Increasing Insect Reactions in Alaska: Is this Related to Climate Change?
aka
An Alaska Allergist’s Observation of Climate Change and Impacts on Human Health

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Adjunct Clinical Professor, University of Alaska
Disclosures

I am not an expert on the topic of global warming.

The purpose of this discussion is not to determine causes or solutions but to point out observations.

- **Research**
  - Genentech
  - Novartis
  - CSL Behring

- **Speaker**
  - Genentech
  - Novartis
  - Teva
  - Sanofi-Aventis
  - Astra-Zeneca
Climate Change

• Near unanimous scientific consensus that climate change is occurring and that our planet is warming.

• Increased greenhouse gases such as CO2 and water vapor are contributing factors.

• These greenhouse gases trap solar energy near the Earth’s surface, resulting in global warming

- Epstein PR. Epidemiology 2002;13:373-5
Climate Change

- Global temperature has risen 0.5 degree C since 1950
  - Nighttime & winter variance: 1 degree C
  - Temperatures rising faster in the polar regions: 2 degrees C

- Projected temperature rise by 2100
  - 1.4 – 5.8 degrees C
    - Range indicates uncertainty about future greenhouse gas emissions

- The increase will be greater at higher latitudes and over land

- Intergovernmental Panel on Climate Change (IPCC).2001
- Epstein PR. Epidemiology 2002;13:373-5
Temperature Changes
Global Warming

IPCC: Intergovernmental Panel on Climate Change (2001)
Impact on Human Health

- **World Health Report, 2002**
  - Over the past 30 years, climate change has resulted in
    - 150,000 deaths annually
    - 5 million disability adjusted life years annually
  - Associated with
    - Extreme heat, drought, storms and floods
    - Changes in air and water quality
    - Malnutrition from crop failures
    - Transmission of infectious disease
    - Changes in insect patterns

North to Alaska?
Scientists sound alarm as change picks up speed

In the News

Polar meltdown

Continued from 6-A

Two penguins, a star of the movie ‘Water Hole,’ have been rescued from the sinking ice of the Arctic.

“The ice shelf collapsed in three weeks,” said Dr. John King, a scientist at the University of Colorado.

King said the collapse was caused by a combination of factors including a warming climate and melting ice.

“While these changes are happening, the polar regions are also experiencing warming. This is a worrying trend,” said King.

WHAT TO DO

Most scientists agree that the changes anticipated at the poles in the next 50 years are inescapable, and avoiding worse scenarios will take a drastic reduction in emissions of greenhouse gases. Until then, there are some actions that can be taken to mitigate the impact of climate change and protect the polar regions.

“While we cannot stop the polar regions from warming, we can certainly reduce the impact,” said King.

WARMING: Ancient ice shelf collapsed in 3 weeks

Continued from 6-A

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Circumpolar Regions

- Will continue to be the first to illuminate the impacts of climate change

- Over the next 100 years Alaska is projected to lose 90% of its historic tundra
  - Replaced with forestation and other vegetation growth,
  - Resulting in dramatic change to the ecosystem
  - Extinction of some plant and animal species

- Increase in insects and pathogens may result in epidemics of plant disease and insect attacks

Bachelet D, Earth Observatory, NASA, August 3, 2004
Temperature Changes
Global Warming

- Over the past 50 years Alaska’s climate has warmed 3.4 degrees F (2 degrees C)
- Winter temperatures in Alaska have risen 6.4 degrees F
- The planet has warmed 0.5 degrees C during that same period.
- Projected temperature rise per decade is 0.2 C
- Alaska has risen at 3-4x the rate of the global temperature.
Melting Permafrost

Change in permafrost temperatures at various depths in Fairbanks (Alaska)

Mean annual temperature °C

Soil depth (in meter)
- 0.12 m
- 0.52 m
- 1.01 m

Source: Romanovsky, in Impacts of global climate change in the Arctic region, IASC, Tromsø, April 1999.

Higher temperatures soften Alaska
Alaska's average annual temperatures have risen over the past half century. Higher temperatures have caused the permafrost, which underlies much of the state, to gradually recede. The loss of permafrost is expected to change the surface through erosion and sink holes posing threats to roads, buildings, and other structures.

