Antibiotic-producing Symbionts in Temperate Formicidae

By Ryan Croft with Dr. Elise Kimble, Dr. Allen Childs,
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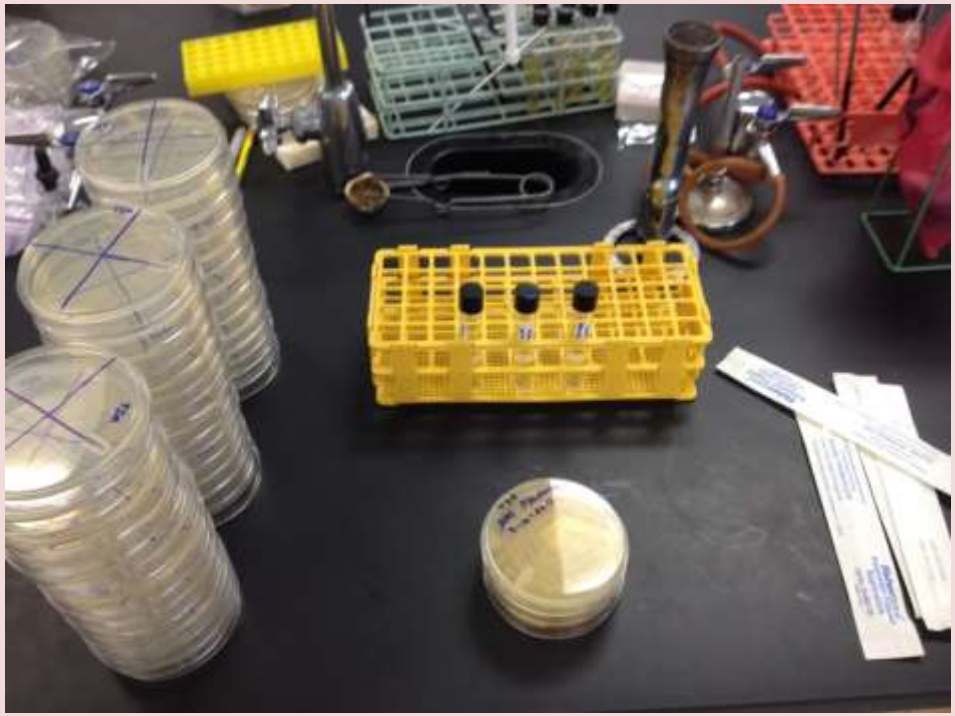
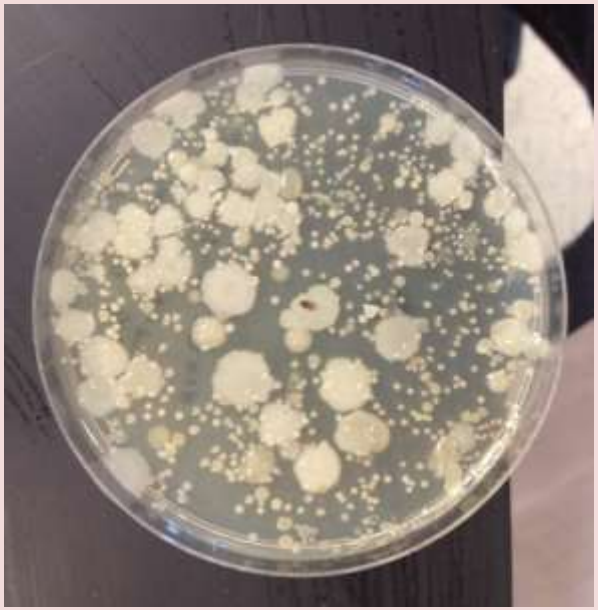
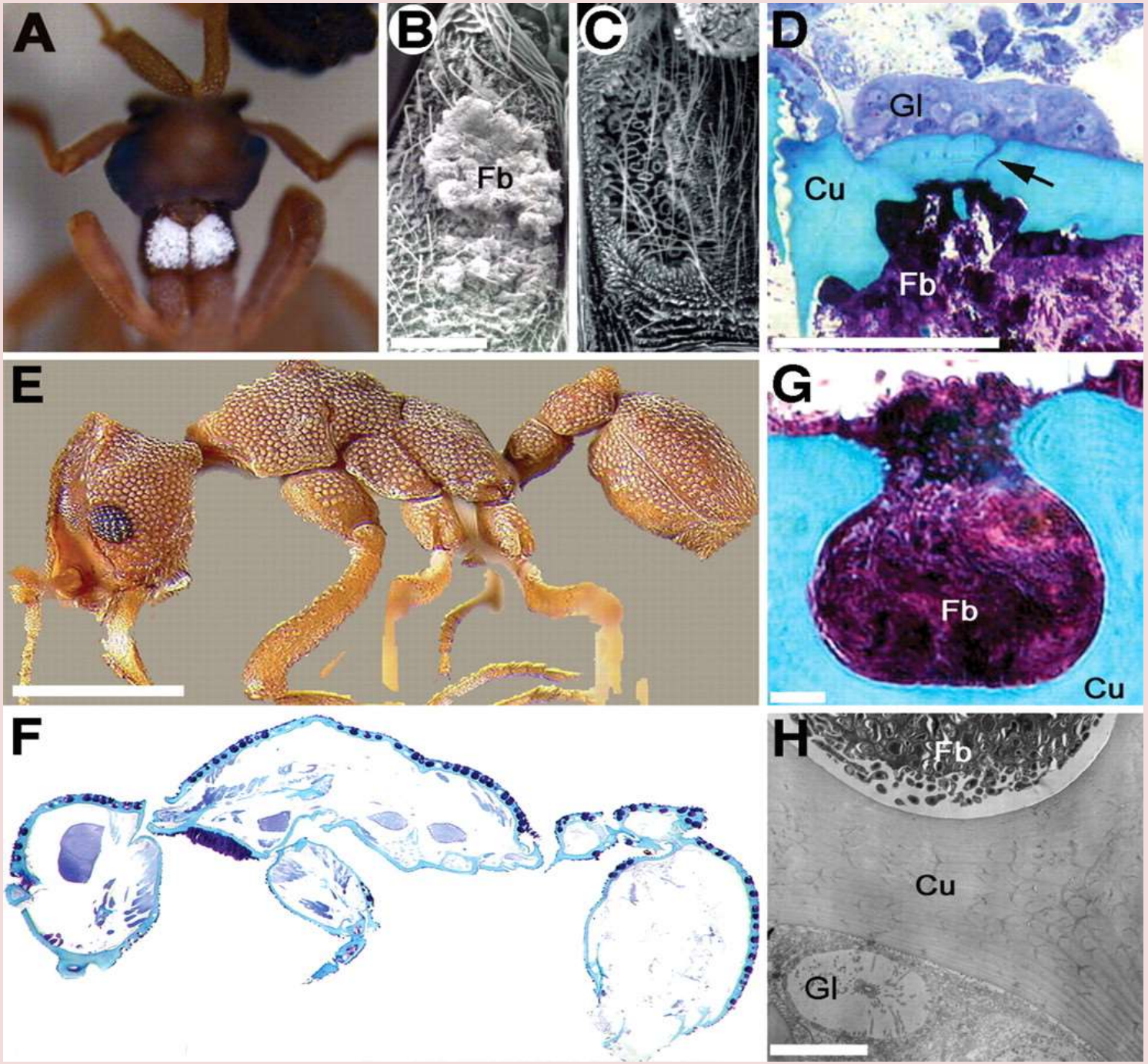




