



"Bugs"

- #CLASSIFICATION:
- #Kingdom: Animal
- #Phylum: Arthropod
- #Classes: Insecta (Hexapod)
Arachnid (Octopod)

"Bugs"

- #Such organisms are everywhere!
- #These creatures adapt to both new and changing environments
- #Human problems involve: chronic infestation, acute bites or stings and transmission of diseases

Loxoscelism

- #Brown recluse spider
Loxosceles reclusa
- #Related species
L. arizonica, L. devia, L. laeta, L. refugesens, L. apachea, L. blanda, L. unicolor (deserta)

Loxosceles Species

Range of recluse (genus *Loxosceles*) spiders in the United States

Brown Recluse Spider

- #*Loxosceles reclusa*
undisturbed areas
- #Violin-shaped marking
- #3 sets eyes (instead of four)
- #Necrotic cutaneous 75%
- #Viscero-cutaneous 25%
Hypotension, shock, hemolysis, convulsions, renal insufficiency, nausea

Brown Recluse Spider



Brown Recluse Spider



Three sets of eyes

Brown Recluse Spider

- #Initial bite: painless
- #Pain: onset 8 hrs, severe by 24 hrs
- #Erythema: 24-48 hrs
- #Edema/central ischemia 48-72 hrs
- #Necrosis develops 7-14 days
- #Sloughing by 21 days

Brown Recluse Spider Bite



Brown Recluse Spider Bite



Brown Recluse Spider

- #Venom is complex
- #Major constituent is hyaluronidase
- #Elastase, collagenase, proteases
- #Sphingomyelinase-D causes cell wall lysis, particularly of platelets and RBC's (anemia, thrombocytopenia)

Brown Recluse Spider: Rx

- ⌘ Early excision of small lesions?
- ⌘ Prednisone 60-100 mg/day?
- ⌘ Dapsone 50-200 mg/day?
- ⌘ Electric current?
"Stun Gun" 40-50kV/4.5 mAmp
- ⌘ Plastic surgical correction of defects indicated later

Brown Recluse Spider

⌘ "No therapy has been firmly established in the scientific literature to be better than simple, conservative care."

Dermatol Clin 15:307-311, 1997

Brown Recluse Spider

- ⌘ Did a brown recluse cause the lesion? Recovery and identification of offending spider is rare!
- ⌘ Alternate considerations:
necrotizing fasciitis, pseudomonas sepsis, thromboembolism, drugs, trauma, vasculitis, factitial, localized bacteria (anthrax, vibrio), calcinosis cutis

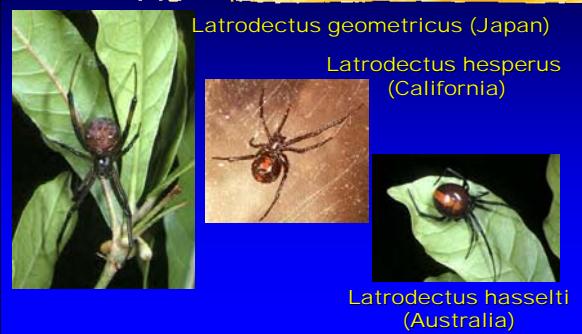
Black Widow Spider

- ⌘ *Latrodectus mactans*
- ⌘ Shy, non-aggressive web weaver
- ⌘ Large, black body w/ red marking often in shape of hourglass
- ⌘ Painless bite, painful 30 minutes
- ⌘ Toxicity 24-48 hours later

Black Widow Spider



Black Widow: Related Species



Black Widow Spider

- #Toxicity: alpha-latrotoxin (strong neurotoxin)
- #Massive release acetylcholine
- #Muscle spasms, headache, insomnia, agitation, lacrimation, salivation, abdominal cramps
- #Rx: Calcium gluconate? Narcotics
- #Anti-venom

Ticks



Ticks: Major varieties

#Amblyomma

- A. americanum (Lone Star Tick)
- A. maculatum (Gulf Coast Tick)

#Dermacentor

- D. andersoni (Rocky Mountain Wood Tick)
- D. variabilis (American dog tick)