Alaska warmer by degrees

Source: U.S. Department of the Interior, Alaska Climate Research Center
Melting Permafrost & Erosion

Kipnuk, an Eskimo village
100 miles west of Bethel, on the Bering sea
Population of 500.

Six other villages on the Northwest coast of Alaska need extensive sea wall work or plan to dismantle and move their villages.
Rising temperatures are thought to cause sea levels to rise. The greatest impact is the loss of sea ice and resulting erosion from waves. The Intergovernmental Panel on Climate Change, IPCC, reports that sea levels rose between 10 and 20cm worldwide during the 20th Century. It predicts a further rise of between 9cm and 88cm by 2100.
Portage Glacier

Portage glacier has retreated 5 km since 1939 at approximately 150 meters per year.
The Impact of Climate Change on the Health of the Forests
The Impact of Climate Change on the Health of the Forests

- Cumulative impact of the spruce bark beetle from 1989 to 2002 on the Kenai Peninsula.
- Over 4 million acres impacted.
- Scientists now agree that the warming climate played a significant role in the outbreak.
Impact on Mammals
US Global Change Research Program, National assessment, 2001

- Climate change impacts the Caribou
  - It has resulted in
    - deeper snow depth
    - greater insect pressure
  - Increasing work / movement
  - Decreasing feeding time

- Since 1968, sea ice has
  - retreated 14%
  - thinned by 60%
• In the winter of 2001 the Bering Sea remained ice-free
  • The first time in recorded history
• It is projected that Arctic summer ice will completely disappear by 2050.
Global warming’s threat to polar bears

Sea ice and polar bears

Sea ice extent in the fall of 2007 declined to the lowest level since satellite measurements began in 1979. The sea ice extent at the end of summer melting was 1.7 million square miles, compared to the 1979-2000 median of 2.7 million square miles. The greatest loss has been north of Siberia and Alaska coasts. Over most of their range, polar bears hunt and feed on ice year-round, visiting land for only short periods.

**Alaska’s polar bears**

The state’s polar bears come from three areas (see map below). The Chukchi Sea bears roam between Alaska and the Russian Far East coasts. The northern and southern Beaufort Sea bears cover a wide swath of the Alaska and Canada coastline and waters.

- **Size:** Males stand 8-11 feet tall, leave a 10-inch-wide footprint and weigh 500 to 1,000. Females are smaller usually 400 to 700 pounds.
- **Life span:** 25 to 30 years.
- **Natural history:** Polar bears follow sea ice and ringed seals, their primary prey. They also eat bearded seals, whales and carrion. They do not hibernate.
- **Reproduction:** Females bear one cub every three to four years. One of the slowest reproductive rates of any mammal.
- **Hunting:** Females den on land or sea ice.

<table>
<thead>
<tr>
<th>LOCATION (YEAR)</th>
<th>ESTIMATED POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chukchi Sea (1993)</td>
<td>2,000</td>
</tr>
<tr>
<td>Southern Beaufort Sea (2006)</td>
<td>1,500</td>
</tr>
<tr>
<td>Northern Beaufort Sea (1986)</td>
<td>1,300</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>4,700</strong></td>
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**Arctic Ocean ice sheets shrink**

**LOCATION**

*September monthly median sea ice extent based on data from 1973 to 2003*

**Observed sea ice extent Sept. 1997-2000**

The decrease of the Arctic ice likely will continue until mid-September, causing the ice sheets at the North Pole to shrink further.

The two Japanese agencies have been observing Arctic ice since 1978 using satellite and vessels.

The agencies said the sea ice sheets were shrinking because the Arctic ice formed later than usual last winter and was relatively thin from the start. As a result, the ice started melting earlier than usual, causing the sea water to absorb more solar heat due to a lack of ice, which usually reflects sunlight.

Furthermore, a low-pressure system off Siberia brought strong winds to the North Pole, resulting in much of the Arctic ice being driven towards the Atlantic Ocean.

