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Genetic structure of a world-wide ant invasion

Background

- The little fire ant *Wasmannia auropunctata* is native to the Neotropics but has numerous invasive populations throughout the world, including the US (Hawaii and Florida), many Pacific islands and Central Africa (Cameroon and Gabon).
- By tending plant pests *W. auropunctata* can directly harm agriculture. Its surprisingly painful sting makes work on infested farms nearly impossible.
- *W. auropunctata*'s arrival is usually correlated with decreases in abundance and species richness of ants and other invertebrates. Reports of attacks on vertebrates are also common.



W. auropunctata worker scavenging dead bullet ant.

Results

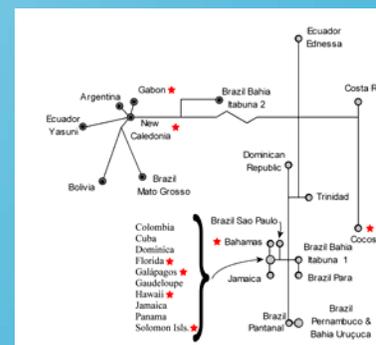


Distribution and sampling of *W. auropunctata*. Native range is outlined in black. The two types of circles represent two different clades (see below).

- Two genetically distinct sympatric clades, according to both intraspecific network and traditional phylogenetic models. Both clades are invasive.
- At least three separate source populations:
 - Caribbean region → Florida & Pacific
 - South America → Africa & New Caledonia
 - Central America → Cocos Island
- High genetic relatedness of invasive populations.
 - Low power for testing relative size of native vs. invasive populations ($N=3$, Wilcoxon signed rank test $P=0.091$).

Methods

- Sequenced COI/COII region of mtDNA, including tRNA leucine and an intergenic spacer
- Genetic relationships determined using traditional phylogenetics (not shown) and a genotype network.
- Relationships used to test McGlynn's (1999) observation that invasive populations are smaller in size than native population using Purvis and Rambaut's (1995) algorithm.



Median-joining network of *W. auropunctata* populations. Invasive populations are marked by stars. Note that the edge joining the two clades (grey and black-dotted) has been scaled down by a factor of 2.5.

Study goals

Ultimately, I plan to use the multiple introductions of *W. auropunctata* for studying parallel evolution of invasive populations. However, the following questions must be addressed first:

- I. Is '*auropunctata*' just one species?
- II. Given *W. auropunctata*'s large native range, where are the sources of invasive populations?
- III. What are the genetic relationships between populations?

Future directions

- Are the Caribbean populations native?
 - Fine scale genetic analysis.
- Are there two cryptic species?
 - Morphological and behavioral studies.

References

McGlynn, T.P. 1999. *Am. Nat.*, 164: 690-9
 Purvis, A. & Rambaut A. 1995. *CABOIS*, 11:247-251



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