#Ixodes

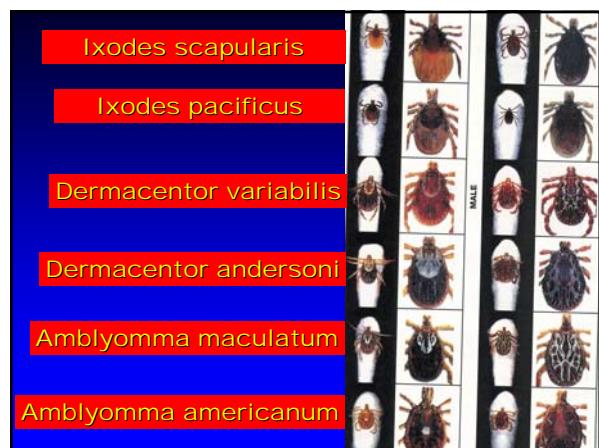
- I. pacificus (Western black-legged tick)
- I. scapularis (Black-legged deer tick)

Ticks: Main Types



Ticks: Major Varieties

	Ornamentation	Long Palps	Festoons
Amblyomma	Yes	Yes	Yes
Dermacentor	Yes	No	Yes
Ixodes	No	Yes	No



Amblyomma americanum
Lone Star Tick



Tularemia
Tick paralysis
Ehrlichiosis

Amblyomma maculatum
Gulf Coast Tick



Gulf coast
Atlantic Seaboard

Tick paralysis

Dermacentor variabilis
Dog tick



Rocky Mountain Spotted Fever
Tularemia
Ehrlichiosis

Dermacentor andersoni
Wood tick



Rocky Mountain Spotted Fever
Colorado Tick Fever
Tularemia

Ixodes scapularis
Black Legged Tick



Lyme Disease
Babesiosis
Ehrlichiosis

Ixodes pacificus
Western Black-legged tick



Lyme Disease
Tularemia
Tick paralysis
Ehrlichiosis

Tick Diseases



- #Rocky Mountain Spotted Fever
Rickettsia rickettsii
- #Lyme Disease
Borrelia burgdorferi
- #Ehrlichiosis
 - HME: *Ehrlichia chaffeensis*
 - HGE: *Ehrlichia equi*
- #Babesiosis
Babesia microti

Tick Diseases



- #Tularemia
Francisella tularensis
- #Tick paralysis
Neurotoxin

Tick Diseases

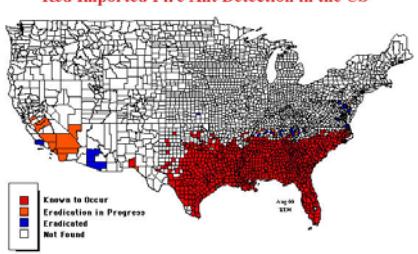


(Imported) Fire ants

- #Originally imported from Paraguay through Mobile, AL in the 1930's
- #Domain has extended to include most of the south and southeast
- #Two species, *Solenopsis invicta* and *Solenopsis richteri*, now are interbred and indistinguishable

Fire Ant Domain

Red Imported Fire Ant Detection in the US



Fire ants

- #Colonial: one or more queens, sexual castes (winged male and female), workers, immature ants
- #Queens lay up to 2000 eggs/day
- #100,000-500,000 ants per colony
- #Aggressive and omnivorous

Fire Ants: Mounds



Fire Ants



Fire Ants

- #STING, not bite; complex venom
- #Local wheal&flare-->sterile pustule
- #Secondary infection (scratching)
- #30% persistent, indurated nodules
- #0.5% anaphylaxis
- #Rare: seizure, stroke, neuropathy