IPCC projected this summer’s Arctic ice sheet at about 2.9 million square miles, dropping to about 2.1 million square miles in 2040 and about 1.7 million square miles in 2050. However, some research institutes, including one in the United States, have pointed out that the reality is 30 years ahead of the projections.
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**Location (Year)** ESTIMATED POPULATION
1. Chukchi Sea (1993) 2,000
2. Southern Beaufort Sea (2006) 1,500
3. Northern Beaufort Sea (1990) 1,200
Total 4,700

**Median sea ice extent Sept. 1997-2000**

**Observed sea ice extent Sept. 2007**

**September monthly median sea ice extent based on data from 1979 to 2003.**

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Changing Patterns

Yellowjackets, ospreys and hummingbirds, oh my!

With hunting season upon us, it's time to clean out the freezer...

**SUMMER OF THE YELLOWJACKET:** It's not very often that Fairbanksites are hoping for an early freeze but this year, i.e. the Summer of the Yellowjacket, it wouldn't be a bad thing if it kills off all the wasps around town. It hasn't happened yet, though.

As a result, the Fairbanks North Star Borough School District canceled Thursday's elementary school cross-country running meet at Birch Hill Recreation Area for fear of stings, according to Conrad Gonzales, activities coordinator for the school district.

The school district also canceled some field trips to the Alaska Bird Observatory this week because of the yellowjacket situation, said ABO executive director Nancy DeWitt. The cancellation is both

**IN THE BAG:** University of Alaska president Mark Hamilton won't have to worry about eating cafeteria food for the next year. Hamilton bagged a moose and was back at work earlier than expected this week. He won't have to worry about making room on his office wall for any antlers, though. The bull wasn't exactly a trophy but it was big enough to fill the freezer.

**AIR TIME:** On another hunting note, former NFL running back Larry Cosnka, the former Miami Dolphin great and Hall of Famer who now lives in Alaska and films an outdoor show that is aired on the Outdoor Channel, went duck hunting and pike fishing with Fairbanks guide Bill O'Halloran last week on Minto Flats.

Bill was out caribou hunting when I called, but his wife, Pat, said Cosnka filmed two shows during the hunt: one on duck hunting and a cast and blast segment featuring duck hunting and pike fishing. This isn't the first time Cosnka has hooked up with O'Halloran, who owns North Country River Charters in Fairbanks. O'Halloran took Cosnka pike fishing on the Yukon River a couple years ago, Pat said.

"Bill said he was just great," Pat said of Cosnka. "He said he was one of the best storytellers there is sitting around a fire."

O'Halloran also hosted Bill Nichols, a senior writer for Ducks Unlimited Magazine, on the hunt.

**JOINING THE CLUB:** The 200-Pound Club seems to get bigger every year in Valdez. This year there were 16 halibut entered in the derby that weighed 200 or more pounds. While statistics on such matters aren't readily available, derby director Laurae Praz said that's the biggest number of 200-plus pound fish she has seen in the four years she's been involved with the derby.

**FISH FINDERS:** Eagle-eyed bird watchers report that ospreys have been seen several times recently carrying fish in their talons along Grant Road and over the University of Alaska Fairbanks agricultural fields headed in the direction of Chena Ridge, which means there must be a nest in that neck of the woods somewhere.

**HUMMMMMMM:** Speaking of birds, the Alaska Bird Observatory received three valid reports of hummingbirds in Fairbanks this summer, according to DeWitt.

The ABO gets legitimate hummingbird reports in Fairbanks every few years and the three reports appear to be valid considering the sources, said DeWitt.

While rufous hummingbirds nest in Southeast and occasionally in Southcentral, hummingbirds aren't normally seen north of the Alaska Range, said Dan Gibson, curator of ornithology at the University of Alaska Museum of the North.

The museum does not have a single hummingbird specimen from Fairbanks and the only hummingbird specimen collected in the Interior was an Anna's hummingbird that was found in Tok sometime in the 1990s, said Gibson.

There are reports of hummingbirds north of the Alaska Range every year, usually in late August or early September after the nesting season, Gibson said. The preponderance of hummingbird reports and sightings in Southeast and Southcentral, according to Gibson, is due to their nearness to range, while the Interior, he said, "is just too far north, but it's a different story for the birds and folks who can have them."
Rufous Hummingbirds

• The Rufous is the most widely-distributed hummingbird in North America. Winters in Mexico and Panama.