Introduction

- *Attine* Ants

- Bacterial Symbiosis
  - These ants house and grow bacteria on their exoskeleton.
  - The bacteria provide protection against unwanted bacteria and fungus in the their fungal gardens.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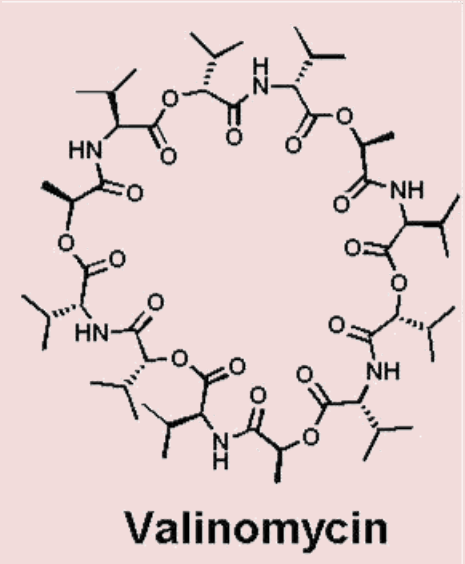
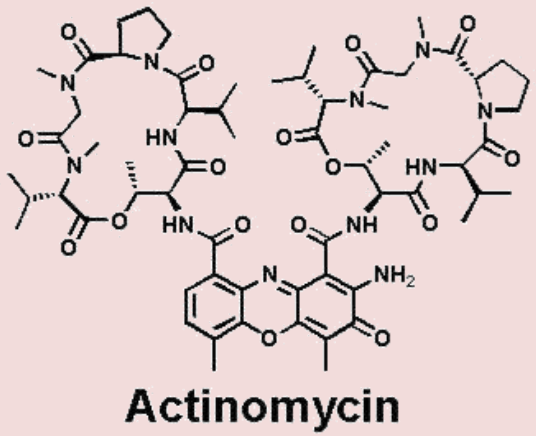
The Idea

