

# Hymenoptera Allergy: Ants and Flying Insects

## An Overview

*World Allergy Congress  
2011*



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# Disclosures

- Research
  - ♦ Genentech  
(not relevant to this program)
- Industry Speaker
  - ♦ none
- Financial
  - No conflicts or disclosures

# Stinging Insect Hypersensitivity

Golden et al. Stinging insect hypersensitivity Practice Parameter JACI 2011;127:852-4

## 1) Emergency departments

- Need for better recognition
- Need for appropriate use of epinephrine

## 2) Bumblebees are important cause of sting reaction in some settings, such as greenhouse pollination

- Bumblebee venom is distinct from honeybee venom
- There is cross-reactivity between honeybee in some patients
- Where available, use bumblebee specific venom

## 3) More guidance on when not to test

- Negative predictive value is very high
- Positive predictive value is lower (25% false positive)
- Venom testing and treatment might not be required

# Stinging Insect Hypersensitivity

Golden et al. Stinging insect hypersensitivity Practice Parameter JACI 2011;127:852-4

## 4) Growing evidence

- Fire ant sting evaluation & management
- Demographic information on scope and distribution

## 5) Measurement of Baseline Serum Tryptase

- Severity of sting reactions
- Frequency of systemic reactions with VIT
- Chance of VIT failure
- Risk of relapse if VIT stopped

## 6) More discussion & Guidance

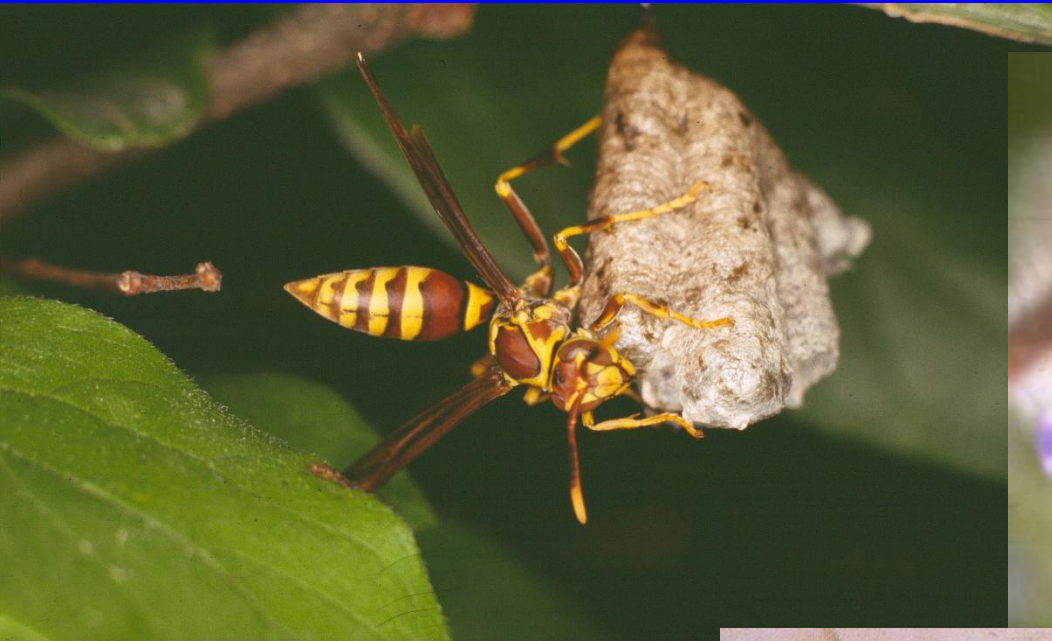
- Self-injectable epinephrine

# Stinging Insect Hypersensitivity

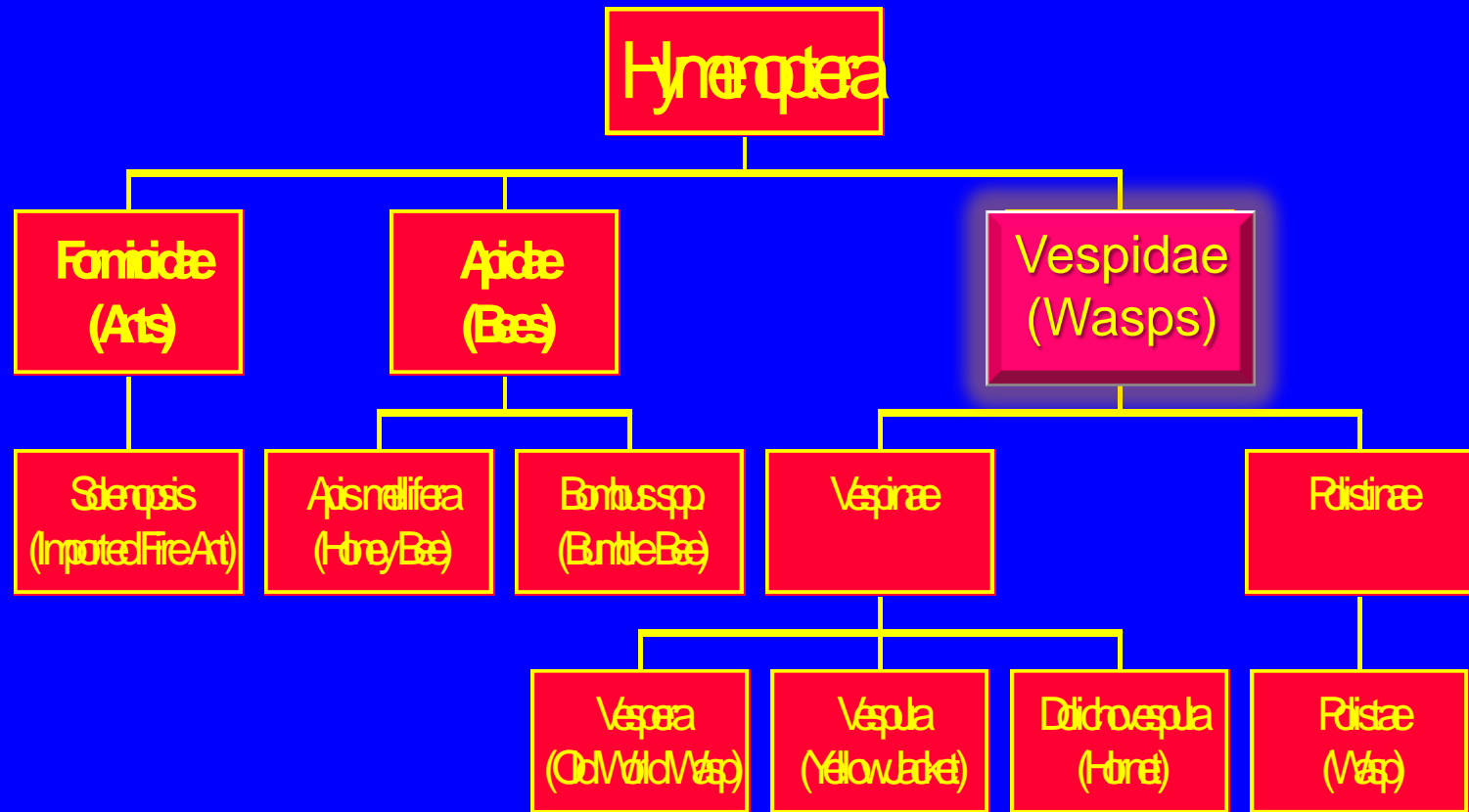
Golden et al. Stinging insect hypersensitivity Practice Parameter JACI 2011;127:852-4

- 7) New evidence on relative risk of
  - ACE Inhibitors
- 8) Important predictors of outcomes of sting reaction
  - Severity of previous reaction
  - Mast Cell Tryptase level
  - Cardiovascular drug use
  - Age
  - Male gender
- 9) Updates on VIT
  - Use of Antihistamines on the day of shot
  - Regimens for VIT progression
  - Appropriate maintenance dose of VIT
  - When to discontinue VIT

# The Usual Suspects



# Hymenoptera Taxonomy





# Wasp (*Polistes* spp.)



- Long and slender, many different colors
- Paper comb nests on eaves or rafters
- Stinger retractable
  - may sting > once
- Less aggressive unless nest threatened
- Small colonies
  - 10-25 workers







# Hornet

(*Dolichovespula* spp.)



- European hornet → *Vespa crabo*
- Bald-faced hornet → *Dolichovespula maculata*
- Large, differing colors
- Large paper-like nests in trees, on buildings
- Painful stings from kinins
- Active at night, seek light
- Colonies
  - 200-1,000