• Seen in Southeastern and occasionally Southcentral Alaska. It has never before been reported above latitude 61.

• In 2006 the Rufous hummingbird was reported in Fairbanks (latitude 64.8).

• There was even one report from extreme eastern Siberia!
Impact on Human Health in Alaska

Vector Borne Disease

Vibrio parahaemolyticus in Cordova
• Cordova Alaska oyster farms in 2004
  • By summer 2004, the water temperature had risen just enough to poke above the crucial 59-degree mark.

• **Vibrio** naturally harbors within coastal and estuarine marine algae and copepods
  • Proliferation of algae and copepods is affected by sea surface temperature

• Marine ecosystems, including Alaska, have been linked to climate changes and warming temperatures.

Changing Patterns of Insects

Lepidopterism in Alaska
Lepidopterism

- Adverse reaction
  - Direct contact
  - Inhalation
  - Ingestion

- Venom excreted through hollow hairs (setae)
  - Up to 2,000,000 setae per caterpillar
  - Envenomation referred to as “Erucism”

- Contact reaction
  - Immediate burning pain (98%)
  - Grid-like row of punctures
  - Vesicles & hemorrhagic bullae
  - Local swelling, lymphadenopathy
  - Fever, malaise, HA, shock (5%), and seizure (0.2%)
  - Anaphylaxis
Lepidoptera

- An estimated 20,000 species of butterfly worldwide
  - Approximately 700 species in the US
    - 75 to 80 species inhabit Alaska
    - 6 species overwinter as adults
- Of 35 species studied in Europe *
  - 63% shifted their ranges north
  - 3% shifted their ranges south
- In Northwestern US, increases in minimum winter temperatures have had the greatest impact on their northern migration **

The buzz about town

Yellowjackets making an early appearance in the Interior

By Tim McPherr

Staff Writer

If you haven’t noticed, you can hear the buzz in the woods.

They’re honeybees.

Here is the buzz, to believe, or maybe some of us just don’t want to, it’s shaping up to be another bad year for yellowjackets in the Interior.

“I’ve never had this many calls this early for wasps and yellowjackets,” said Diane Clausen, integrated pest management specialist for the University of Alaska Fairbanks Cooperative Extension Services.

The wasps started late last week and have continued at a higher volume this week.

“I’ve had two or three people tell me they can hear them buzzing in the woods again,” Clausen said. “A couple of people have asked if it’s going to be as bad as last year.”

Last year was a particularly bad year for yellowjackets in the Interior.

The insects, which are known to cause allergic reactions to wasp sting, caused the popular Fairbanks annual fish derby to be canceled because of wasp sting incidents. Some people died from allergic reactions to wasp sting and yellowjackets terrorized the populace for most of July and half of August.

Several outdoor events were canceled or moved indoors because the risk of getting stung was so high. Humor for wasp spray was that stores couldn’t keep cases of the stuff on the shelf.

This year is that the yellowjackets seem to have arrived earlier this year and if the dry, warm weather persists, things will only get worse.

“Last year was a particularly bad year for yellowjackets in Fairbanks. They seemed to have arrived earlier this year and if the dry, warm weather persists, things may get worse.”
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
Summer of the yellowjackets

Predator Control
Homemade wasp traps do the trick.

Yellowjackets: Insects inundate Fairbanks

Insects infest Fairbanks, Alaska 2006

Medical Buzz

Yellowjackets, insects, wasps, home remedies

Q&A with an entomologist

Insect behavior and control tips

The Yellowjackets' Day

Understanding insects and their behavior

Yellowjackets in Fairbanks, Alaska

Yellowjackets and wasps

Fairbanks News Miner (August 13, 2006)
Yellow Jacket (*Vespula* spp.)
Yellow Jacket (*Vespula* spp.)

