^c \rightarrow PKP^d$ $PKP \rightarrow BP$	36 35	16.7 5.7	16.7 20.0	359 201	504 452	183 97	$5.6 \\ 5.7$	22,2 20.0	8 3	29 17	$\begin{pmatrix} 6\\ 4 \end{pmatrix}$

^a Includes Cx. pipiens complex, Ae. aegypti, Mansonia sp., and Cx. (Melanoconion) sp.

^b Represents the collection sequence each aspirator was used at each house (first \rightarrow second) to collect mosquitoes from the lower (<1.5 m) walls and furniture. In all houses, the lower wall collections were paired with upper (1.5 m) wall and ceiling collections by using a Prokopack with an extension pole.

^e BP, CDC-backpack aspirator.

^d PKP, Prokopack.

PKP collected significantly more mosquitoes per house than the CDC-BP (Wilcoxon signed rank test, P<0.05). PKP increased *Ae. aegypti* detection in 14-16%

87% bloodfed Ae. aegypti females collected with PKP

Outdoor collections in Atlanta

Currently used to assess:

abundance of *Cx. quinquefasciatus* in urban creeks of ATL

Stratify collections

Backyard collections of Aedes albopictus in residential areas of ATL





Commercialization

- Who?
 - Researchers
 - Public health organizations
 - Vector control companies
- Why?
 - Need for improvement of current design
 - Mass distribution
 - Cost-effective design
- Timetable
 - Emory submitted patent in Oct 09
 - Search for Companies

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