

NEW AND SCARY TICKS!

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Widespread and difficult to control, diseases from mosquito, tick, and flea bites are major causes of sickness and death worldwide. The growing number and spread of these diseases pose an increasing risk in the U.S. The report found that the nation needs to be better prepared to face this public health threat.

TICKS IN CONNECTICUT

- At least 16 species of ticks known (11 in NJ, 30 in NY State)
- 2 species mostly commonly bite humans, now 3
- 4 species can transmit disease pathogens

Blacklegged Tick
Ixodes scapularis



American Dog Tick
Dermacentor variabilis



Lone Star Tick
Amblyomma americanum



Woodchuck Tick
Ixodes cookei



Others from humans in Connecticut include *I. dentatus*, *R. sanguineus*

LONE STAR TICK

AMBLYOMMA AMERICANUM



95% tick bites in southeastern U.S.

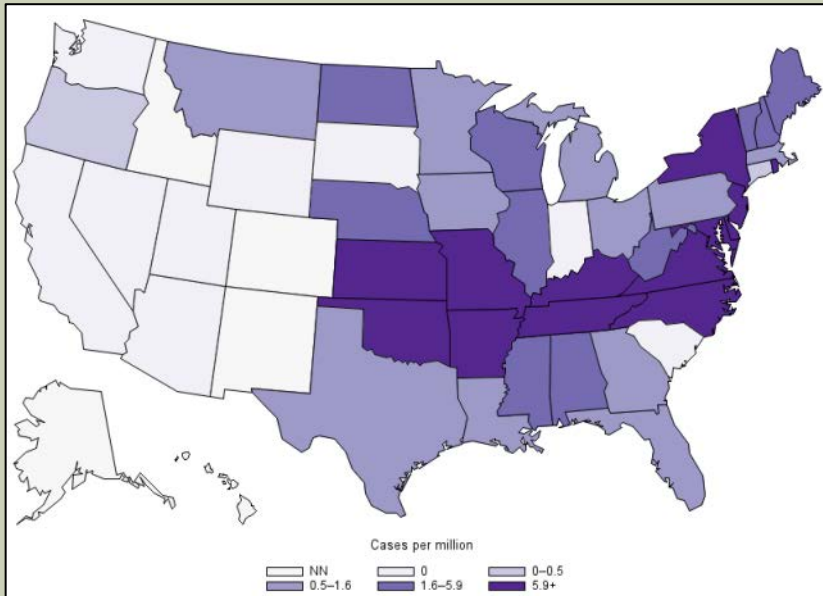
- Bourbon virus
- Ehrlichiosis
Ehrlichia chaffeensis
Ehrlichia ewingii
Panola Mountain ehrlichia
- Heartland virus infection
- Southern Tick-Associated Rash Illness
STARI
- Spotted Fever Group Rickettsia
- Tularemia
- Red Meat Allergy (alpha-gal syndrome)

HUMAN EHRLICHIOSIS



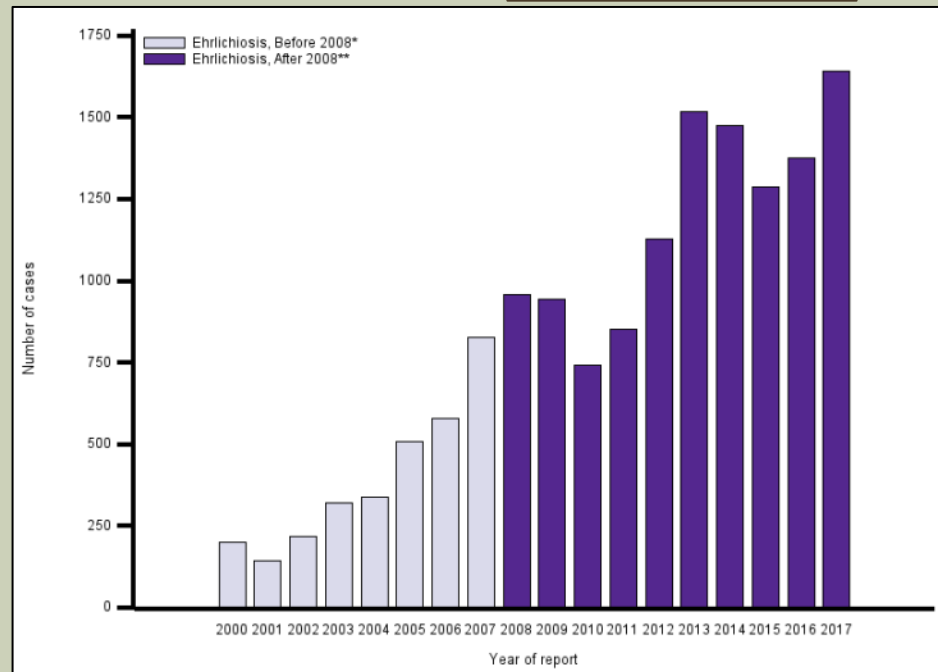
Photo/CDC

Ehrlichia chaffeensis and a few cases of *Ehrlichia ewingii* are transmitted by the lone star tick in the southeastern and southcentral United States



Annual reported incidence (per million population) for *E. chaffeensis* in the United States for 2017. (NN= Not notifiable)

E. chaffeensis morulae in cytoplasm of monocyte/CDC



Number of human cases of ehrlichiosis caused by *Ehrlichia chaffeensis* reported to CDC annually from 2000 through 2017



SYMPTOMS & TREATMENT OF EHRlichiosis



- Fever (100%), malaise (98%), myalgias (98%), shaking chills (98%), sweats (98%), headache (85%), nausea (39%)*
- Symptoms may be mild or severe and require hospitalization*
- Decreased white blood cell (leukopenia) and platelet counts (thrombocytopenia), history tick-bite or exposure
- Clinical illness greatest in older or immunocompromised patients
- Drug of choice is doxycycline or tetracycline. Response is usually rapid with fever subsiding in 24-72 hours and cure
- Many patients recover without antibiotic therapy

*From Bakken et al. 1996, Bakken & Dummler 2006.
JAMA 275:199-205, Ann NY Acad Sci 1078:236-247



Fifty-nine (12.5%) of 473 adults and eight of 113 pools of five nymphs each (estimated minimum prevalence of infection 1.4%) contained DNA of *E. chaffeensis*