Fire Ants

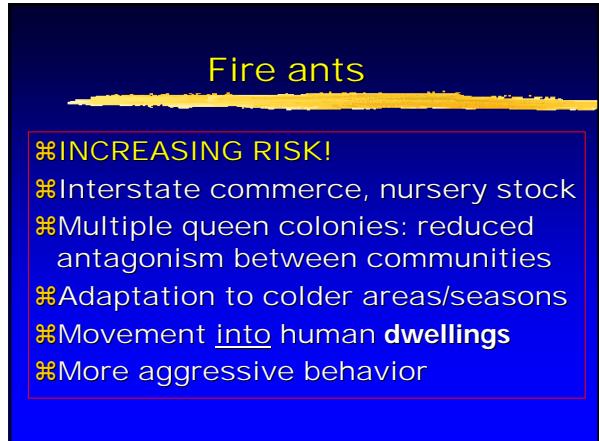
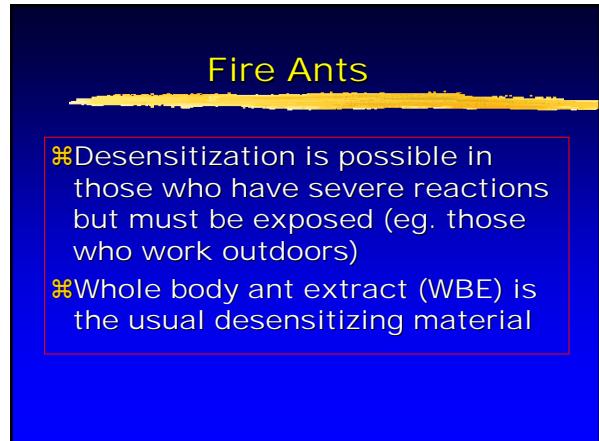
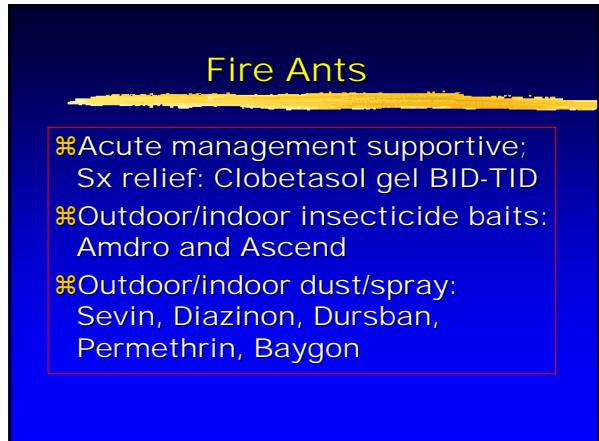
- #Neurologic complications most common in very young or very old
- #Neurologic complications more likely with extensive stings
- #Very high risk in debilitated, non-ambulatory residents of nursing homes

Fire ants

- #DEATHS reported in at-risk individuals, even when stung indoors!
- #*South Med J* 88:712-715, 1995

Fire Ant Sting







Scabies

⌘ *Sarcoptes scabiei*

⌘ Direct skin-to-skin contact
Most often sexual contact
Transmitted by healthcare workers

⌘ Incubation to Sx: 4-6 weeks
Shorter w/ subsequent attacks

⌘ Total mites on body 10-12
Only 5-6 w/ subsequent attacks

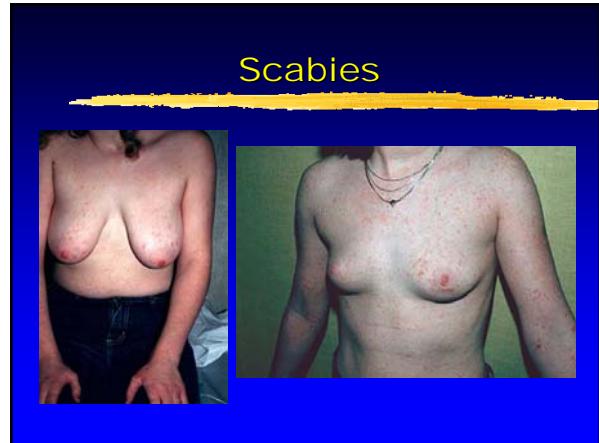
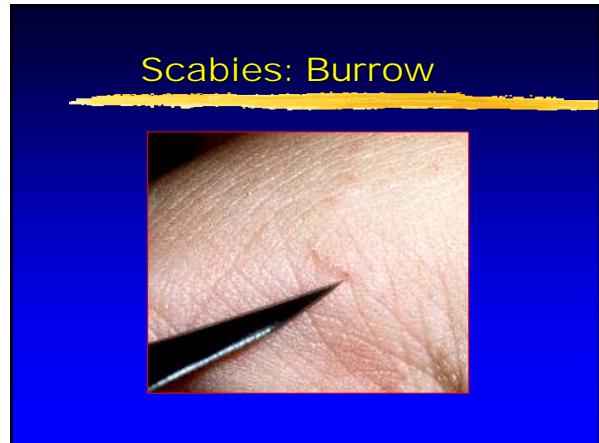
Scabies