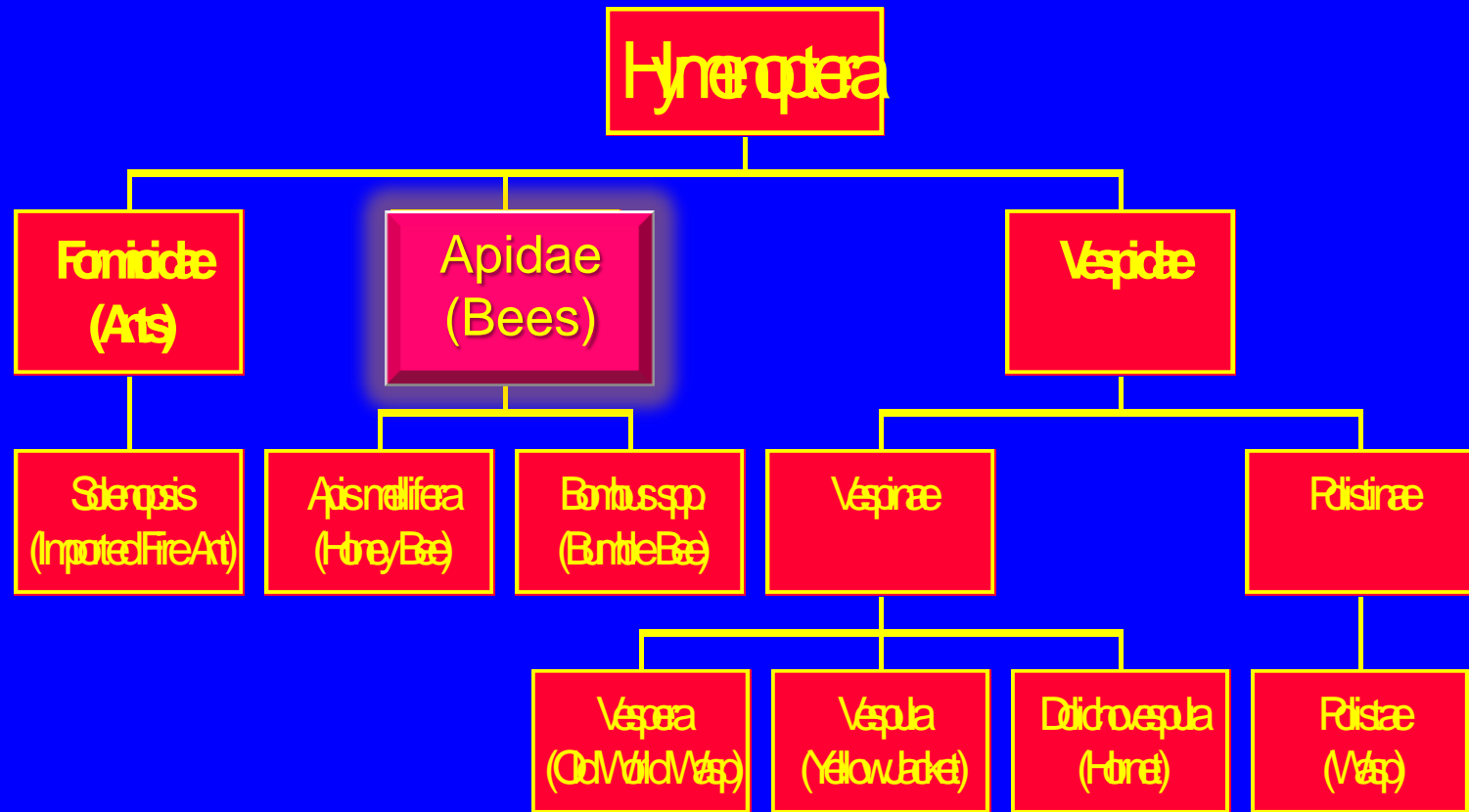
# Yellow Jacket (*Vespula* spp.)



- Two genera
  - *Vespula vulgaris* (common yellow jackets)
  - *Dolichovespula arenaria* (aerial yellow jacket)
- Yellow and black
- Nests
  - Subterranean nests
    - 500 – 5000 in a colony
  - Small aerial nests
    - 100 – 700 in a colony
- Aggressive scavengers and foragers
  - Agitated by vibration
  - Causes most stings in USA



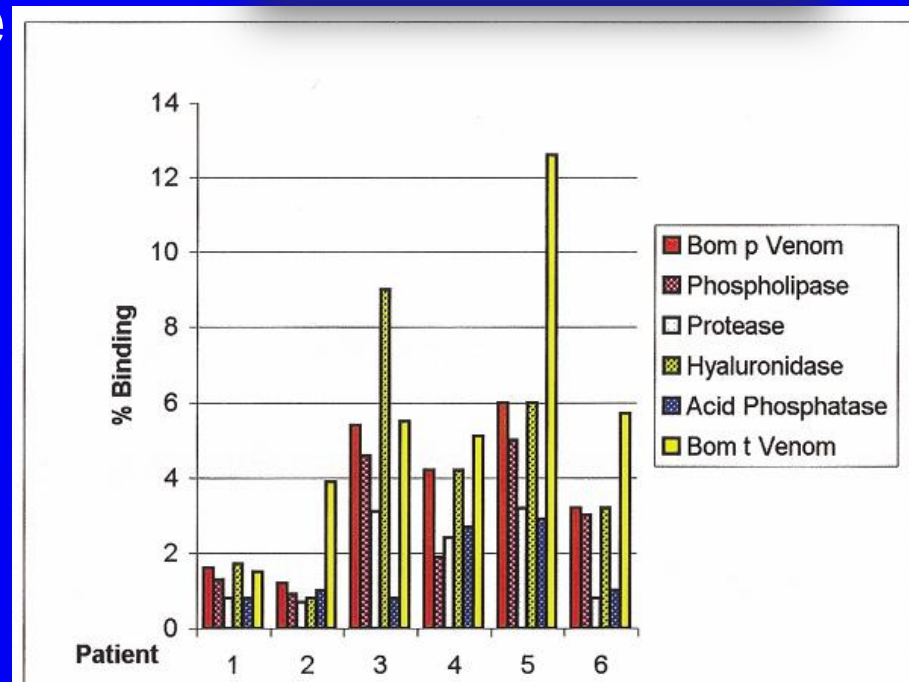
# Hymenoptera Taxonomy



# Occupational Allergy to Bumblebees

Hoffman D et al. J Allergy Clin Immunol 2001;108:855-60

- Greenhouse pollination
- Two distinct groups
  - Honeybee cross-reactive
  - Bumblebee specific
- Four species of bumblebee
- Recommendation
  - Specific Bumblebee species venom be used for testing and VIT (if available)
- Bumblebee venom is not available in the US and some European Countries



# Honeybee

## (*Apis mellifera*)



- Stout, hairy body
- Around lawns and pollinating plants
- Attracted by bright colors
- Barbed stinger
  - Remains in skin
  - Eviscerates the bee
- Bumblebee cross reacts
  - In some, but not all patients
- Africanized “killer” bee cross reacts
- Large domesticated colonies
  - >65,000 workers



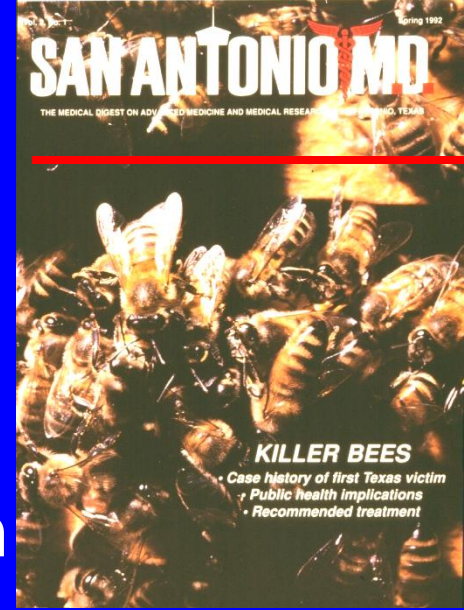
# Honeybee (*Apis mellifera*)



# Killer Bee

## *(Apis mellifera scutellata)*

- Africanized “killer” bee cross reacts with honeybee
- Introduced into Brazil in 1956 and began expanding northward in 1957
- Present in southern US
- More aggressive
  - ◆ Swarm at slight provocation (vibration)
  - ◆ Pursuit over 1 mile
  - ◆ Deliver 8 times number stings of honeybee
- High temperatures and low rainfall (Brazil)
  - greater activity of bees
  - larger number of wandering swarms



# Killer Bee (*Apis mellifera scutellata*)



**SATURDAY**  
DECEMBER 14, 1991  
FINAL  
☆☆

10th YEAR NO. 329

**San Antonio Light**  
We're Your Paper.

25 CENT

**'Killer' bees blamed in Valley ambush**

Associated Press

**ON THE MARCH**

- **LATEST ATTACK:** A woman in Edinburg was stung repeatedly, along with two others. The swarm also attacked and killed a dog chained nearby.
- **NEW LOCATION:** Swarm found around a railroad car in Victoria. Experts earlier had doubted the bees would reach Victoria for at least another year.
- **QUARANTINES:** A total of 18 counties in South Texas are now under a quarantine in an effort to

and no injuries were reported.

"Killer" bees have been migrating north since their arrival in South Texas in October 1990. A total of 18 counties now are under a quarantine in an effort to slow their advance.

The bees have been spreading through the Americas since 1957, when African queens escaped from an experiment in Brazil and began breeding with the bees

a colony of bees, which swarmed around her and two others, stinging them several times. The woman was treated at a local hospital and released. The others declined treatment.

However, a dog chained outside the home was unable to escape the attack and was stung to death.

The colony was destroyed, and tests indicated the bees were Africanized, said the

Department's Africanized honeybee program.

Quintero also said a group of apian stewards found earlier this week in a railroad car in Victoria had been confirmed to be "killer" bees.

Those bees were believed to have traveled some 200 miles by rail to get to Victoria. "Killer" bees have hitched rides in trucks, farm equipment and even ships,

*If you see a honeybee, there's virtually no way to tell whether the occupants are the gentle honey bees we're used to or the aggressive Africanized bees that will swarm if provoked, so don't disturb it.*

**The Africanized Honey Bee and Outdoorsmen**

The best defense against the Africanized honey bee is to avoid it, according to Dr. John Thomas of the Texas Agricultural Extension Service. Stay away from likely nesting sites for bees, such as hollow trees and crevices.

If you find a nest, do not disturb it. Africanized honey bees are more sensitive than the bees we're used to and may react vigorously if antagonized.

Should a nest of bees become disturbed, for whatever reason, the best action is to RUN! Honey bees are slow liars—don't stand and swat at them but immediately get to your car, a building, or even thick brush.

If you find a colony of Africanized honey bees in a favorite recreation area have it removed. Contact your county extension office, local beekeepers association, or local police or fire department for help. Do not try to destroy a nest yourself.