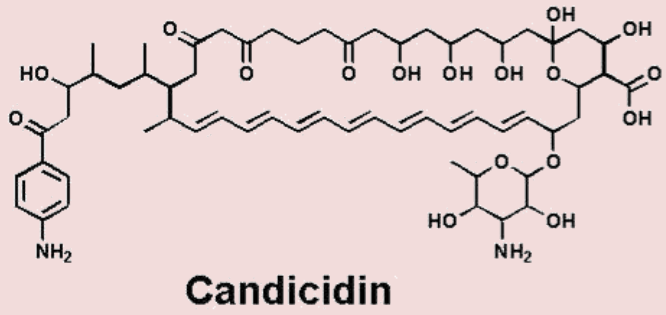
- Two questions:
  - Could temperate ants be a promising source for novel antibiotics?
  - Do temperate ants use antibiotic active bacteria symbiotically like *Attine* ants?

Hypothesis

- I am proposing that ants could be a promising source for novel antibiotics and that non-fungal farming ants use antibiotic active bacteria symbiotically just like agricultural ants.







Materials and Methods

- Collect ant samples
- Plate ant samples
- Isolate bacterial colonies
- Test bacterial colonies

for antibiotic production

- Identification through pcr
  - DNA extraction
  - pcr of the 16S rRNA gene
  - BLAST search

Collected Ant Samples

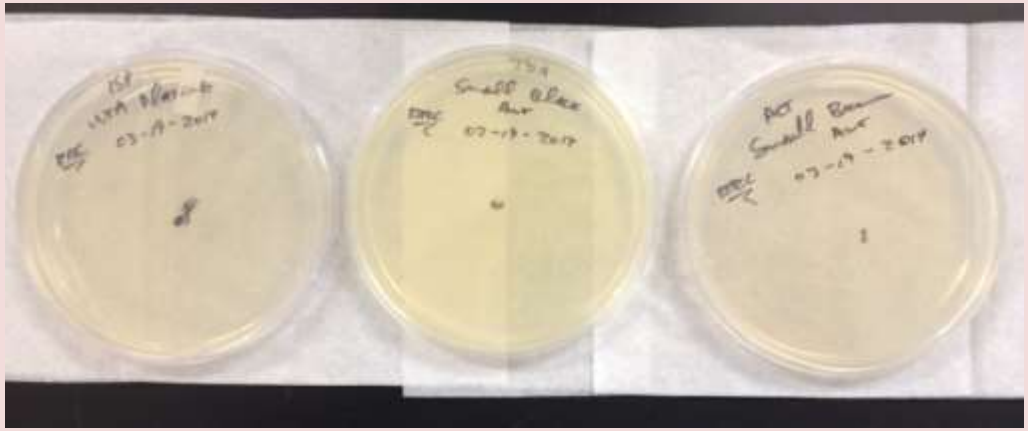
- Six different species
  - Two known
  - Four identification in progress






Plated Ant Samples

- Plated samples on seven different agar media.
  - TSA, HTSA, ACT, SDA, MYX, ISP, and TOM.