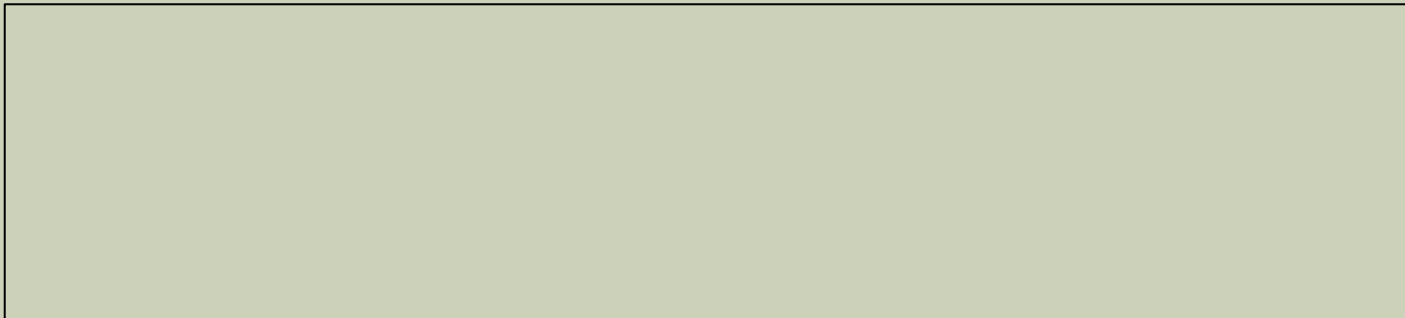
Adult *A. americanum* ticks from Prudence Island, R.I., were collected from vegetation in the fall of 1992 and were stored in 70% ethanol. In 1996, 1997, and 1998, nearly all *A. americanum* ticks collected were submitted by residents living mainly in coastal communities in Fairfield and New Haven Counties, Conn.

Six of 52 (11.5%) *A. americanum* ticks collected on Prudence Island, R.I., contained *E. chaffeensis* DNA. Of 106 *A. americanum* ticks removed from persons from Fairfield County, Conn., 8 (7.6%) contained *E. chaffeensis* DNA.

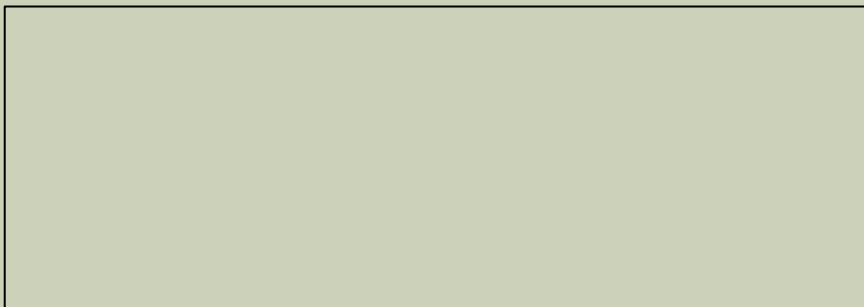
RED MEAT ALLERGY

- Food allergy triggered by tick bite.
- Delayed anaphylaxis (3-8 hours) to red meat that is related to serum IgE antibodies to the oligosaccharide galactose- α -1,3-galactose (alpha-gal), a sugar carbohydrate carried by the tick and found in beef, lamb, pork & venison.
- Delayed reaction makes connection to meal less likely
- Once sensitized to red meat, reaction itchy rash to anaphylactic shock (hives; swollen lips, eyes, tongue and throat; respiratory issues; vomiting; diarrhea; increased heart rate and low blood pressure. In some, just upset stomach & cramps).
- Est. about 5,000 cases alpha-gal syndrome in the southeast, distribution cases similar to that lone star tick (hundreds cases on Long Island).
- Not everyone reacts, unclear how long it lasts. Reaction may decline if no further tick bites, but in others seems to persist.

NBC News
Linda Carroll
Apr 20 2016



Future for Coastal Connecticut?



“In places where the lone star tick is gaining prevalence, doctors also are seeing an increase in cases of alpha-gal syndrome, a strange allergy to red meat induced by tick bites.”

“Dr. Erin McGintee, an allergist and immunologist at ENT and Allergy Associates in Southampton, sees two to three cases of alpha-gal syndrome per week during tick season. Since diagnosing her first case in October 2010, she has seen more than 380 patients. “The cases are definitely increasing over time,” she said.”

“That is no surprise to Karen Wulffraat, administrative director of Southampton Hospital’s Tick-Borne Disease Resource Center. “The calls about lone star tick bites are increasing in number, even overtaking the blacklegged tick,” which is native to the Northeast, she said.””



AMBLYOMMA AMERICANUM BIOLOGICAL NOTES



- The aggressive lone star tick accounts for ca. 95% of all tick bites in the southeastern United States
- Passing human can pick up hundreds larvae from brushing vegetation that produce erythematous pruritic (itching) papules and attached larvae are small so often treated as a rash
- Nymphal encounter rates can exceed 500 per hour
- Multiple concurrent tick bites from lone star ticks common



Photo: Tom Harkins
From Robyn Nadolny's presentation



Robyn . Nadolny



Fisher et al. 2006. Arch Dermatol. 142(4):491-494.
doi:10.1001/archderm.142.4.491