- Two genera
  - *Vespula vulgaris* (common yellow jackets)
  - *Dolichovespula arenaria* (aerial yellow jacket)
- Yellow and black
- Nests
  - Subterranean, in walls, or aerial
    - 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
  - Increase risk of infection
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, 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 snowmobile. 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 snowmobiles so the vehicles would be ready.

“He was a generous man. Someone we should all strive to be.”

—Sydney Morgan, sister of Zachary Warwick

See DEATH, Page A6
Hymenoptera Related Deaths in Alaska

• 2 deaths from hymenoptera stings in Alaska

• Fairbanks during the summer of 2006

• Presumed to be Yellow Jackets

Oswalt ML, Foote JT, Kemp SF. Anaphylaxis of two fatal yellow jacket stings in Alaska. J Allergy Clin Immunol, 2007;S34(abstract 129)
Case 1

- 29 y/o male asthmatic
- Working in yard with a weed trimmer
- Stung by hymenoptera (presumed YJ)
- Attempted to drive himself to ED however had LOC and rolled his vehicle off the road into a fence
- EMS responded
  - Unconscious with albuterol in his lap
  - Intubated at the scene
  - Epinephrine given x 3
  - Atropine given x 3
- Emergency Department
  - Advanced cardiac life support
  - Unable to resuscitate
Case 2

- 50 y/o male with hypertension (lisinopril & HCTZ)
- Cutting trees with a chain saw
- Stung in the back of neck by YJ (witnessed by his wife)
- Two minutes later he fell to all fours
- She got an epi-pen from her house, found him LOC
- 911 called and epi administered after 3rd attempt
- She began CPR
- EMS
  - Continued CPR
  - Unable to intubate / combi-tube airway was inserted
- Emergency Department
  - Advanced cardiac life support
  - Unable to resuscitate
Wasp sting blamed for second death in Fairbanks

By TIM MOWRY
Staff Writer

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

Matt Bus, a 60-year-old Fairbanks truck driver, died Tuesday, shortly after getting stung by a yellowjacket at his home on 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 Acres home. Warwick died while trying to drive himself to the hospital. Anaphylaxis is a severe and rapid multi-system allergic reaction that occurs when a person is exposed to a trigger substance, such as bee or wasp venom. It is potentially fatal because it can cause rapid constriction of airways if left untreated.

Matt Bus (pronounced Bush) stopped breathing within minutes after being stung by a yellowjacket 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 knew all of a sudden he was dancing around, swatting at the back of his neck,” said Monica Bus, who was holding a running chainsaw at the time.

A yellowjacket stung him in 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 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.

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 Monica. "He got stung every summer.

She advised him to put some baking soda on the sting.

Maybe two minutes later, he just all of a sudden cocked his head and said, "Damn, this thing really hurts," she said.

Almost immediately, he began wobbling and went down on all fours, she said. That’s when Monica ran to the house for the EpiPen.

"I wasn’t even gone 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.”

Terrified, 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 work the EpiPen but after three tries was able to jab it into his upper thigh, she said. Then she started beating on his chest and screaming 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. Medics and doctors had a hard time getting a tube down his throat because of swelling, she said.

An hour and a half later, doctors told Monica her husband was dead.

"The doctor told me from the moment he got stung there was nothing that could have been done," said a distraught Monica on Friday. "He said it wouldn’t have mattered if I got the EpiPen in him right then."

The deaths of Bus and Warwick are the first known fatalities by bee stings in Fairbanks, according to Dr. Tim Foote, an allergist at Tanana Valley Clinic in Fairbanks. He called the deaths "unprecedented" and "tragic.

"I think this is an anomaly for our community," he said, noting that the chances of dying from a sting are less than being struck and killed by lightning.

About 90 people die from bee or wasp stings each year in the United States, said Foote.

In the case of both Bus and Warwick, it was the first time either had shown an allergic reaction to a sting. That’s the case in about half the deaths attributed to bee and wasp stings, Foote said.

Fairbanks is experiencing its worst summer in more than a decade for wasps, both yellowjackets and bald-faced hornets, according to experts. That fact is born out by the number of sting victims showing up at the emergency room, said Dr. Eric Stirling, the emergency room physician at Fairbanks Memorial Hospital who treated Bus.