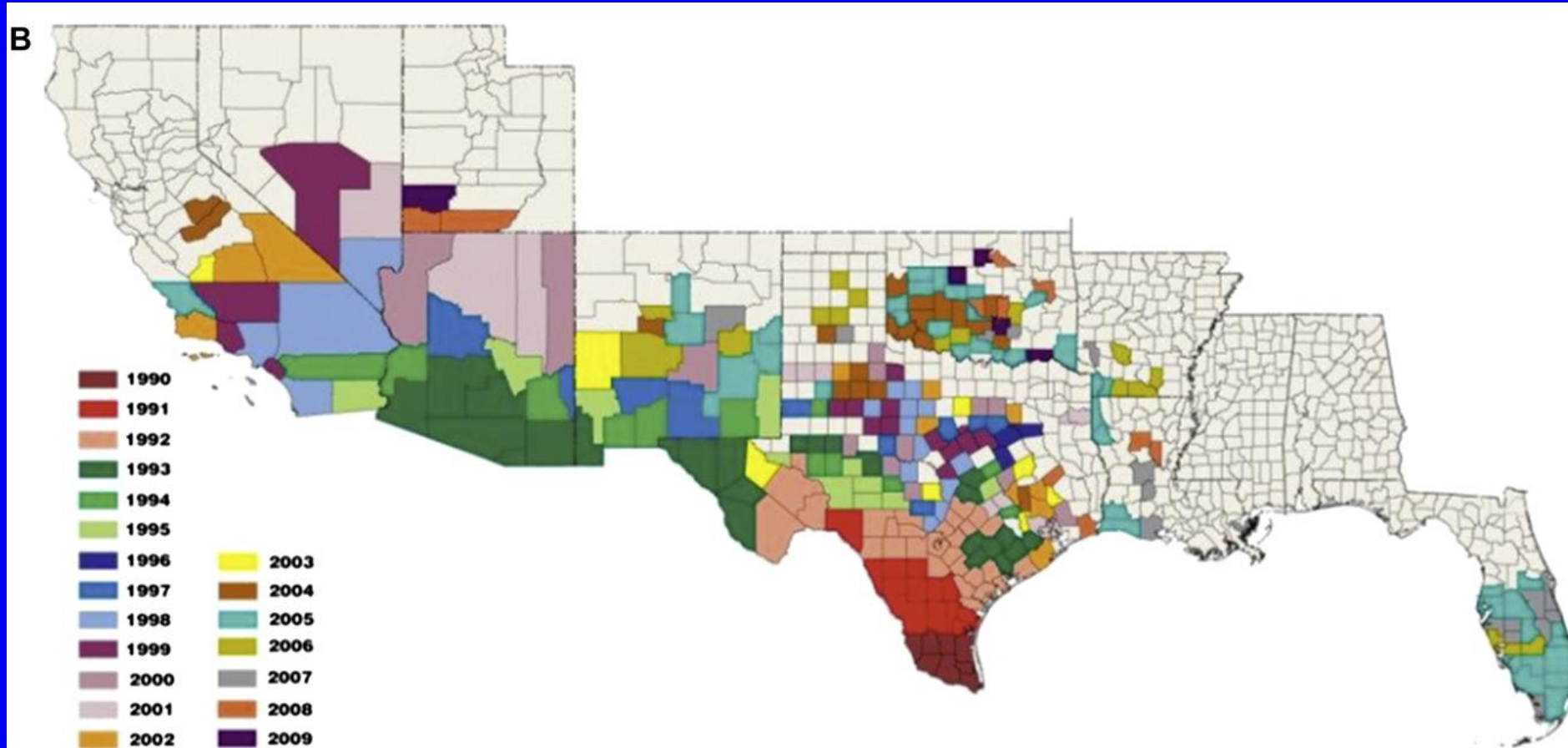
Remember, however, that not all bee colonies will be Africanized bees. Colonies of European honey bees compete with the Africanized bees for food and nesting sites, so removing any and all bee colonies is not a good idea.

Thomas said there is no difference between the sting of Africanized and European honey bees. People at risk of suffering health problems from bee stings are those few who are allergic to bee venom.

If you want to know more about the Africanized honey bee, or honey bees in general, contact your county extension office or write to the Texas Agricultural Extension Service; Department of Entomology; Texas A&M University; College Station, Texas 77843-2475.



# Distribution of Africanized Bees in the US in 2009



# Killer Bee

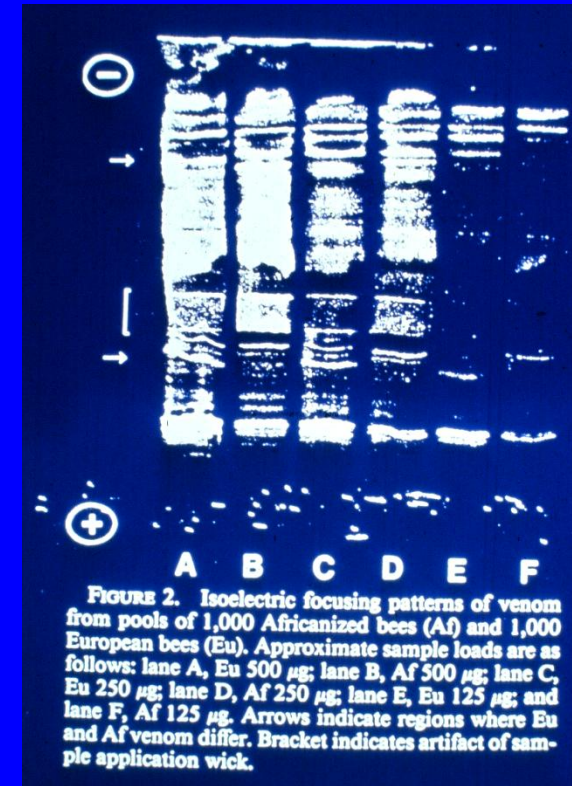
*(Apis mellifera scutellata)*



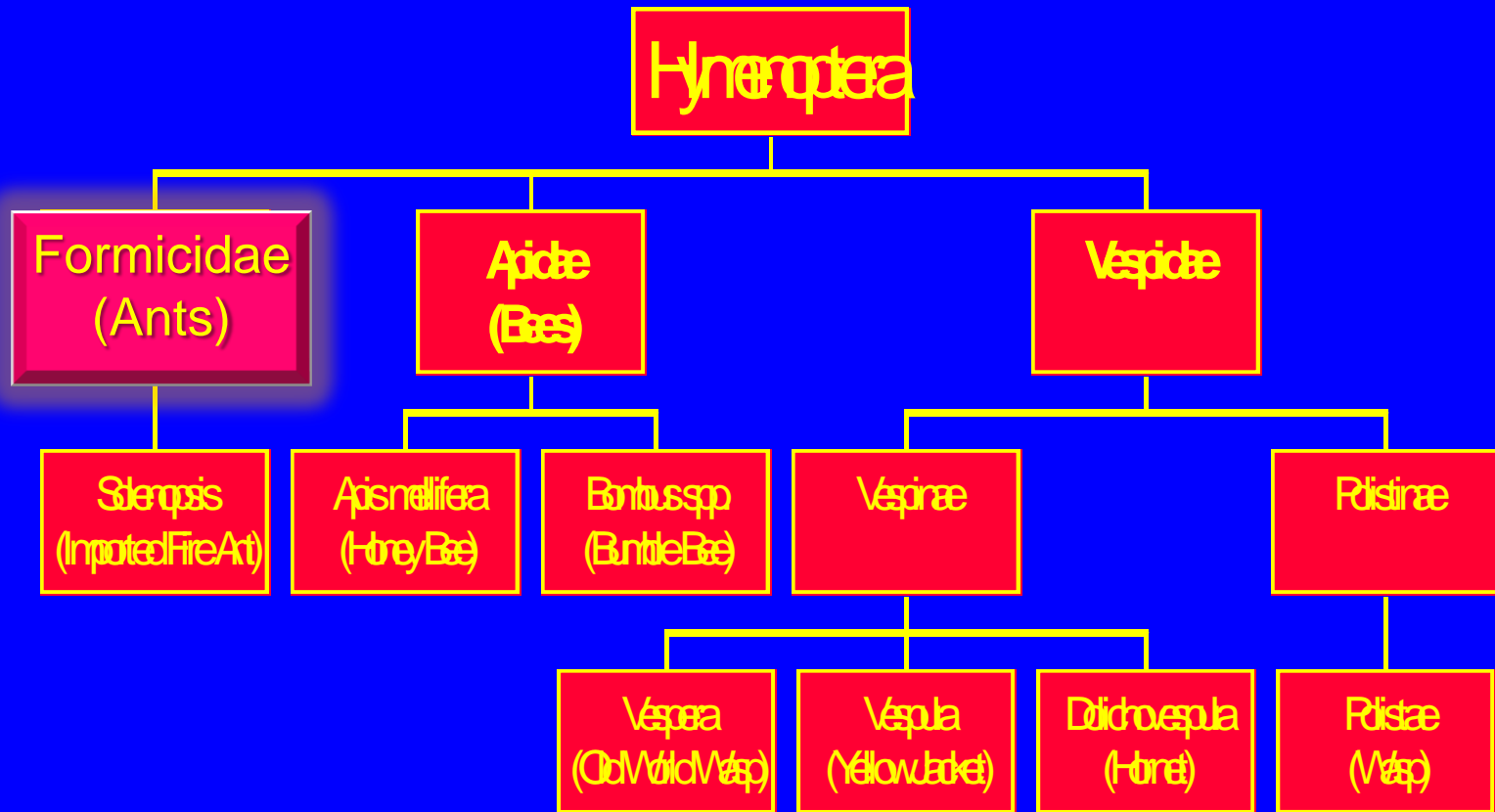
# Venom Components

Schumacher ML et al. J Allergy Clin Immunol 1992;90:59-65

- Studied the venom of
  - 103 EU Bees and 92 Africanized bees
- Africanized bees contained significantly less venom but more phospholipase than did EU bees.
- Biogenic amines
  - Histamine
  - Dopamine
  - Acetylcholine
  - Norepinephrine
- Polypeptide Toxins
  - Mellitin
  - Kinins
- Enzymes
  - Phospholipase
  - Hyaluronidase



# Hymenoptera Taxonomy



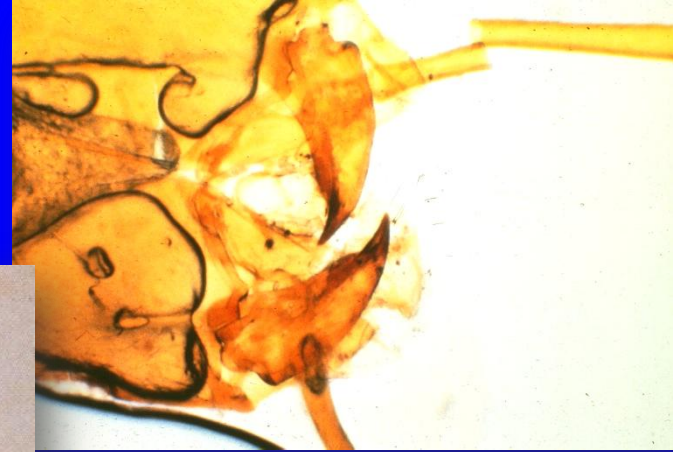
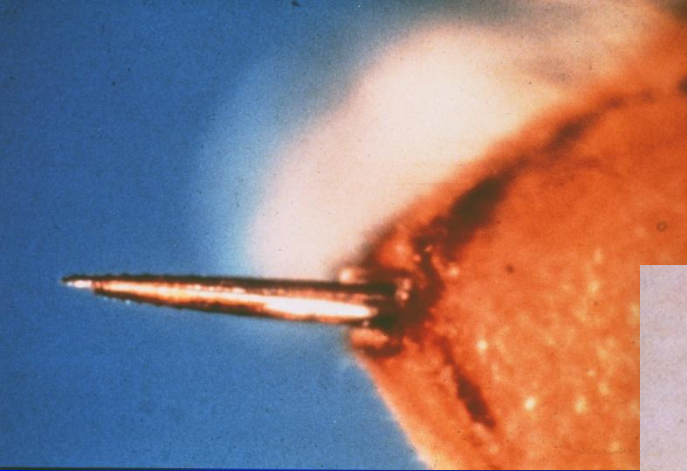