AMBLYOMMA AMERICANUM BIOLOGICAL NOTES

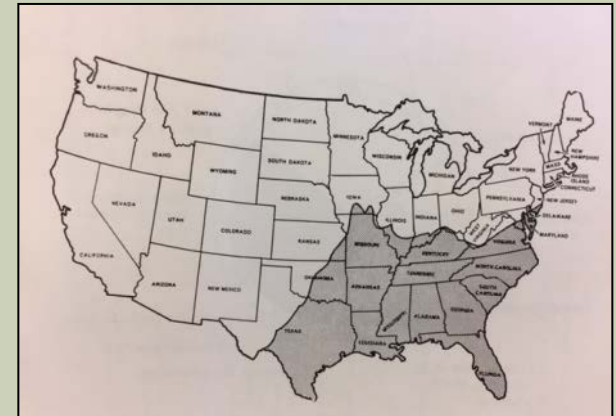
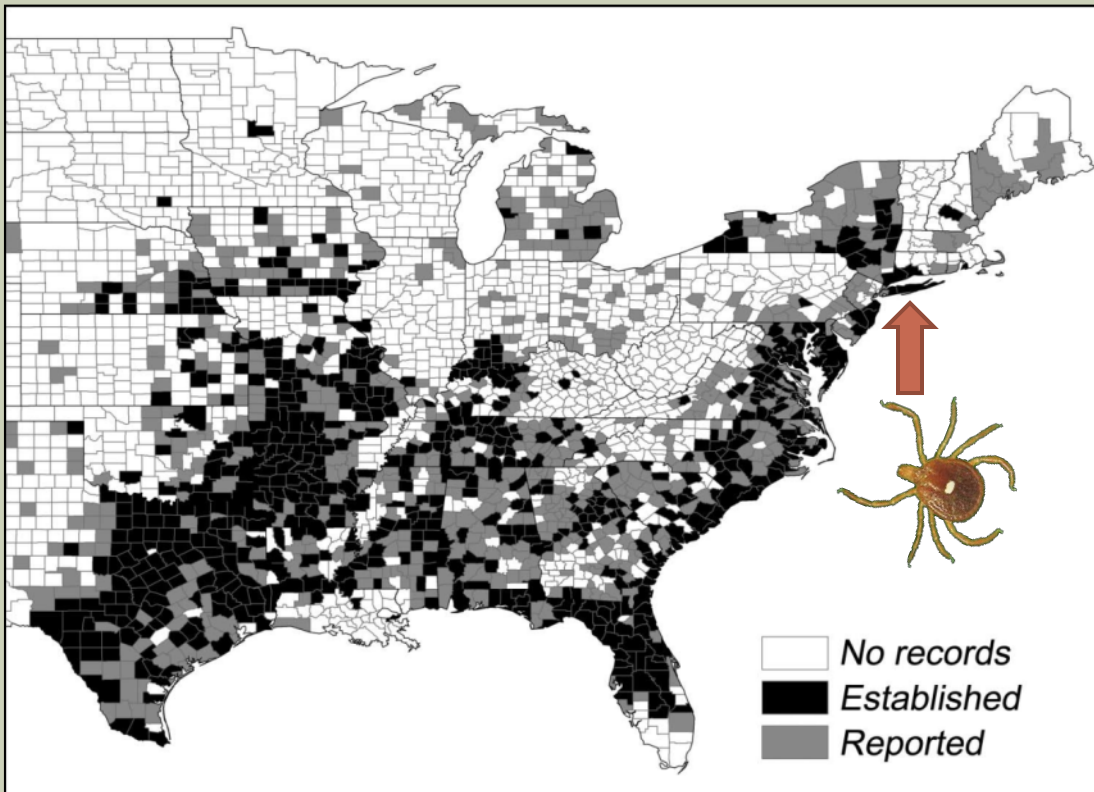


- Resurgence of the lone star tick in southeast associated with increased populations of white-tailed deer and turkey in the southeast (est. only 300,000-500,000 deer remained US end of the 1800s; none in Indiana, 12 in Connecticut)
- Evidence that American dog ticks, *Dermacentor variabilis*, disappearing some areas where lone star ticks have increased substantially



SPATIAL DISTRIBUTION OF COUNTIES IN WHICH *A. AMERICANUM* IS KNOWN TO BE ESTABLISHED OR REPORTED, CUMULATIVE FROM THE 1890S TO PRESENT TIME.

Springer, Y. P., et. al. 2014. Spatial distribution of counties in the continental United States with records of occurrence of *Amblyomma americanum* (Ixodida: Ixodidae). *J. Med. Entomol.* 51: 342-351.

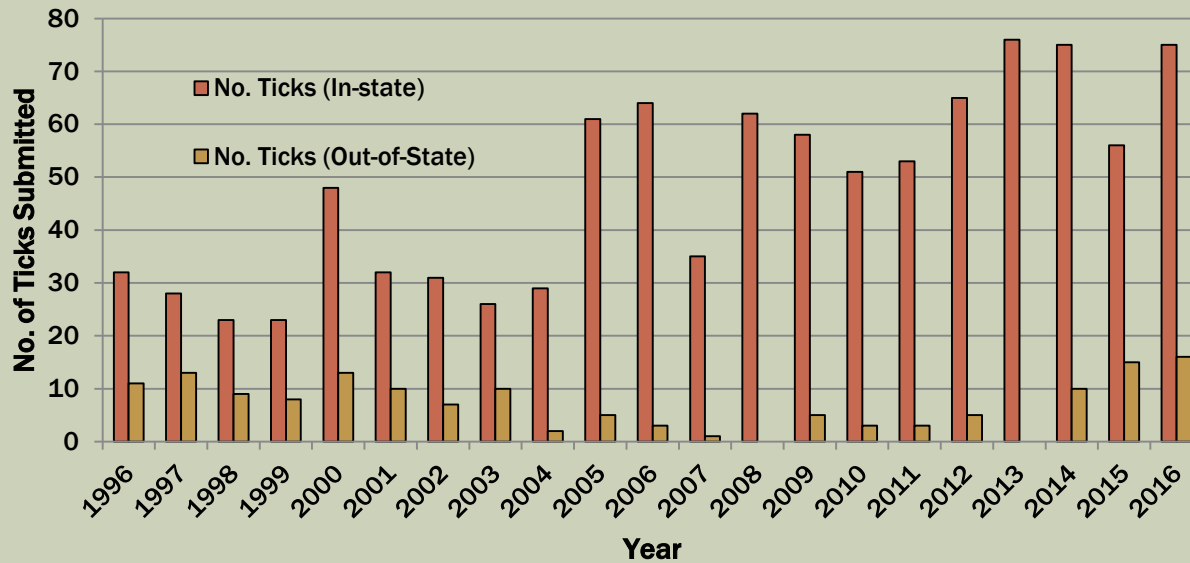


Probably distribution lone star tick populations of economic importance in the United States. Hair & Howell 1970