⌘ Primary lesion: burrow

⌘ Female crawls in epidermis for 1-2 months laying 10-40 eggs during lifespan

⌘ Pruritus major symptom

⌘ Rash: genitalia, wrists, thighs, areolae, fingerwebs



Scabies

- # Scabies atypical in children!
- # Head/neck, palms and soles
- # Papulovesicular lesions and papulonodular lesions are common

Pediatric Scabies



Scabies

- # "Crusted" or "Norwegian" scabies is another variant
- # Seen with states of both immunocompromise and immunosuppression
- # Thick, crusted, fissured lesions which may lead to sepsis

Scabies in Immunocompromised



Scabies in Immunocompromised



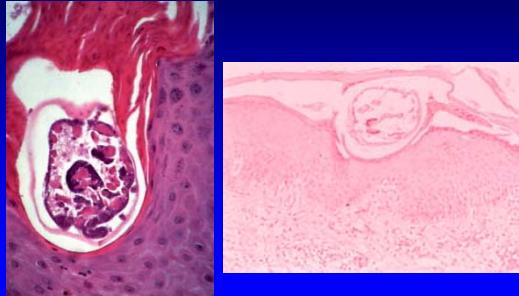
Scabies and HIV

- # 2% of HIV+ individuals have or will develop scabies
- # About 1/3 of such patients will cause hospital epidemic
- # Suspect scabies in any itchy HIV+ patient

Scabies Prep: Diagnosis



Scabies: Histology



Scabies: Rx

- #**Permethrin 5% (Elimite^R):**
Applied 8-12 hours; 1 or 2 times
 - #**Lindane:** Applied 8-12 hours;
requires a second application
 - #**Crotamiton (Eurax^R):** daily x 2-3d
 - #**Sulfur 10% in white petrolatum:**
daily x 2-3d



Scabies: Ivermectin

- ⌘ Stromectol^R tablets 3 mg
 - ⌘ Dose: 200ug/kg single dose (may repeat in two weeks if needed)
 - ⌘ Disrupts neuron chloride ion gate; influx of Cl⁻; massive release GABA; neuron paralysis; parasite death
 - ⌘ Minimal toxicity to humans b/c no susceptible neurons in PNS