# Solenopsis species



- *S. invicta* - red imported fire ant
  - Dominant species in USA
  - Significant cross reactivity with others (venom and WBE)
- *S. richteri* - black imported fire ant
  - Northern Mississippi & Alabama
  - Hybridized with *S. invicta*
- *S. xyloni* - California
- *S. geminata* - Florida and Pacific islands

# Imported Fire Ant



# Reactions to IFA



- Local - pustule, erythema, and/or pruritis
- Systemic
  - Stafford, et al (1989) - retrospective survey
    - 20,755 treated annually for IFA sting
    - 13,139 (63%) local reactions
    - 413 (2%) anaphylaxis
  - Rhoades, et al (1989)
    - Retrospective physician survey
    - 32 deaths



# IFA Sting Attack Rate

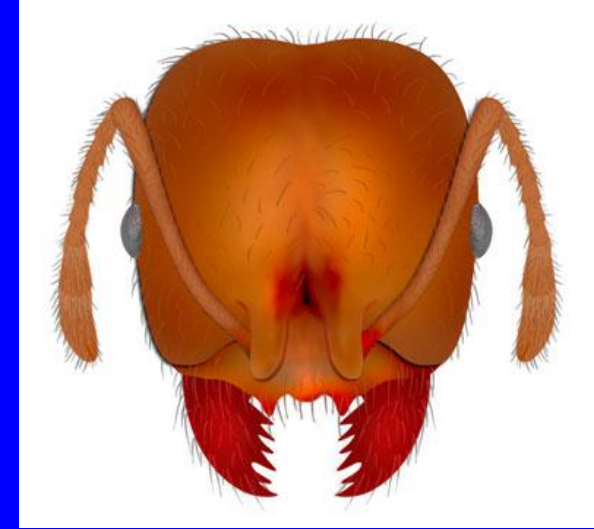


- Retrospective Survey Data
  - 58% 1 year sting attack rate (DeShazo, et al 1984)
  - 29% 3 month sting attack rate (Clemmer, et al 1975)
    - 55% sting attack rate among children < 10
- Prospective Study (Tracy, Demain, et al JACI, 1995)
  - N = 137
  - 3 week period in San Antonio
  - 50% sting attack rate
  - 7% sensitivity rate (based on RAST & Skin Test)



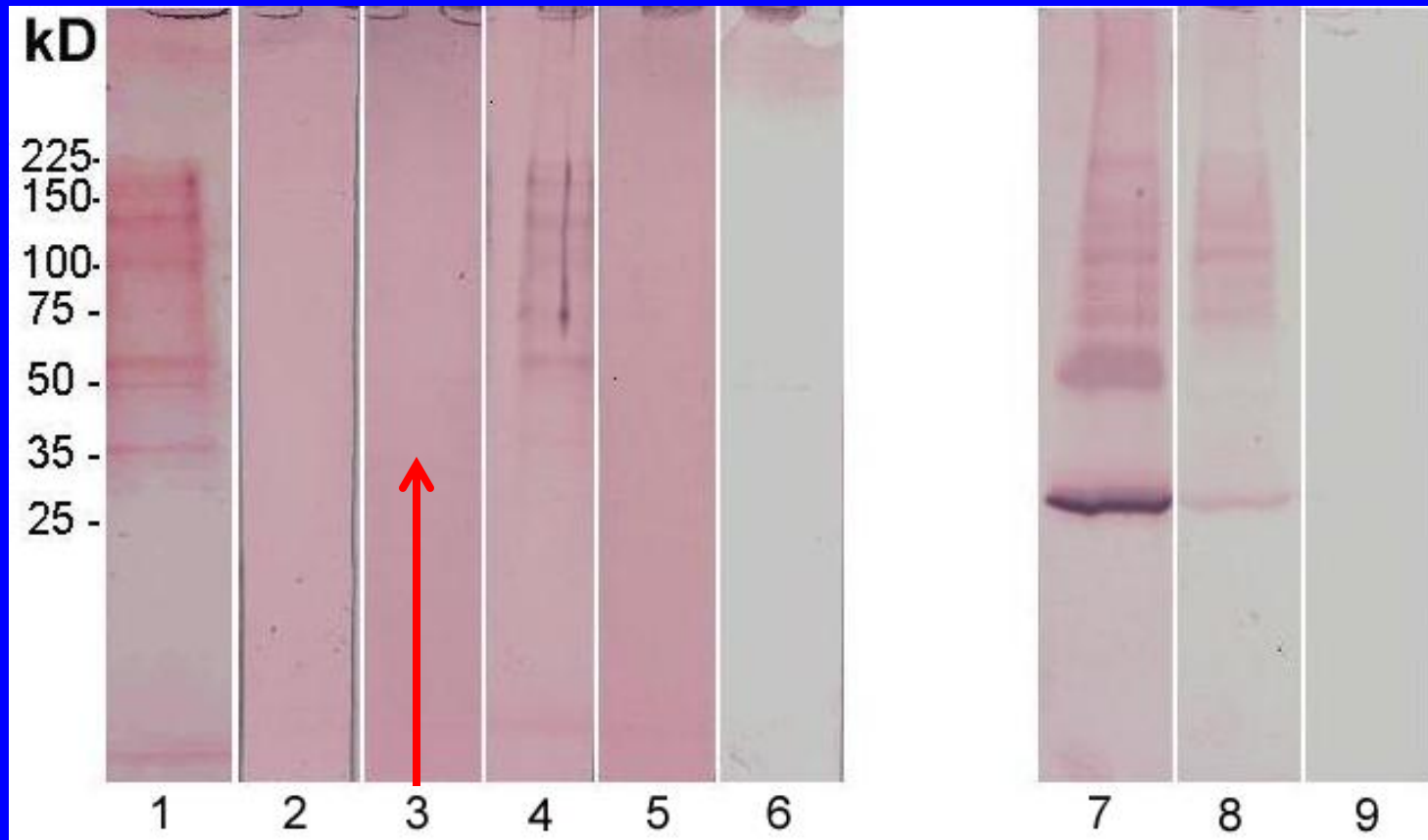
# IFA Venom Antigens

- Antigenic components
  - Sol i I
    - 5% of total venom volume
    - Cross reactive with Yellow Jacket venom
    - Possible cross reactivity with scorpion venom
  - Sol i II - phospholipase
    - 67% of total venom volume
    - 7-25  $\mu\text{g/ml}$  in WBE
  - Sol i III - similar to antigen-5 family
    - 20% of total venom volume
    - 10-16  $\mu\text{g/ml}$  in WBE
  - Sol i IV - 9% of total venom volume



# RAST Inhibition: *C. vittatus* and IFA

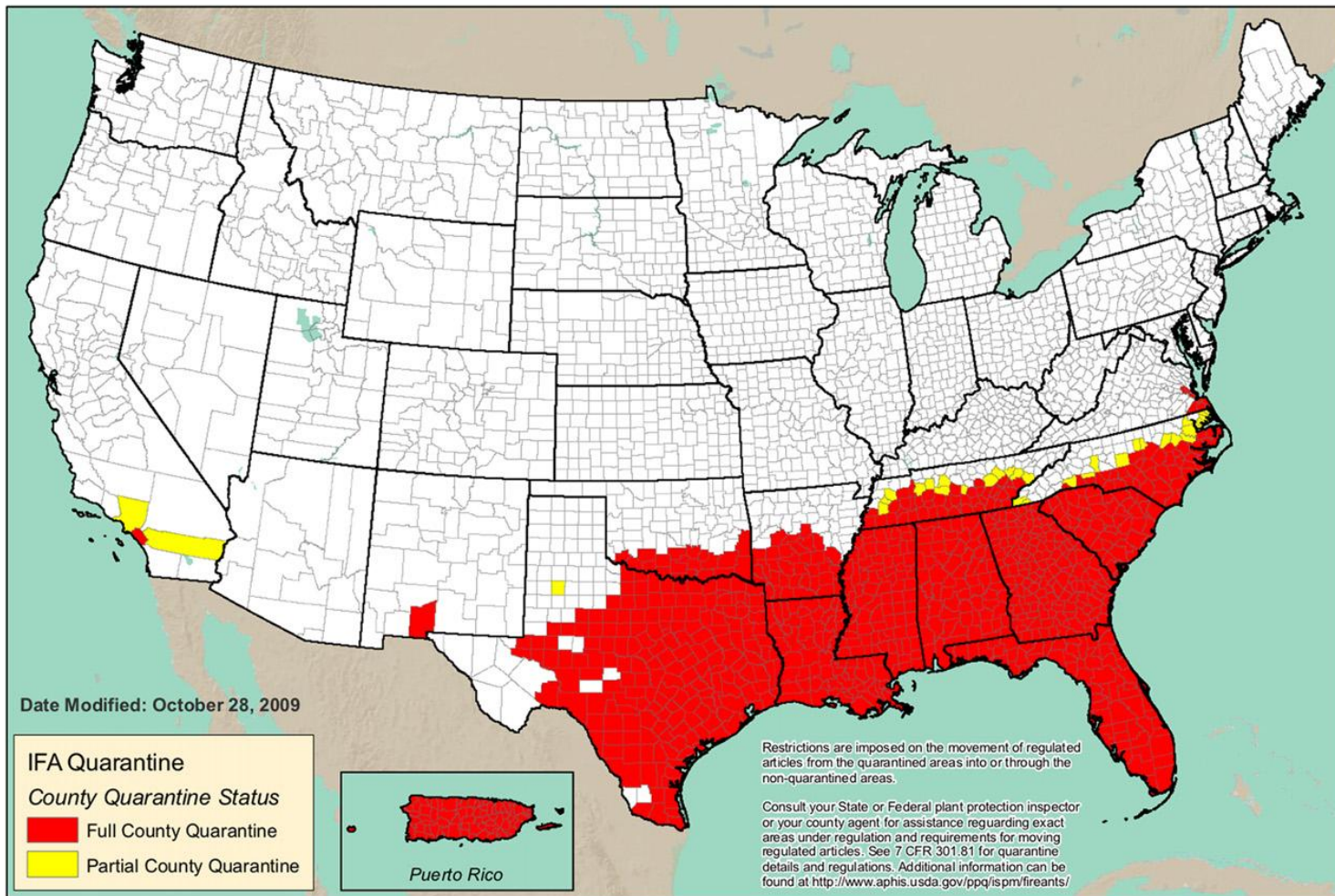
Nugent J, More D, Hagan Demain J, et al, J Allergy Clin Immunol 2004;114:383-6