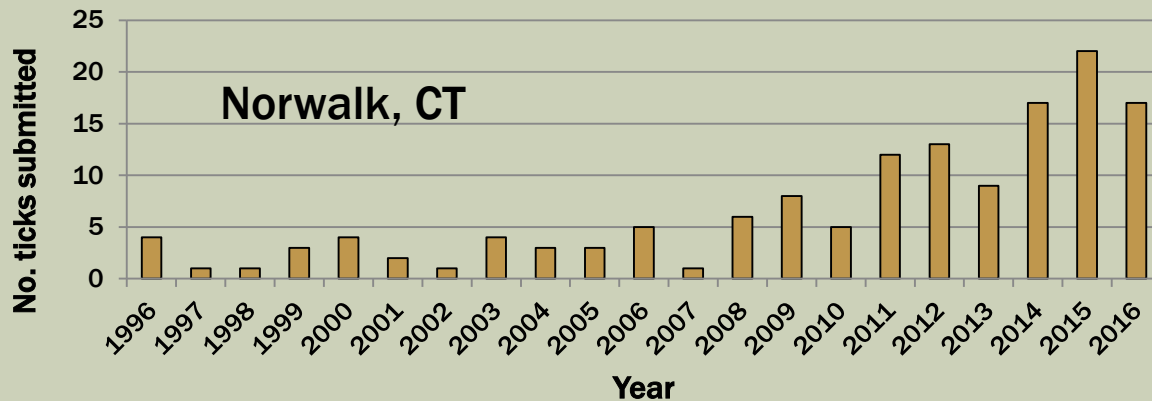
Collection/report \neq Established (criteria ≥ 4 ticks)



LONE STAR TICK IN CT

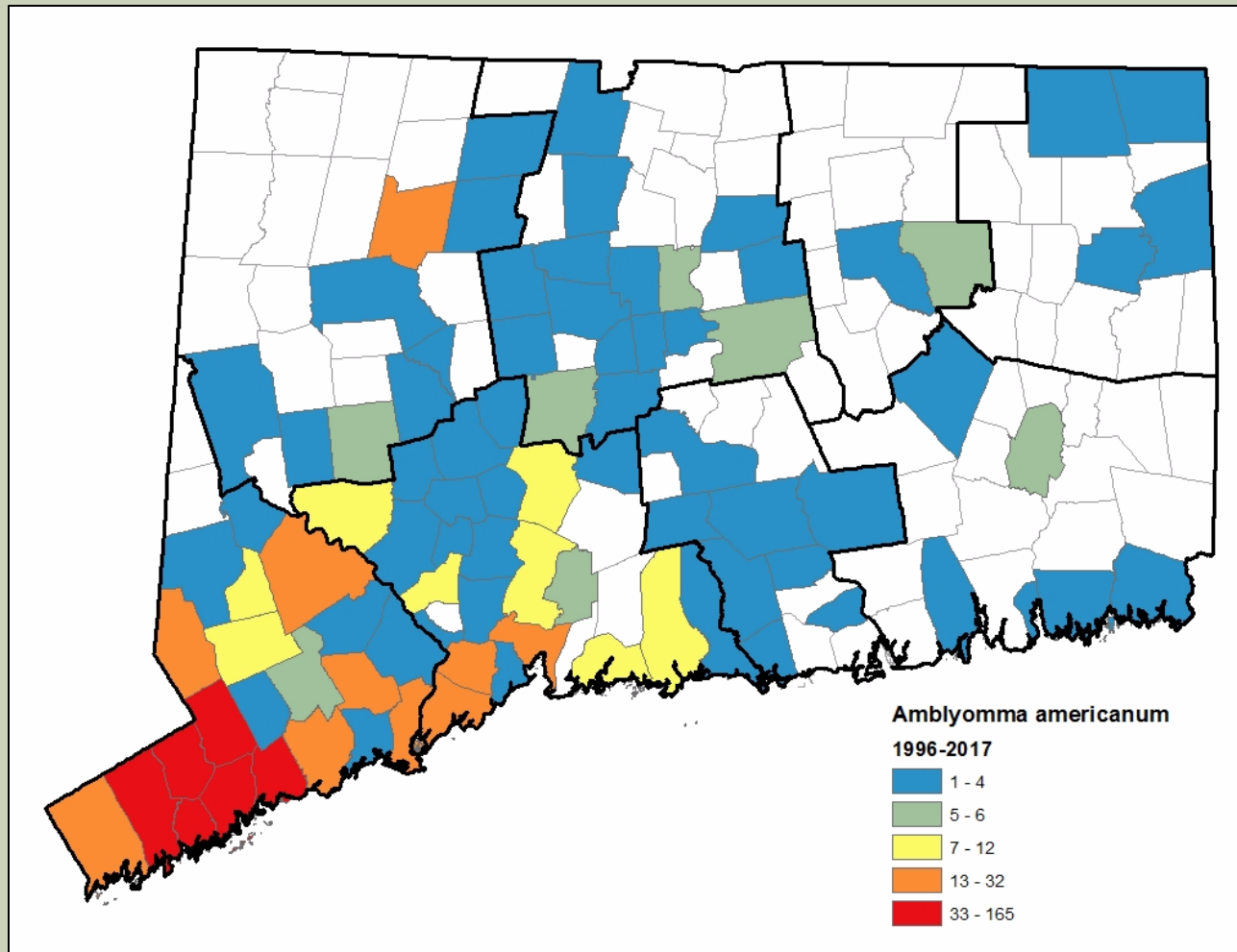


Slow, but steady increase in lone star tick submissions documented by Dr. Goudarz Molaei at the CAES Tick Testing Laboratory (2-3% of total)

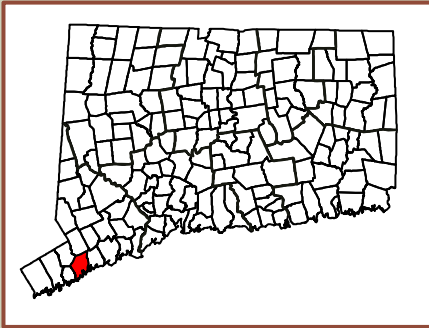


Also a steady increase in lone star ticks from the city of Norwalk and other towns in southwestern CT

LONE STAR TICKS SUBMISSIONS TICK TESTING LABORATORY



Ticks discovered on white-tailed deer on 27 June 2017 at Manresa Island, a peninsula in South Norwalk by a DEEP EnvCon Officer and confirmed as lone star ticks by Dr. Kirby Stafford 28 June 2017



J. Nivolo/DEEP



K. Stafford/CAES

Active infestation seems limited to that site



May 24, 2018 courtesy CT DEEP

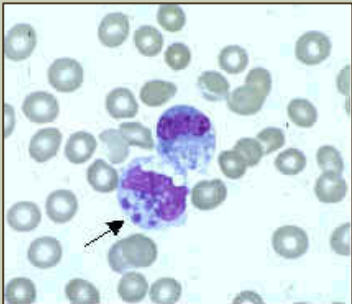
Left: Original site discovery deer (top) and 4-poster at site. Right: Tick burden on ears of tagged white-tailed deer doe inside Manresa Island (top), May 2018 (left) and on a buck outside the fenced portion of the site (bottom).