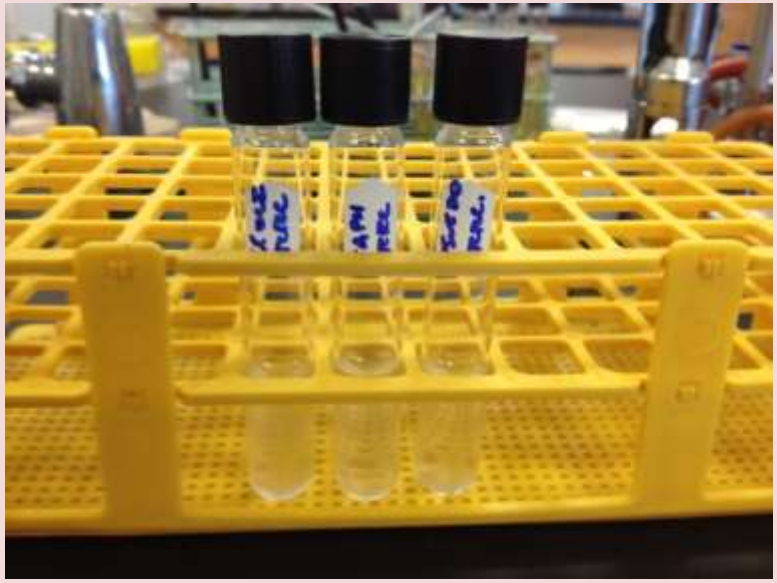
Isolated Bacterial Colonies

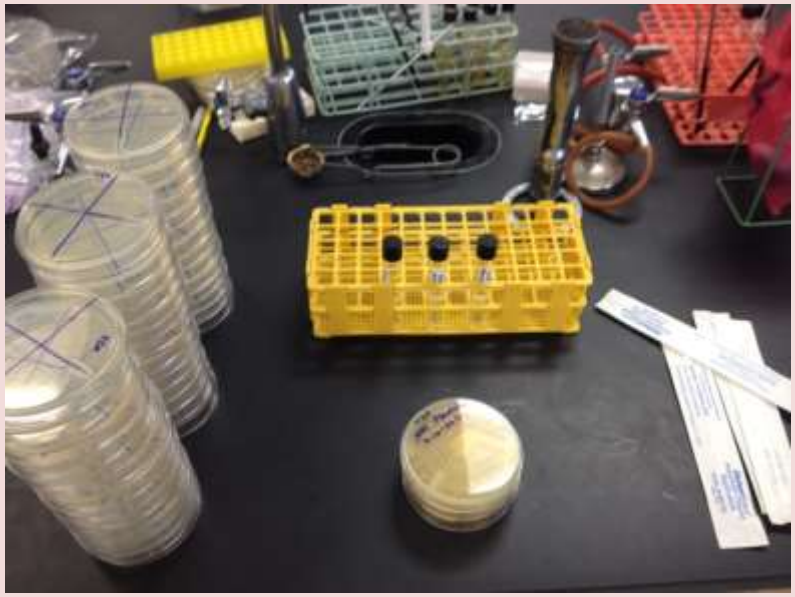
- Isolations based on morphology
- Huge bacterial variety



Tested for Antibiotic Activity

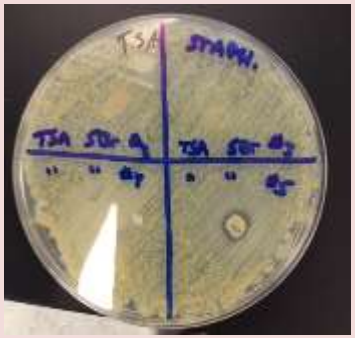
- Activity against three common pathogens
  - *Staphylococcus aureus*
  - *Escherichia coli*
  - *Pseudomonas aeruginosa*

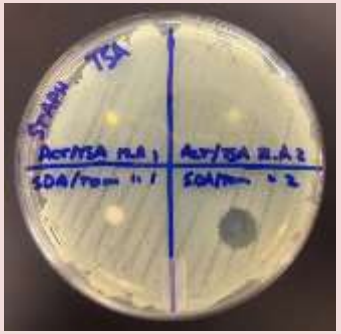


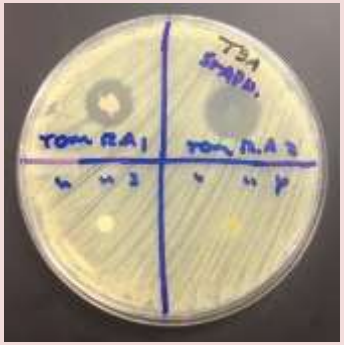


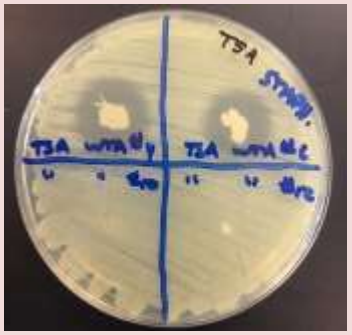
Identification Through pcr

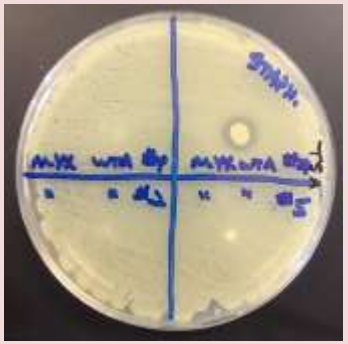
- DNA extraction
- pcr 16S rRNA gene
- BLAST search