1 = Scorpion allergic sera  
2 = Scorpion allergic sera pre-incubated with scorpion venom  
3 = Scorpion allergic sera pre-incubated with IFA WBE  
4 = IFA allergic sera  
5 = IFA allergic sera pre-incubated with IFA WBE  
6 = Pooled cord sera

7 = IFA allergic sera  
8 = Scorpion allergic sera  
9 = Pooled cord sera

# Distribution of Imported Fire Ants in the US in 2009



USDA-APHIS-PPQ  
2150 Centre Ave.  
Fort Collins, Co 80526

0 100 200 300 400 Miles

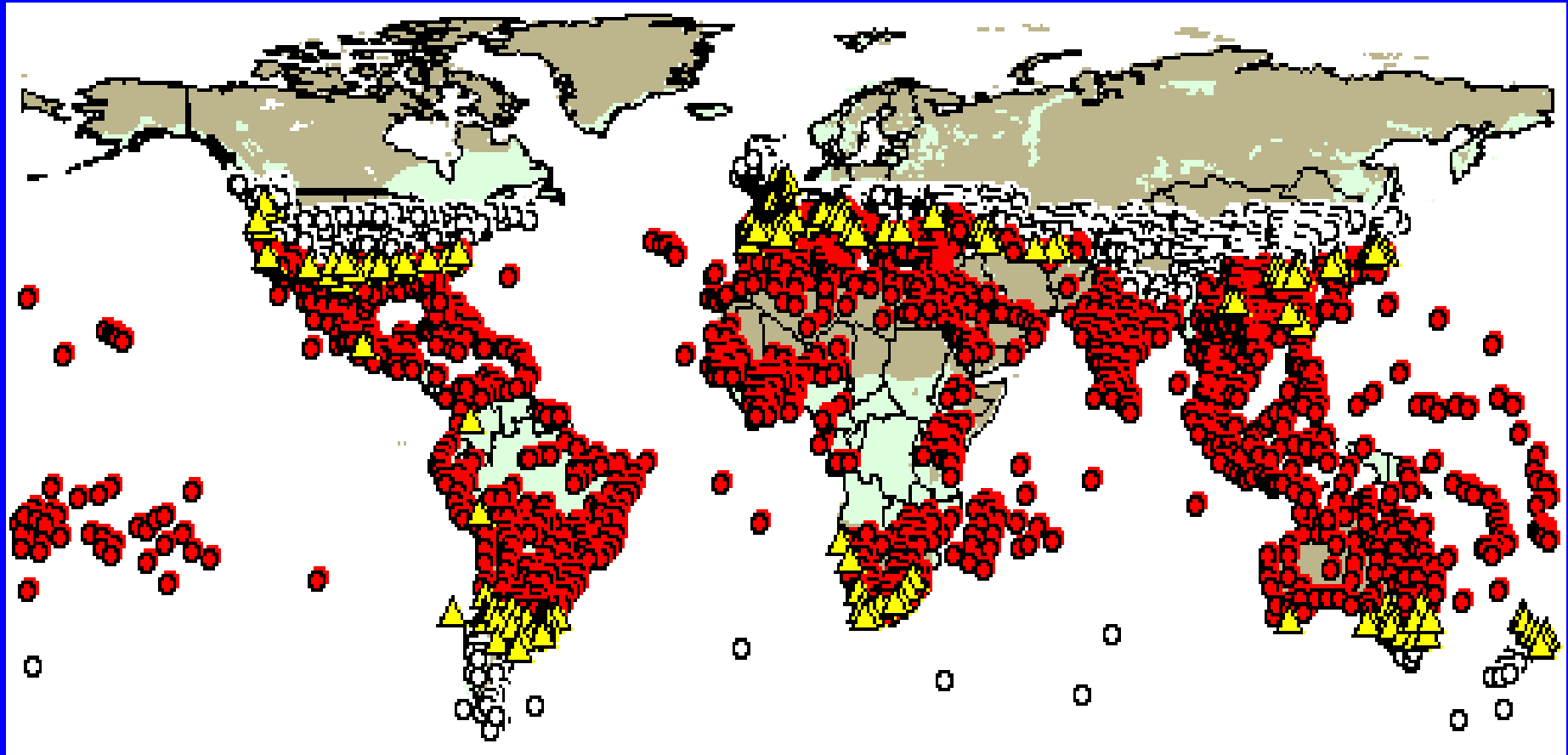


Data Sources:  
TeleAtlas Dynamap  
USDA-APHIS-PPQ

Coordinate System:  
Lambert Azimuthal Equal Area

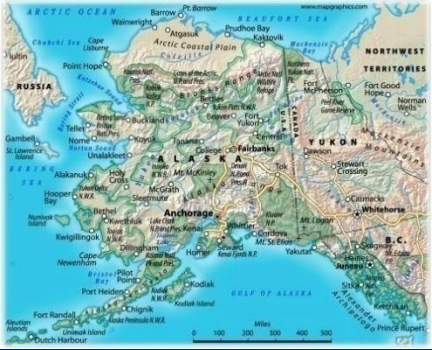
The U.S. Department of Agriculture's Animal and Plant Health Inspection Service collected the data displayed for internal agency purposes only. These data may be used by others; however, they must be used for their original intended purpose.

# Distribution of Imported Fire Ants throughout the Globe



# North to Alaska: Changing distribution of Hymenoptera





# Increasing Hymenoptera in Alaska

- The number of hymenoptera in Fairbanks estimated to have increased 10 fold \*\*
- Jack Whitman, a biologist with the Department of Fish & Game \*
  - Used 3 homemade traps
    - (soda bottles & whitefish)
    - Trapped 3,461 YJ on his property in a week
  - Destroyed 9 aerial nests in three weeks
    - Estimated over 12,000 YJ
- This pattern was similar throughout the state
- Insects adapt well to warmer temperature \*\*\*



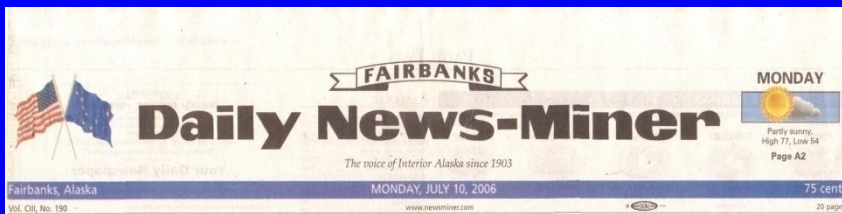
\* Mowry T, Fairbanks Daily Miner, Aug 13, 2006

\*\*Conversation with Derek Sikes, PhD, UAF Entomology

\*\*\*Frazier M, et al, Am Nat 2006. 512-520

# Hymenoptera Related Deaths in Alaska

- 2 deaths from hymenoptera stings in Fairbanks during the summer of 2006



## Yellowjacket sting suspected in man's death

By MARGARET FRIEDENAUER and ROBINSON DUFFY Staff Writers

A Fairbanks man died Saturday after apparently suffering an allergic reaction to a yellowjacket sting and attempting to drive himself to the hospital.

Zachary M. Warwick, 29, was pronounced dead at Fairbanks Memorial Hospital on Saturday evening. Emergency personnel with Fairbanks Police and Fire Department transported Warwick to the hospital after responding to a single vehicle accident near Ryan Middle School.

Warwick was unconscious at the scene and having respiratory difficulties. Police on Saturday said Warwick's 2005 GMC Sierra Pickup was surprisingly intact with only moderate front-end damage after he lost consciousness and drove through two fences near Ryan Middle School. Officers said he was not injured in the crash.

According to his sister, Sydney Morgan,

*"He was a generous man. Someone we should all strive to be."*

—Sydney Morgan, sister of Zachary Warwick

Warwick likely was stung at his Glacier Avenue home Saturday afternoon, suffered an allergic reaction and drove to the hospital for treatment.

Warwick was asthmatic, Morgan said, and had his inhaler with him in his vehicle. Morgan said when family members went to her brother's home Sunday, they found the last Web search on his computer was for symptoms and treatment of wasp stings.

Warwick was born and raised in Fairbanks along with Morgan and brother Jesse

Warwick. He graduated from Lathrop High School in 1995. During high school, Zachary represented Alaska on the Junior Olympics Alpine Ski Team.

Along with parents, Andy and Judy, the family spent much of their free time at their Harding Lake cabin.

"He loved to be out (at Harding Lake)," said family friend Jeff Cook on Sunday. "Whether it was out on the water or on his snowmachine. He was a very outdoor-oriented boy."

Warwick earned a business degree from Montana State University and was working toward an accounting degree at University of Alaska Fairbanks. He worked at Warwick & Schikora CPAs.

Morgan said her brother enjoyed being around friends and family and taking care of things like getting food ready for gatherings or making sure gas tanks were filled on boats or snowmachines so the vehicles would



Photo courtesy of the Warwick family.  
**ZEST FOR LIFE**—Zachary M. Warwick, 29, poses with his dog Boots during a Fourth of July celebration held last week.

See DEATH, Page A6



## Wasp sting blamed for second death in Fairbanks

By TIM MCWY Staff Writer



MATT BAR

A second man has died from a wasp sting this summer in Fairbanks.