PREVALENCE OF *E. CHAFFEENSIS*, *E. EWINGII*, AND *A. PHAGOCYTOPHILUM* IN HOST-SEEKING *A. AMERICANUM* (N = 51 FEMALES, 49 MALES, 104 NYMPHS) FROM MANRESA ISLAND, SOUTH NORWALK, CT



Stage/Sex	No. (%) infected			
	<i>E. chaffeensis</i>	<i>E. ewingii</i>	<i>A. phagocytophilum</i>	Total
Adult	44 (44.0)	3 (3.0)	1 (1.0)	48 (48.0)
Female	18 (35.3)	2 (3.9)	0 (0.0)	20 (39.2)
Male	26 (53.1)	1 (2.0)	1 (2.0)	28 (57.1)
Nymph	1 (1.0)	8 (7.7)	0 (0.0)	9 (8.6)

E. chaffeensis morulae in cytoplasm of monocyte/CDC

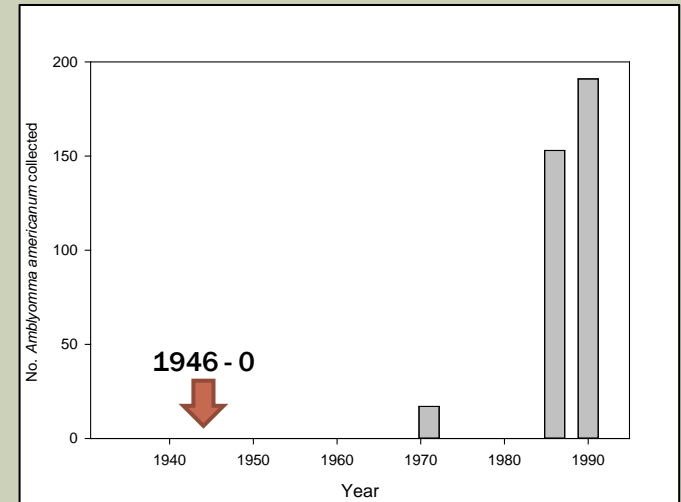
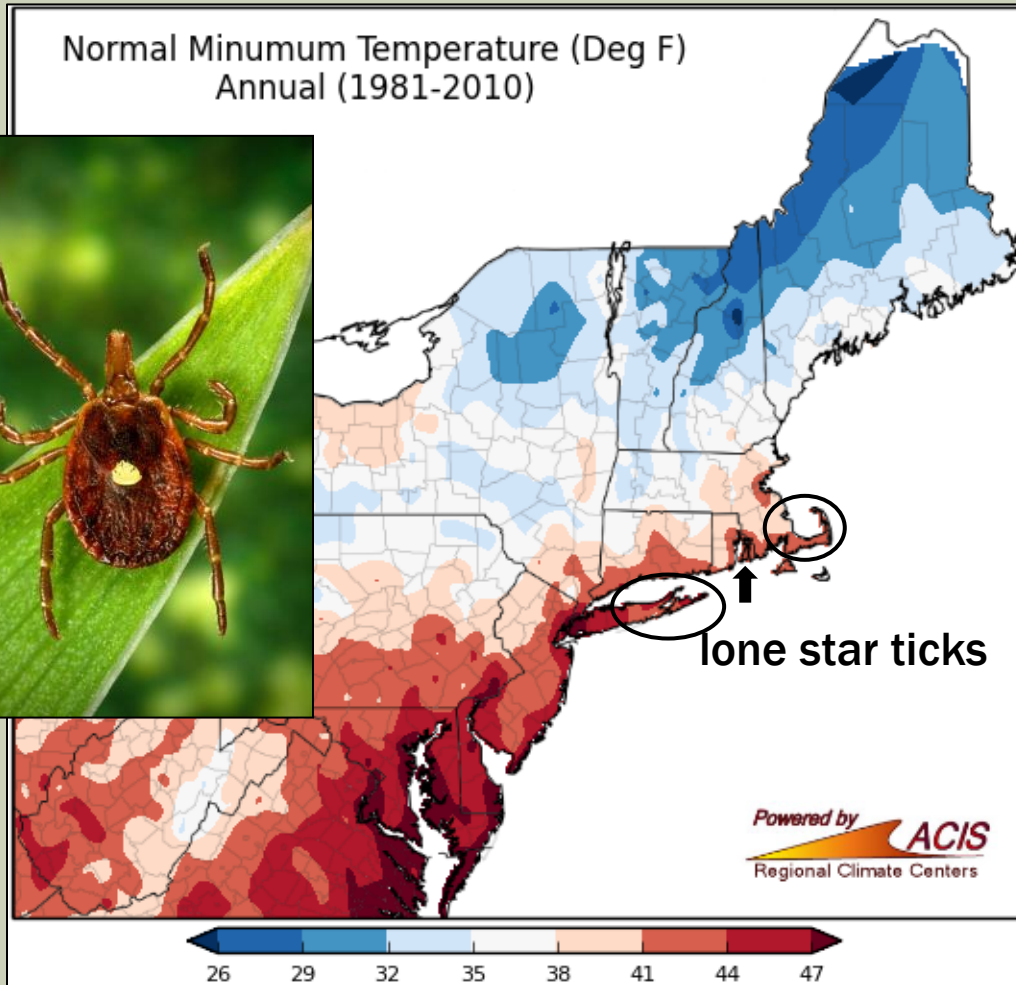


The prevalence of Anaplasmatatacaee infections in a sample of 100 host-seeking adult *A. americanum* was 48.0% and was predominated by specimens infected with *E. chaffeensis* (Table 3). The *Anaplasma phagocytophilum* detected in one male *A. americanum* was 100% identical to the sequence for AP-Variant 1.

MINIMUM TEMPERATURE FACTOR NORTHERN DISTRIBUTION LONE STAR TICK?



