Slightly Less Simple Mosquito Modeling

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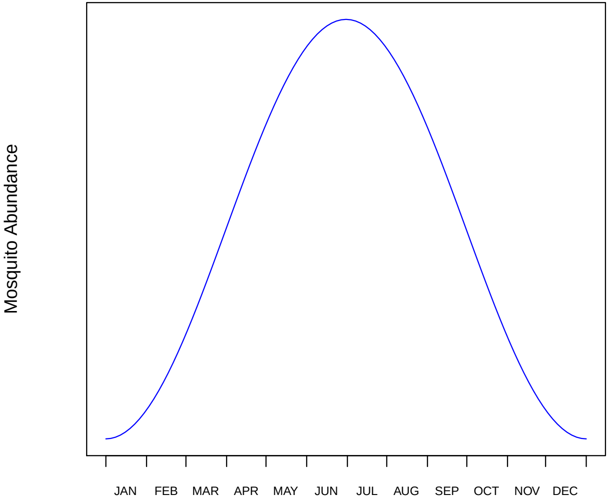
Mosquito Abundance
JAN
FEB
MAR
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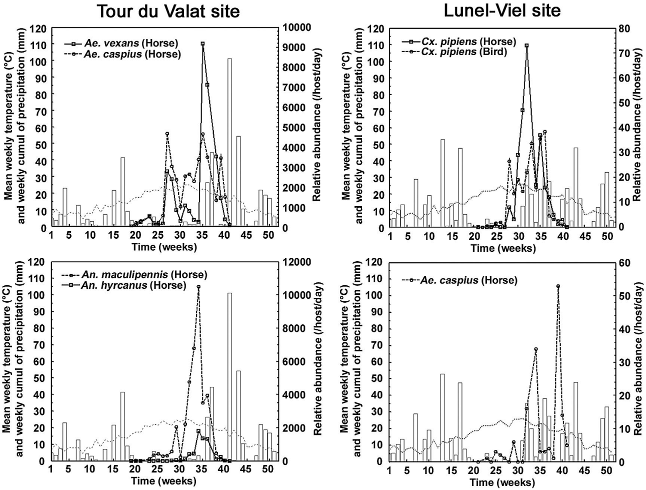

Figure: Bicout et al. "Horse-, Bird-, and Human-Seeking Behavior and Seasonal Abundance of Mosquitos in a West Nile Virus Focus of Southern France". J. Med. Entomol. 43(5): 936-946 (2006)

So, a Disconnect.

Specifically, it is impossible to match features like peak population, total population over a year, and turnover rate with a functional form

$$M(t) = C \sin(\omega t + \theta)$$

...and these features can be critical to predicting transmission dynamics, and thus planning interventions.

Do Better, But Keep It Simple

What's appealling about this trigonometric representation?
Simplicity:

- two parameters
- no spatial features
- "easy" analytical form

Possible to identify alternatives that *can* match salient features, but still retain these features?

What are those salient features?

- every year,
- over a relatively short duration,
- the mosquito population rapidly increases,
- sits at a high level of activity,
- then rapidly declines,
- apparently connected with resource availability & environmental suitability

1. useful to write models in terms of measurable parameters,
2. measurable parameters are not scale-free,
3. mathematics is more useful when scale free, therefore
4. dimensional analysis is awesome