Matt Bar, a 39-year-old Fairbanks truck driver, died Tuesday shortly after getting stung by a yellowjacket at his home off Farmers Loop, according to his wife, Monica.

It was the second death this summer in Fairbanks attributed to yellowjacket stings. Zachary Warwick, 29, died of anaphylactic shock July 9 after getting stung while working in the yard of his Hamilton Arms home. Warwick died while trying to drive himself to the hospital.

Anaphylaxis is a severe and rapid multi-or-

gan allergic reaction that occurs when a person is exposed to a foreign substance, such as bee or wasp venom. It is potentially fatal because it can cause rapid constriction of airways or fall unconscious.

Matt Bar pronounced death stopped breathing within minutes after being stung by yellowjackets at around 2:30 p.m. He was pronounced dead at Fairbanks Memorial Hospital about an hour and a half later, said his wife of 21 years.

"We were down in our driveway cutting trees and the next thing I know all of a sudden he was dancing around, sweating at the back of his neck," said Monica Bar, who was holding a running chainsaw at the time.

A yellowjacket stung him on the back of the neck and the stinger was still visible, she said. But the sting didn't seem to bother her husband, Monica said. He took his shirt off and walked over to shut the chainsaw off before showing her the sting.

"It didn't swell up or anything," she said. Though she had an Epipen, an emergency shot of epinephrine used to treat allergic reactions to stings, because she developed a rash one time after getting stung, Monica didn't bother getting it because her husband had been stung several times before and had never had a problem.

See STING, Page A8

## STING: Second death attributed to bees unprecedented

Continued from Page A1

He just got stung two weeks ago and he got stung two weeks before that and nothing ever happened," said Morgan. "He got stung every summer."

She advised him to get some baking soda on the sting. "Maybe two minutes later, he got all of a sudden, he had his head and neck," Morgan said. "Then, this thing really hurt."

Almost immediately, he began wobbling and went down on all fours, she said. That's when Morgan ran to the house for the Epipen.

"I mean, even gave a minute and when I came out he was at the top of the driveway face down," she said. "He wasn't breathing. He was already blue."

Herrfeld, Monica called 911 and told the dispatcher her husband had been stung by a wasp and couldn't breathe. She had trouble figuring out how to use the Epipen but after three tries was able to jab it into his upper thigh, she said. Then she checked breathing on his chest and administered CPR for help.

An ambulance from the University of Alaska Fairbanks Fire

Department arrived within five minutes and took her husband to Fairbanks Memorial Hospital. Monica said. Monica and doctors had a hard time getting a hold down his throat because of his low red swelling, those said.

It took more than a decade for wasps, both yellowjackets and bald-faced hornets, according to experts. That fact is borne out by the number of sting victims showing up at the emergency room, said Eric Stirling, the emergency room physician at Fairbanks Memorial Hospital who treated Bar.

"The number of bees and the number of people that have been stung, has been increasing," according to Stirling, who has treated dozens of sting victims.

Yellowjackets have different reactions to stings, he said. "One person might get a little swelling around the sting area, one person might get hives, one person might be wheezing, and one person might be in shock in three minutes," said Stirling.

Stirling said that he needed to put one sting victim on a respirator within 15 minutes this summer.

Anaphylaxis is characterized

by a systemic reaction away from the sting site. For example, if someone gets stung in the foot and they begin wheezing or their tongue begins to swell up, they are experiencing anaphylaxis.

Just because someone has been stung several times before and never had a reaction doesn't mean they are immune to anaphylaxis, said Stirling.

"You may have taken penicillin a dozen times and the 13th time you break out in hives and have a hard time breathing," Stirling said. "You just never know."

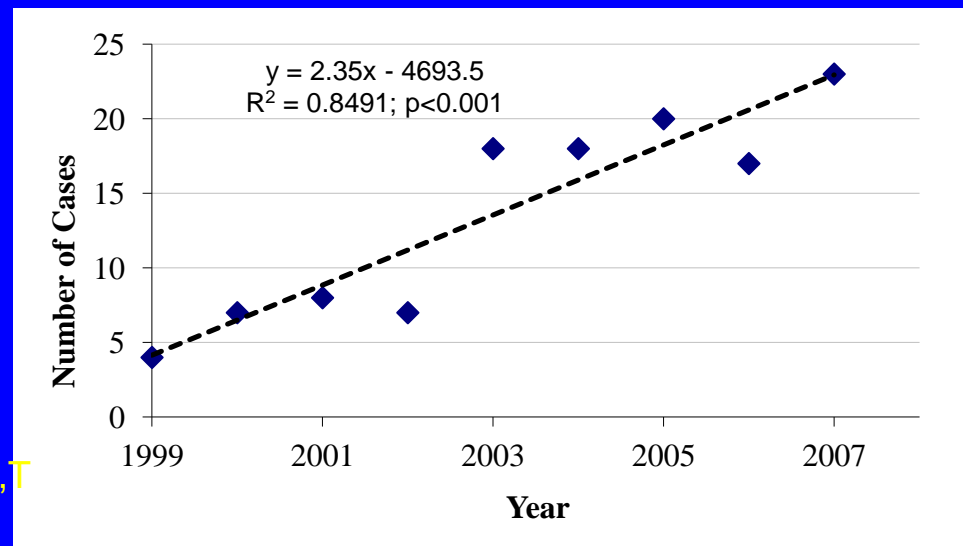
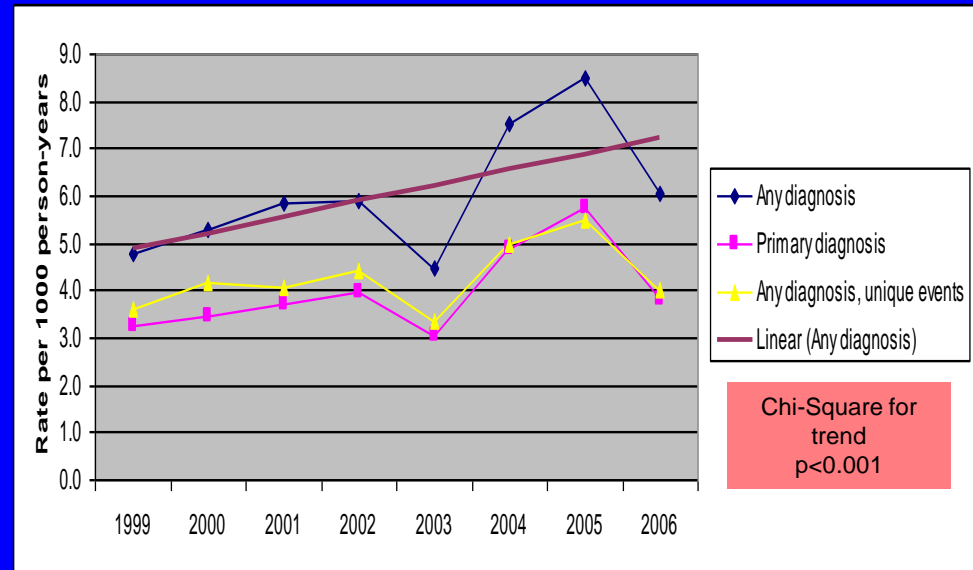
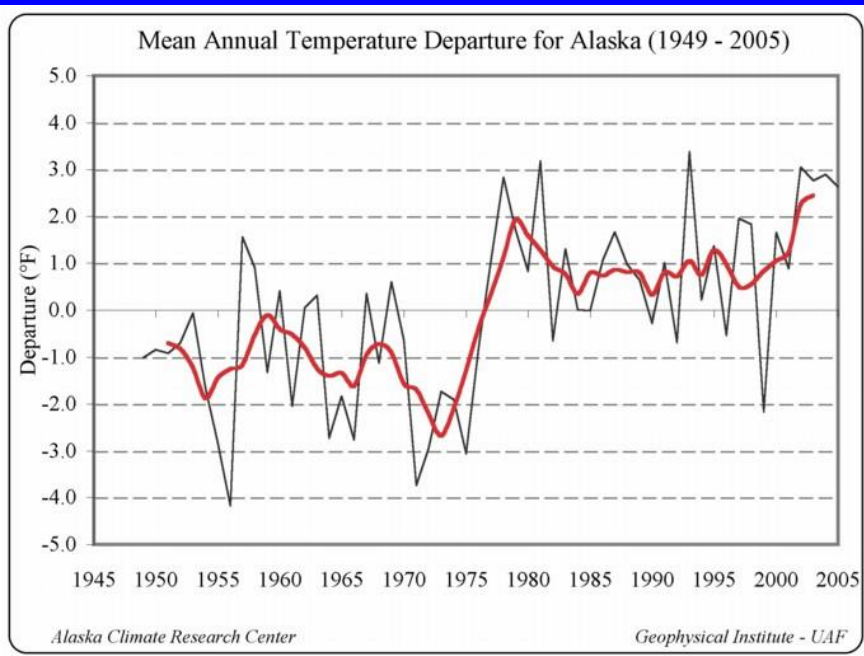
Monica Bar described her husband as "a falling fool." Though he was known as doing a week-end job from the road, she said. He did a lot of falling, his wife said that he loved her every day.

"He would get it at the front of everybody, he didn't care," Monica said.