James Gathany (CDC)



Ginsberg et al. 1991. Increased population densities of *Amblyomma americanum* (Acari: Ixodidae) on Long Island, New York. *J. Parasitol.* 77(3):493-495

Overwintering survival adult lone star ticks

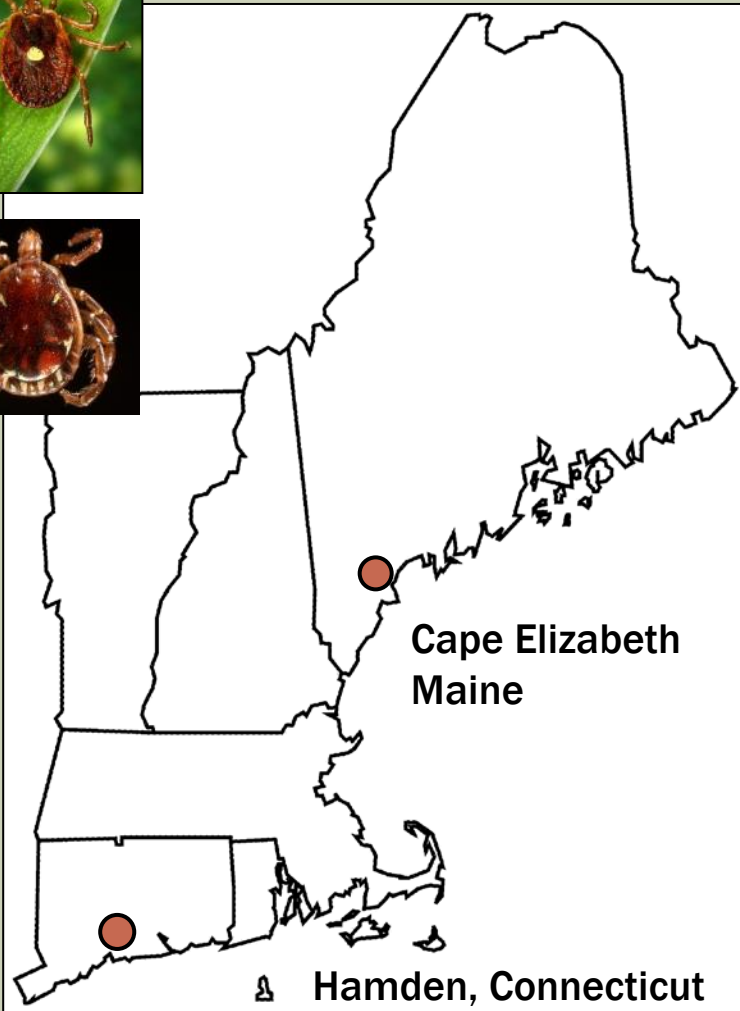
Connecticut 38-69%

Maine 7-9%

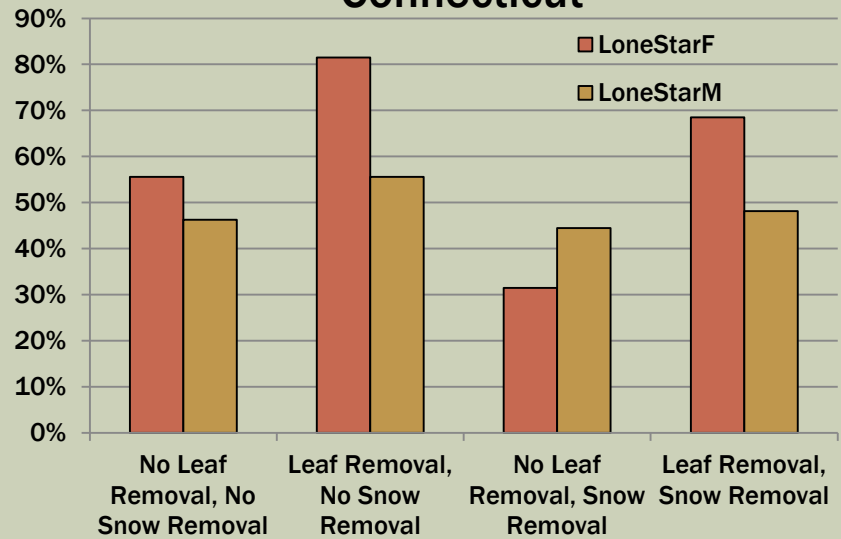
James Gathany (CDC)



