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

**Trapping**
- Gravid
- CDC-light
- BG
- “Magnet”

**Aspiration**
- Landing catches
- Backpack aspirator

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)
# CDC-Backpack aspirator

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
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<tr>
<td>Unbiased collections</td>
<td>Heavy weight (12 kg)</td>
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<td>Bloodfed mosquitoes</td>
<td>Rigid and non-extendable</td>
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<td>Indoor/outdoor</td>
<td>Cost ($499 to $750)</td>
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<td>Estimates of richness</td>
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<td>High sensitivity</td>
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<td>High coverage</td>
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- Estimates of richness
- High sensitivity
- High coverage
Our development

“Prokopack”

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 *Mansonía* 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

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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