He knew behind his wife, two daughters, Devin, 28, and Devin, 27, as well as two grandchildren with another on the way. He was a member of the Fairbanks

Demain, J. G. & Gessner, B. D. Increasing incidence of medical visits due to insect stings in Alaska. *Alaska Epidemiology Bulletin* 13 (2008)

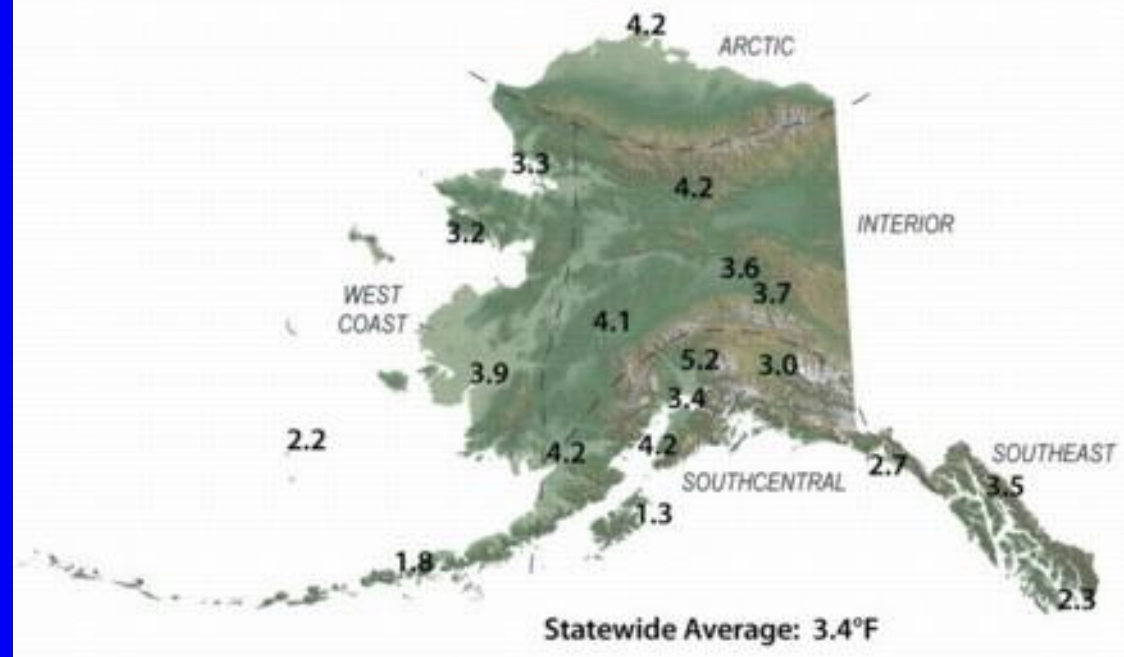
# Temperature change correlate with changing patterns of insects .



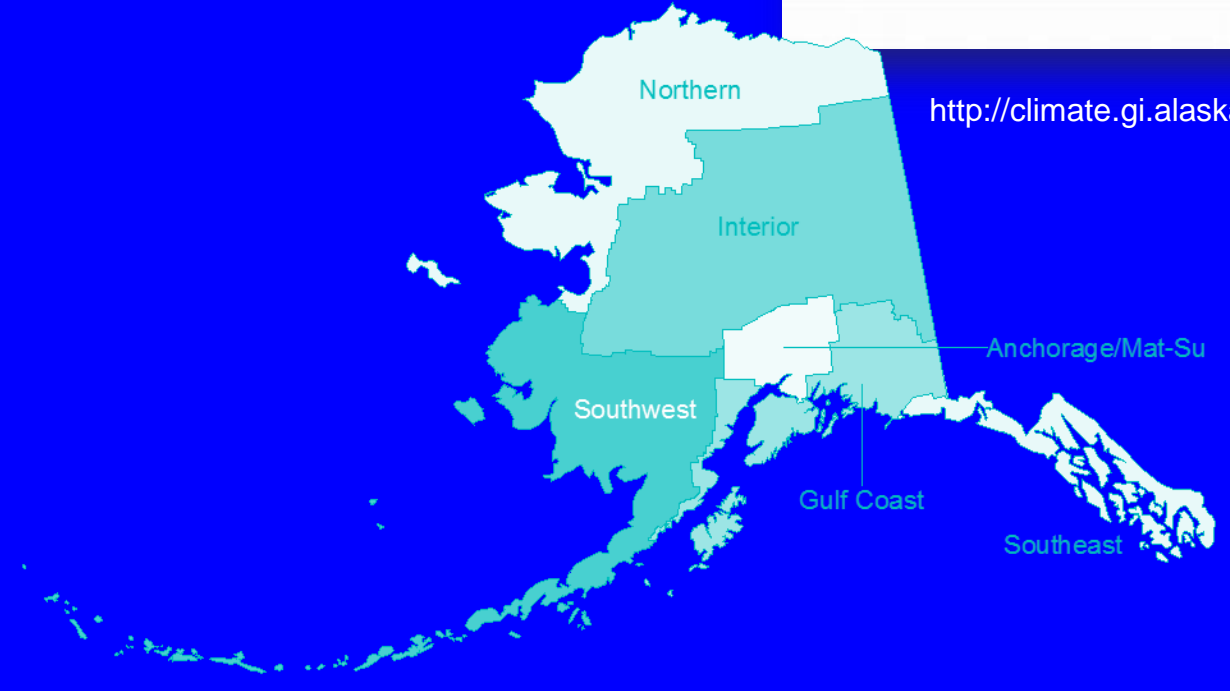
Demain, J, Gessner, B, McLaughlin J, Sikes, D, Foote, T  
Allergy & Asthma Proc, 2009, 30:238-243



Total Change in Mean Annual Temperature (°F), 1949 - 2007



## Epidemiologic Regions of Alaska



<http://climate.gi.alaska.edu/ClimTrends/Change/TempChange.html>

<b>Region</b>	<b>Largest Community</b>	<b>Annual temperature Increase*</b>	<b>Winter temperature Increase*</b>	<b>1999-2001 insect sting incidence<sup>†</sup></b>	<b>2004-2006 insect sting incidence<sup>†</sup></b>	<b>Percent change in insect sting incidence (X<sup>2</sup> for trend, p-value)<sup>‡</sup></b>
Northern	Barrow	3.8	6.1	16	119	626% (13, p<0.001)
Southwest	Bethel	3.7	6.9	62	133	114% (8, p=0.005)
Interior	Fairbanks	3.6	8.1	333	509	53% (28, p<0.001)
Southcentral	Anchorage	3.4	7.2	276	405	47% (22, p<0.001)
Southeast	Juneau	3.6	6.8	221	279	27% (22, p<0.001)
Gulf	Kodiak	1.5	1.5	437	487	11% (0.1, p=0.75)
<b>Statewide</b>		<b>3.4</b>	<b>6.3</b>	<b>254</b>	<b>364</b>	<b>43% (54, p&lt;0.001)</b>

# Diagnosis of Hymenoptera Hypersensitivity

- History
  - Age & Gender
  - Type of reaction
  - Type of insect
  - Co-morbidity, including medications
  - Impact on lifestyle and risk of future exposure
- Assessment of venom specific IgE (systemic rxns)
  - Prick and intradermal skin testing - *preferred method*
  - RAST / Immuno-Cap Assay - *complementary method*
- Measurement of Baseline Mast Cell Tryptase

# Diagnosis of Hymenoptera Hypersensitivity

- Local reactions = 80% - 85%
- Large local reactions = 10% - 15%
- Systemic reactions = 0.5% - 5%
  - Incidence of deaths worldwide is largely unknown
  - 40 - 50 deaths/year in US
    - likely underestimated
  - ◆ 5% of fatalities under age 20
  - ◆ 80% of fatalities over age 40

# Insect Sting Anaphylaxis

Anaphylaxis Practice Parameter. J Allergy Clin Immunol 2010;126:477-80

- Anaphylaxis following insect stings
  - Adults 3%
  - Children 1%
- Cutaneous systemic reactions
  - More common in children
- Hypotensive shock
  - More common in adults
- Respiratory events
  - Equal among age groups
- Recurrence rates of reactions (untreated)
  - 30% - 60%, dependent on severity of prior reaction

# Predictors of Severe Sting Anaphylaxis

Rueff F, et al EAACI. J Allergy Clin Immunol. 2009 Nov;124(5):1047-54

- N= 962 with bee or vespid venom allergy
  - Untreated
- Data collected
  - Tryptase concentration
  - Age
  - Gender
    - 54% male
  - Culprit insect
  - Cardiovascular medication
    - 5.4% Beta-blocker
    - 4.4% ACE Inhibitor
  - Number of minor reactions prior to index field sting

# Predictors of Severe Sting Anaphylaxis

Rueff F, et al EAACI. J Allergy Clin Immunol. 2009 Nov;124(5):1047-54

- 21.4% severe reaction following field sting
- Higher Baseline Serum Tryptase
- Vespid venom
- Older age
- Male
- ACE Inhibitor use
- One or more previous less severe event

❖ Grade I Generalized skin symptoms (eg, flush, generalized urticaria, angioedema)	15.2%
❖ Grade II Mild-to-moderate pulmonary, cardiovascular, and/or gastrointestinal symptoms	63.4%
❖ Grade III Anaphylactic shock, LOC	21.0%
❖ Grade IV Cardiac arrest, apnea	0.4%

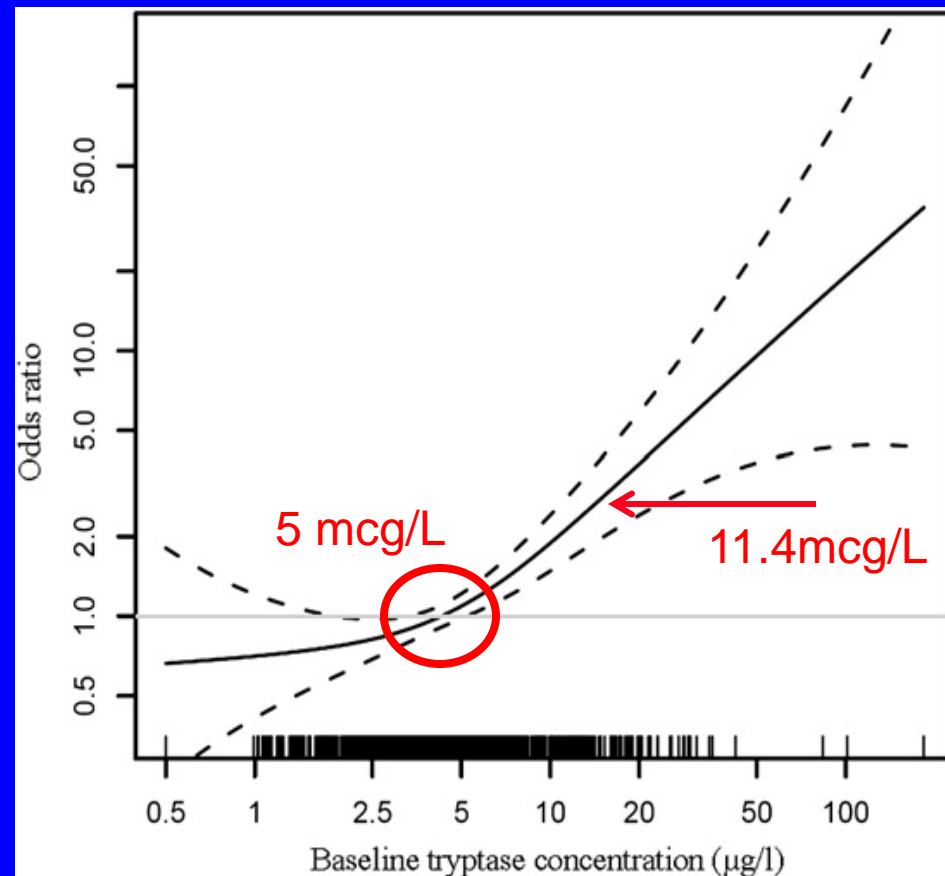
# Baseline Mast Cell Tryptase

Rueff F, et al EAACI. J Allergy Clin Immunol. 2009 Nov;124(5):1047-54

## Correlation Tryptase with severe event (III/IV)

- Mean baseline tryptase
  - 5.84 mcg/L +/- 8.36
- >5 mcg/L increased OR
- 11.4 mcg/L normal level
  - OR >2
  - 8.4% of patients had elevated tryptase level