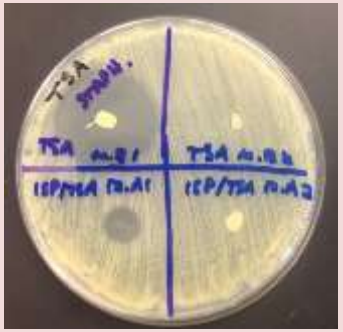




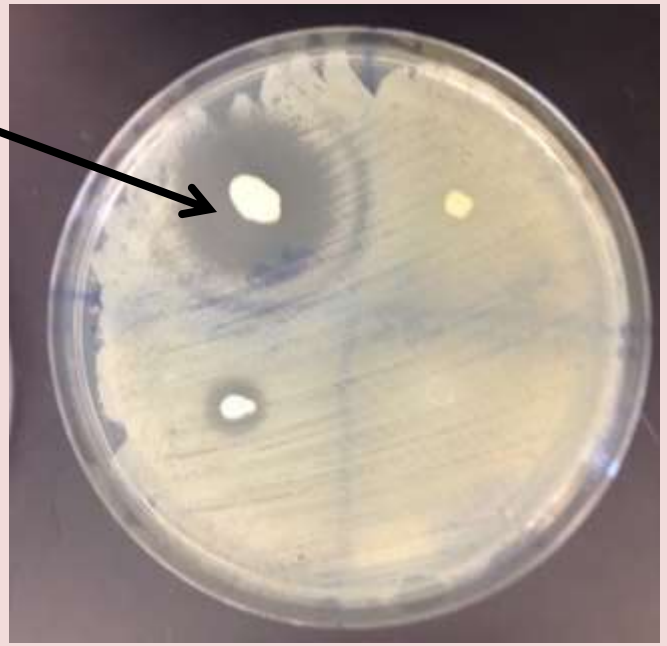


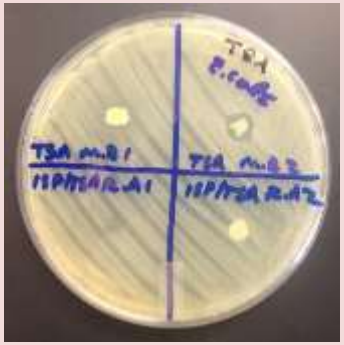


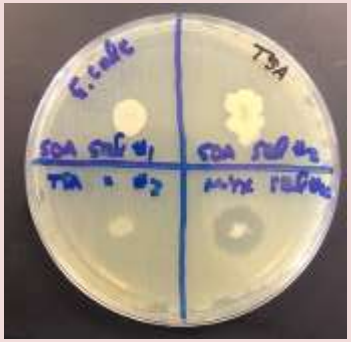


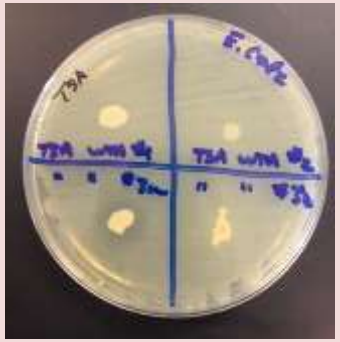


Zone of inhibition









Results

Species	Isolates	Antibiotic Active Isolates	%	*S. aureus*	*E. coli*	*P. aeruginosa*
Western Harvester Ant	17	5	29%	5	0	0
Very Small Brown Ant	22	4	18%	4	0	0
Medium Black Ant	14	3	21%	2	2	0
Western Thatch Ant	23	7	30%	7	2	0
Small Black Ant	28	10	28%	10	4	1
Small Brown Ant	39	8	21%	8	1	0
TOTAL:	143	37	26%	36	9	1

Discussion

- Hypothesis is supported
- It is not only *Attine* ants that harbor antibiotic active bacteria but also these species that I tested.
- We don’t know if these ants benefit from these bacteria YET!
- Fungicidal bacteria

Fungicidal bacteria

Fungal contaminate

Zone of clearing

Acknowledgments

- I want to thank all of you and especially…

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