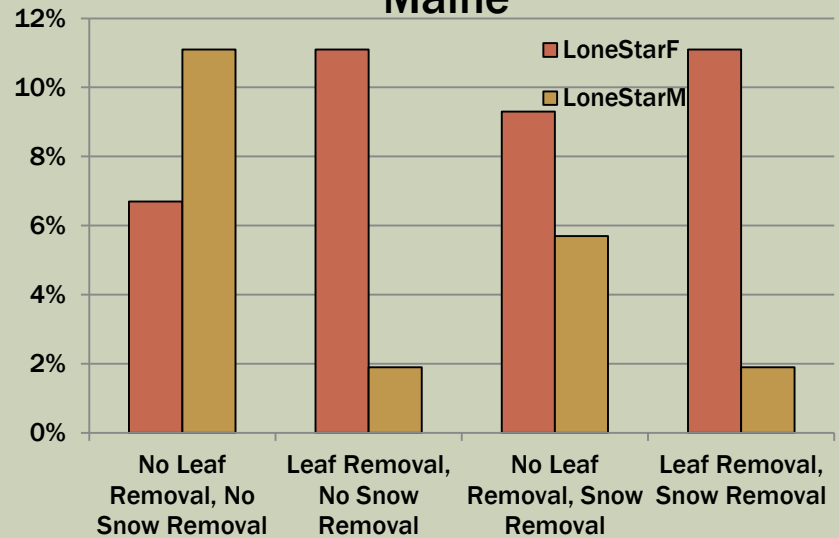
CDC



Connecticut

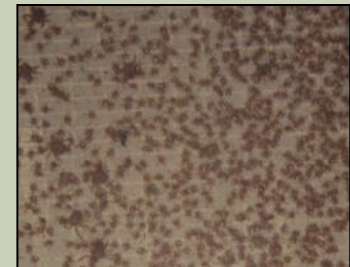
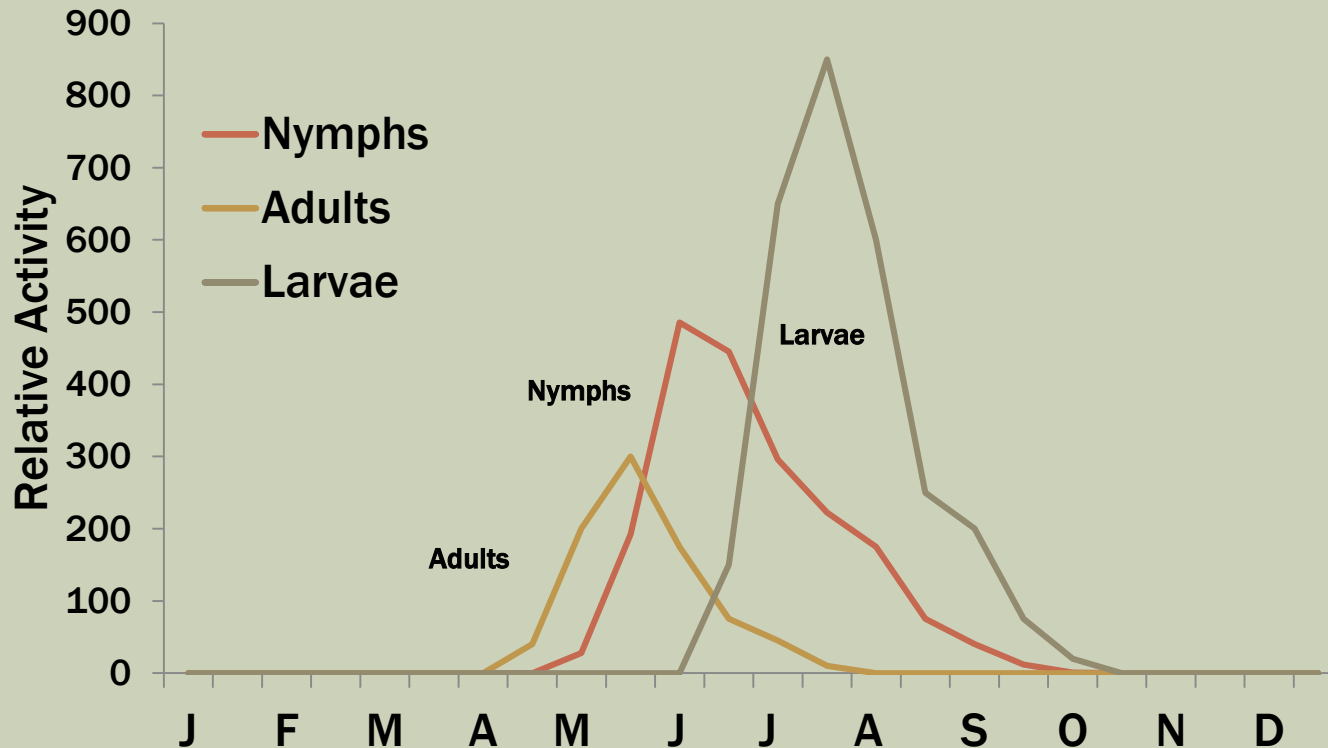


Maine



SEASONAL ACTIVITY OF *AMBLYOMMA AMERICANUM*

Mainly overwinter as unfed adults or nymphs



NORTHERN KNOWN ESTABLISHED LONE STAR TICK POPULATIONS

Lone Star Tick
Amblyomma americanum

Map/CDC

- “Established”
- ‘Frequently’ reported

Cape Cod, MA

Prudence Is., RI

Manresa Is., CT
Sheffield Is., CT

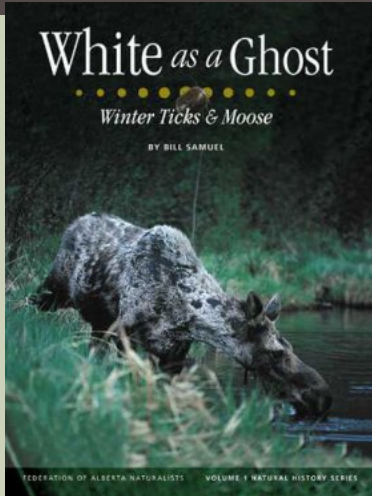


WINTER TICK *DERMACENTOR ALBIPICTUS*



See story in [The Atlantic](#), David Dobbs, Feb 21, 2019

WINTER TICK *DERMACENTOR ALBIPICTUS*



A female "ghost moose" with severe hair loss is seen on cover of *White as a Ghost* by Bill Samuel.



This tick-ravaged moose likely died from the effects of its parasites. Photo Moose Project Staff



The increase in winter tick activity is due in part to warmer winters, but also because the winter tick is a one-host tick whereas each stage of the tick feeds and remains on the animal. Tens of thousands of larval ticks can turn into similar number of adult ticks on an animal.