## OR of severe event with increasing Tryptase





# Higher Tryptase Level

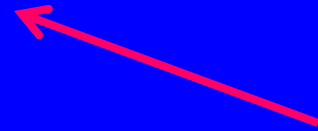
- Higher baseline serum tryptase concentrations predicts more severe reaction
  - Increased OR if level  $>5$  mcg/L
  - Normal tryptase of 11.4 mcg/L may be inadequate (OR  $>2$ )
  - Consider Tryptase level when offering Immunotherapy

# Baseline serum tryptase an important predictor of:

- severity of sting rxns  
Haeberli G, ClinExpAll, 2003  
Rueff F, JACI, 2009
- freq of systemic rxns during VIT  
Rueff F, JACI, 2010  
Bonadonna P, JACI ,2009
- chance of VIT failure  
Haeberli G, ClinExpAll, 2003
- risk of relapse if VIT is stopped  
OudeElberink JNG, JACI,1997

# Predictors of Severe Sting Anaphylaxis

Rueff F, et al EAACI. J Allergy Clin Immunol. 2009 Nov;124(5):1047-54

- 21.4% severe reaction following field sting
  - Higher Baseline Serum Tryptase
  - Vespid venom 
  - Older age
  - Male
  - ACE Inhibitor use
  - One or more previous less severe event
- Interesting: most studies have reported Honeybee causes higher rates of severe systemic reaction

❖ Grade I Generalized skin symptoms (eg, flush, generalized urticaria, angioedema)	15.2%
❖ Grade II Mild-to-moderate pulmonary, cardiovascular, and/or gastrointestinal symptoms	63.4%
❖ Grade III Anaphylactic shock, LOC	21.0%
❖ Grade IV Cardiac arrest, apnea	0.4%

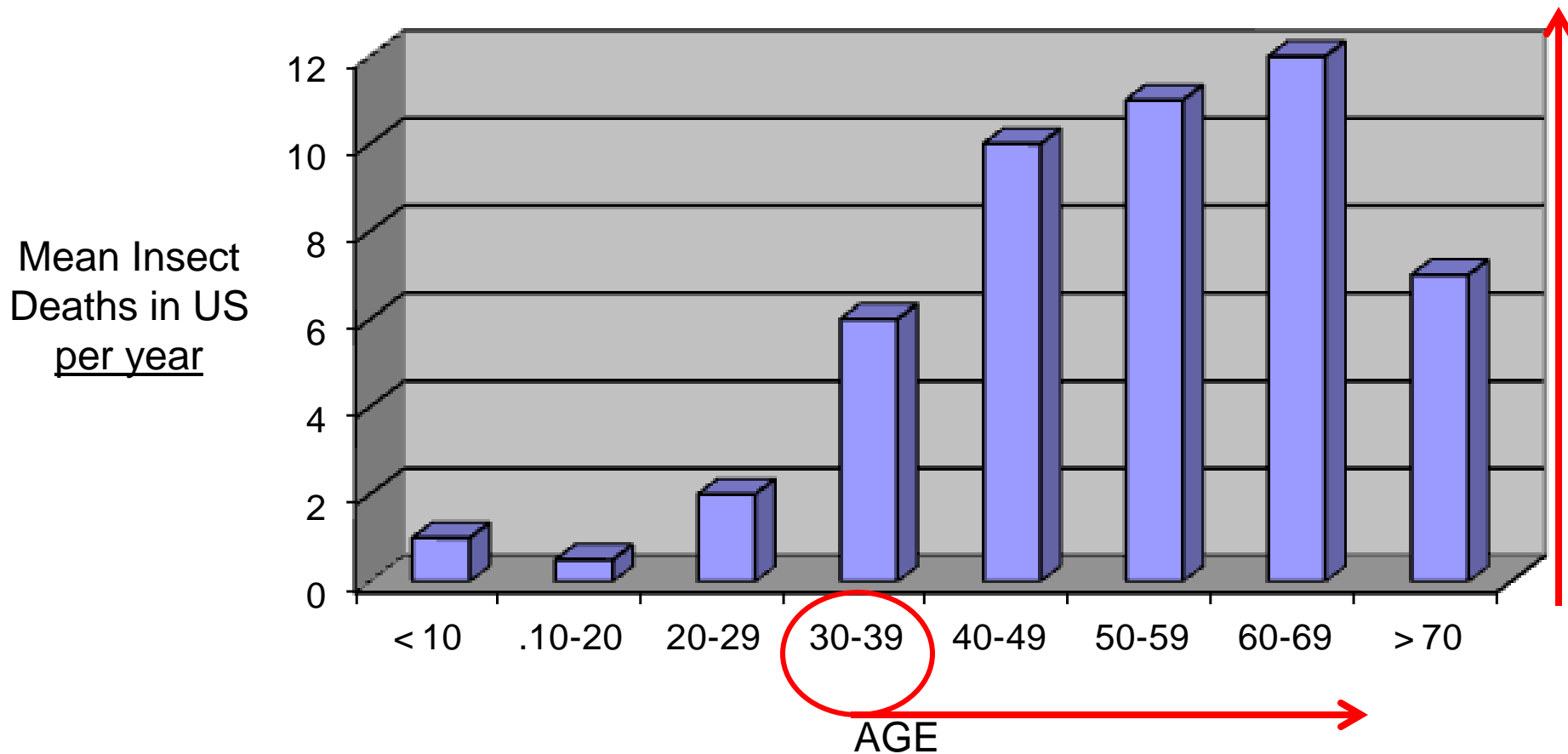
# Predictors of Severe Sting Anaphylaxis

Rueff F, et al EAACI. J Allergy Clin Immunol. 2009 Nov;124(5):1047-54

- 21.4% severe reaction following field sting
- Higher Baseline Serum Tryptase
- Vespid venom
- Older age Increase OR of 1.029 per year of age  
Age >38 at higher risk: p <0.001  
(at 38 y/o OR 1.1)
- Male
- ACE Inhibitor use
- One or more previous less severe event

❖ Grade I Generalized skin symptoms (eg, flush, generalized urticaria, angioedema)	15.2%
❖ Grade II Mild-to-moderate pulmonary, cardiovascular, and/or gastrointestinal symptoms	63.4%
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# Insect Sting Deaths in USA from 1982-1991



Slide courtesy of David Graft, MD

# Predictors of Severe Sting Anaphylaxis

Rueff F, et al EAACI. J Allergy Clin Immunol. 2009 Nov;124(5):1047-54

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# Angiotensin Converting Enzyme Inhibitor

- Exposure associated with increased risk for more severe anaphylaxis (OR 2.27;  $p=0.019$ )
- ACE Inhibitor use
  - only if no reasonable alternative
  - Individual risk-benefit basis

# Risk of severe anaphylaxis (grade III/IV)

Rueff F, et al EAACI. J Allergy Clin Immunol. 2009 Nov;124(5):1047-54

## Generalized Additive Model

<u>Variable</u>	<u>P value</u>	<u>Odds ratio</u>	<u>95% CI</u>	
Index sting VESPID	.008	1.730	1.147	2.607
Preceding, less severe rxn	<.001	4.687	2.913	7.542
Female gender (less risk)	<.001	0.553	0.387	0.791
ACE inhibitor at index sting	.019	2.269	1.129	4.558
Age at index sting (per year)	<.001	1.029	1.018	1.041
(>38 y/o at higher risk p <0.001)				



# Venom Testing

Anaphylaxis Practice Parameter. J Allergy Clin Immunol 2010;126:477-80

- Venom skin test ( I )
  - Most accurate for diagnosis
- In vitro test ( I )
  - An important complementary test
- Neither test reliably predicts severity of reaction ( II )
  - Serum specific IgE in 51 cases of fatal sting anaphylaxis did not predict severity (10% < 0.35, 24% < 0.65)  
Hoffman DR Allergy Asthma Proc 2003 Mar-Apr;24(2):123-7.
- Diagnosis cannot be made by testing alone ( III )
  - Asymptomatic sensitization in 25%
  - History is essential



# Venom Immunotherapy

Anaphylaxis Practice Parameter. J Allergy Clin Immunol 2010;126:477-80

- Should be recommended (I)
  - Patients with systemic sensitivity to venom
    - Except children with cutaneous only
  - Immunotherapy highly effective (90-98%)
- Most patients can discontinue VIT after 5 years
  - Low residual risk of severe sting reaction (<10%)
  - Consider
    - Severity of initial event
    - Age
    - Tryptase level
    - Co-morbid conditions

Will be discussed in detail by Dr Tracy & Dr Akdis

# Stinging Insect Hypersensitivity

Golden et al Stinging insect hypersensitivity Practice Parameter JACI 2011;127:852-4

- Patients with a h/o systemic reaction
  - 1) Education to avoid stinging insects
  - 2) Carry self-injectable epinephrine
  - 3) Should be referred to an Allergist/Immunologist
  - 4) Undergo thorough history and physical exam
  - 5) Undergo appropriate venom testing
  - 6) Initiate Venom Immunotherapy (if indicated)
  - 7) Consider carrying medical identification
- Identification of the responsible insect may be helpful
- Consider a Mast Cell Tryptase level



*Gracias*