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

Different people have different reactions to stings, he said.

"One person might get a little swaying 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.

For example, if someone gets stung in the foot and they begin vomiting 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 Bus described her husband as "a fishing fool." Though he was gone six days a week driving trucks, he called her every day from the road, she said. He made a point of telling his wife that he loved her every day.

"He would say it in front of everybody, he didn’t care," Monica said.

He leaves behind his wife, two stepchildren, Bevin, 28, and Brandon, 27, as well as two grandchildren with another on the way.

News-Miner staff writer Tim Mowry can be reached at 459-7582 or tmowry@newsminer.com.
There continues to be confusion in the general public in identifying or distinguishing between different species of hymenoptera.
Questions

• Do the two deaths from Yellow Jacket stings during the summer of 2006 in Alaska represent an increasing exposure to hymenoptera in Alaska?

• Could there be a correlation between changes in climate and changes in hymenoptera patterns in Alaska?
Methods

• We conducted retrospective reviews of adverse events to insect envenomation as defined by ICD9 codes
  • E905.3
    • Venomous insect specific to hymenoptera
  • E906.4
    • Bite from non-venomous arthropod
  • 989.5
    • Toxic effect from venom
• There are no venomous reptiles in Alaska
Methods

• We searched three separate databases
  • 1) Fairbanks Memorial Hospital Emergency Department 1990 - 2006
  • 2) Allergy Asthma and Immunology Center of Alaska (AAIC) 1999 – 2006
  • 3) Alaska State Medicaid Database (over 132,000 participants) from 1999 - 2006
Increase in ED visits for Stings at Fairbanks Memorial
Patients Referred to AAIC for Evaluation of Sting Reactions

AAIC reported an average increase of 2.5 cases per year (chi-square for linear trend p<0.001)
Increase in Medical Visits for Stings Among Alaska Medicaid Recipients (Over 132,000)

Chi-Square for trend p<0.001 for all lines
Does temperature change correlate with changing patterns of hymenoptera?
Epidemiologic Regions of Alaska

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

• Each of the three databases revealed an increasing trend for patients seeking medical care for envenomation (p <0.001)
• From 1999 to 2006
  • Fairbanks Memorial a 4 fold rise in 2006 from the previous years
  • AAIC had a 3 fold rise in 2003-2007 compared with 1999-2002
  • Medicaid recipients had a significant rise from 1999 through 2006
• A 6.4% population increase from 2000 to 2006 based on US Census Bureau data does not account for these observations
  • 2000 (626,932) versus 2006 (670,053)
• The determinants of insect stings are complex but likely influenced by temperature increases, particularly winter temperatures.
Distribution of Insects

• Arthropods are extremely temperature sensitive

• Climate changes have impacted life cycles and expanded inhabitable territory
  • Mosquitoes and plant communities are migrating to higher ground as permafrost thaws and glaciers retreat
  • Beetle plagued forests in Alaska have impacted over 4,000,000 acres
  • Lepidoptera are expanding their northern boundaries in the northern hemisphere
  • Ticks (*Ixodes ricinus*) that transmit Lyme borreliosis and viral encephalitis have extended northwards in Sweden associated with fewer winter days below 10 degrees and more summer days above 50 degrees
So what impacted the Vikings?

Nothing actually stopped this Viking invasion until 892, when pestilence so ravaged the army that they finally dispersed.

...of failure of the Norse colony in Greenland, we cannot assume that other factors, including pestilence...did not play a more important part in social collapse.

Certainties

• Climate change is occurring as the amount of greenhouse gases (CO2 & H2O) increases in the atmosphere.

• This leads to global warming by trapping additional solar energy near the Earth’s surface.

Uncertainties

• The estimation of health trends and its effects are subject to many variables
• Prior to anthropogenic climate change there was little focus on climate-health relationship
• The health risk of climate related thermal stress, floods and infectious disease lends itself to study while other impacts receive less attention
  • Disruption of fisheries
  • Loss of livelihoods
  • Population displacement
North to Alaska?

Do the observable changes in Alaska predict what is to come?

Are the changing patterns of hymenoptera yet another bellwether of climate change?