Asian Longhorned Tick, *Haemaphysalis longicornis*

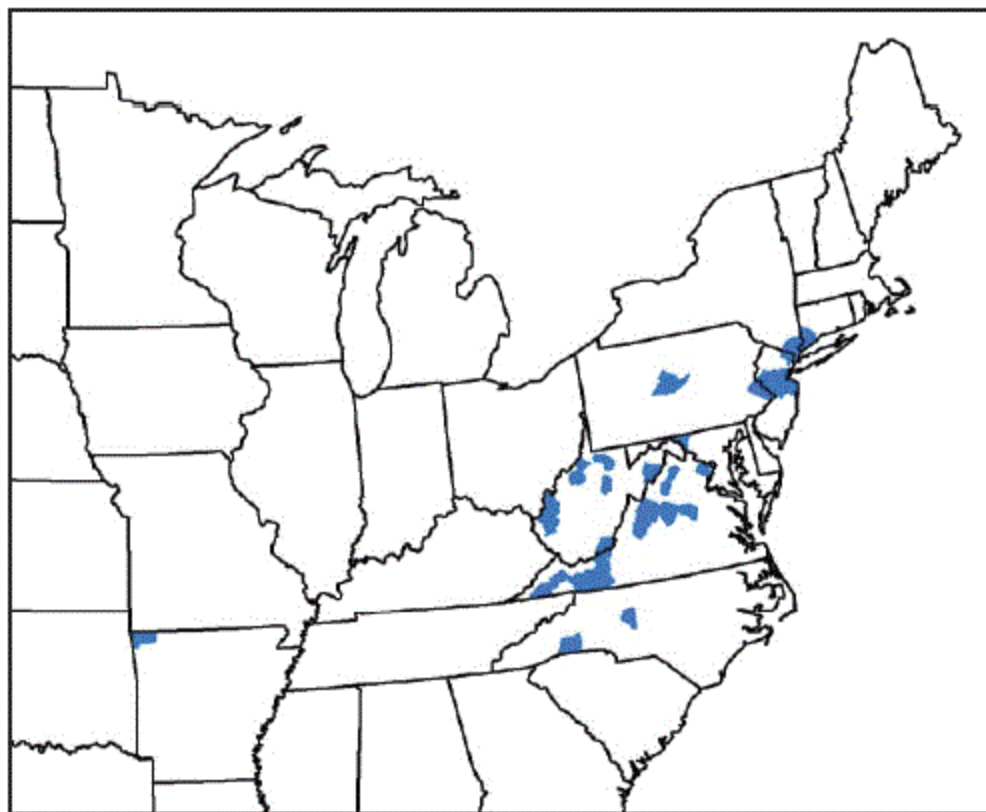


THIS PHOTOGRAPH DEPICTS TWO *HAEMAPHYSALIS LONGICORNIS* TICKS, COMMONLY KNOWN AS THE LONGHORNED TICK. THE SMALLER OF THE TWO TICKS ON THE LEFT, IS A NYMPH. THE LARGER TICK IS AN ADULT FEMALE. MALES ARE RARE. THIS TICK CAN REPRODUCE ASEXUALLY.

James Gathany/Centers for Disease Control and Prevention

New Jersey announced the discovery of an East Asian tick, also known as a longhorned tick, *Haemaphysalis longicornis*, on sheep at a farm in Hunterdon County on 9 Nov 2017. The East Asian tick is considered a serious pest to livestock including cattle, horses, sheep, and goats. It can attack humans, pets and wildlife and is a known vector for a number of human and animal pathogens. It has been detected in at least 9 states and is abundant in NJ and parts of the NYC area.

COUNTIES AND COUNTY EQUIVALENTS* WHERE *HAEMAPHYSALIS LONGICORNIS* HAS BEEN REPORTED (N = 45) — UNITED STATES, AUGUST 2017–SEPTEMBER 2018



CDC/James Gathany

Beard, C. B., J. Occi, D. L. Bonilla, A. M. Egizi, D. M. Fonseca, J. W. Mertins, B. P. Backenson, and e. al. 2018. Multistate infestation with the exotic disease-vector Tick *Haemaphysalis longicornis* - United States, August 2017-September 2018. *MMWR Morb Mortal Wkly Rep* 67: 1310-1313.

HAEMAPHYSALIS LONGICORNIS

BASIC FACTS

- A parthenogenetic/bisexual hard tick species
- Bisexual race occurs in Japan, Korea, and China in conjunction with parthenogenetic race
- Three host tick
- Introduced to Australia in late 1800s
- First discovered in New Zealand in 1911
- Exotic introductions, including US, are parthenogenetic (males rare)
- Can build up high focal populations, especially larvae
- Present in the U.S. since at least 2010 (originally identified as *H. leporispalustris*, rabbit tick)
- Confirmed in 7 counties NJ
- Confirmed in 3 counties NY (Westchester, Rockland, Suffolk) plus NYC (Staten Island)
- Found in variety habitats, short grass, long grass, woods

HOSTS FOR *H. LONGICORNIS*

Dr. Allen C.G. Heath

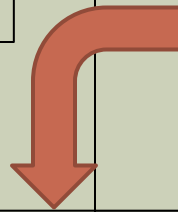
- All classes of livestock: cattle, horses, sheep, goats
- Companion animals
- Wild and feral mammals
- Numerous bird species
- Humans

SE Coop Wildlife Dis Study
University of Georgia

EXPERIENCE NEW YORK

- Dr. Richard Falco, NYS Health, reported that in 2018 the numbers of Asian longhorned ticks collected exploded.
- June 4, 2018 he collected 1 *H. longicornis* nymph
- November 19, 2018
he collected 253 nymphs, 406 adults, 126,968 larvae
- Found in variety of habitats: short grass, long grass, woods
- Found in full sun, partial sun, shade/prefers hot and humid
- Larval peak in late summer/early fall; cluster in large numbers
- Feed on deer (Columbia University)
- Not very aggressive; didn't seem to feed readily on people

TWO NYMPHS ASIAN LONGHORNED TICK DETECTED IN CT 2018



WHERE DO WE GO FROM HERE?

- Lone star tick geographical range is slowly moving northward
- Initiate control program working with NRG Energy and Norwalk Health Department
- First step for the Manresa Island tick population will be proper density assessments in 2018 and 2019 via drag sampling, and deer sampling
- Tick control via passive 4-poster deer treatment station
- Monitoring tick abundance and tick bite records in Norwalk
- State-wide active surveillance in all 8 counties



K. Stafford



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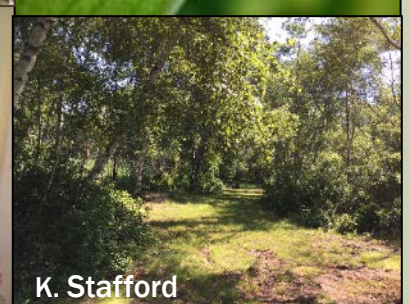
K. Stafford



James Gathany (CDC)



Pfizer



K. Stafford

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Heidi Stuber



Dr. Megan Linske



Dr. Goudarz Molaei



Dr. Kirby Stafford



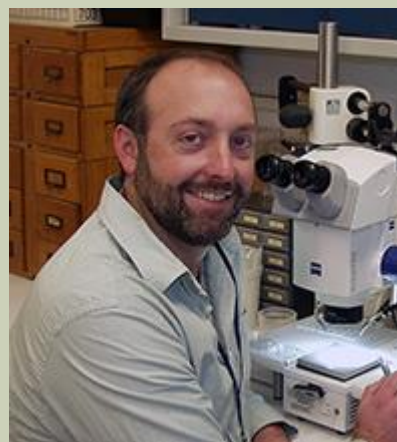
Dr. Eliza Little



Michael Short



Dr. Scott Williams



Dr. Douglas Brackney

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