Scabies: Ivermectin

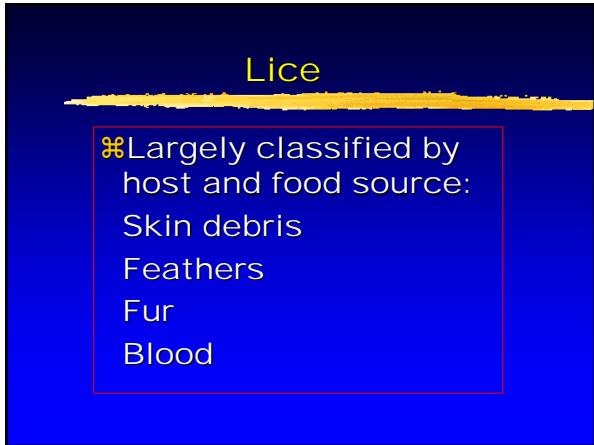
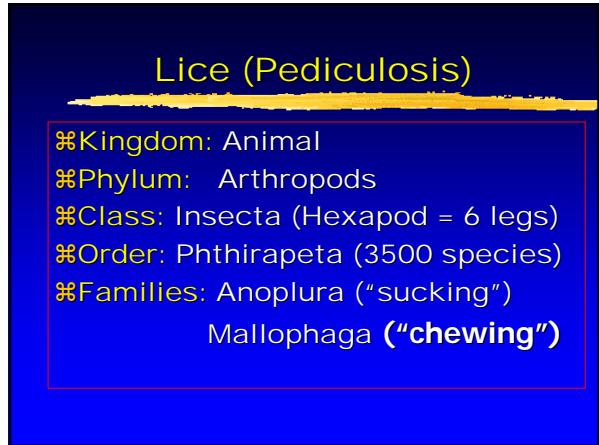
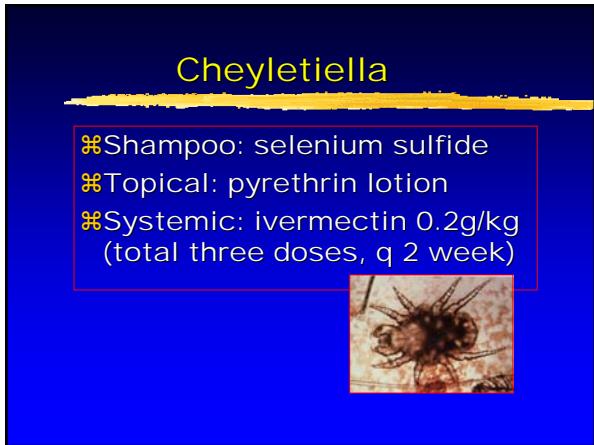
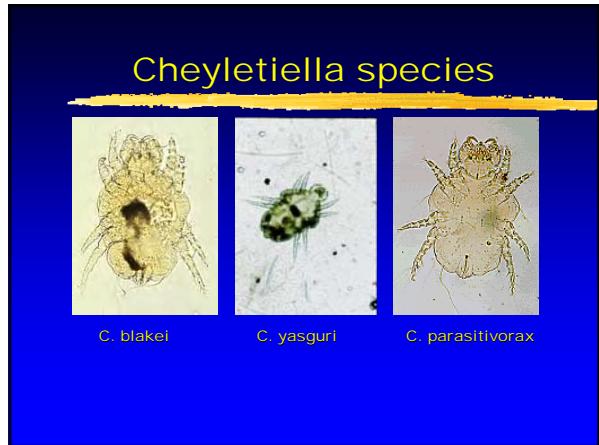
DOSING CHART

15-24 kg	3.0 mg
25-35 kg	6.0 mg
36-50 kg	9.0 mg
51-65 kg	12.0 mg
66-79 kg	15.0 mg
>80 kg	200 µg/kg

NOTE: Not given to children under 15 kg

Cheyletiella

- ⌘ *C. blakei* cats
 - C. yasguri* dogs
 - C. parasitovorax* guinea pigs
and rabbits
 - ⌘ Mite bites an accidental host
(man); self-limited disorder as
mites die; animals = dandruff
 - ⌘ Papules, vesicles on exposed:
arms, anterior thorax, abdomen



Lice: *In our culture!*

- #A lousy problem
- #Get to the nitty-gritty
- #Nit-picking
- #Go over it w/ fine-tooth comb
- #He (she) is such a louse

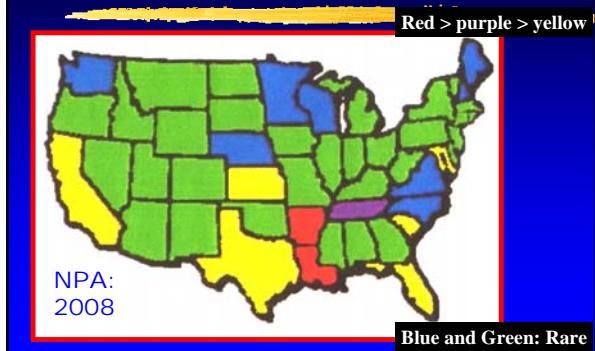
Lice

- #**Head lice**
Pediculus humanus var capitis
- #**Body lice**
Pediculus humanus var corporis
- #**Pubic lice ("Crabs")**
Phthirus pubis

Head lice

- #Obligate human pest: blood meal
- #Female lives 3 wks, lays 100 eggs, attach to hair (nits); eggs hatch in about 10 days; 3 larval forms->adult
- #School kids (20% K-8 grade in urban USA); girls more common than boys; and uncommon in African-Americans (USA v Africa)

Head Lice: USA



Pediculosis (Head Lice)

- #Clinical manifestations
- #Pruritus and excoriation
Represents sensitivity to salivary or fecal antigens
- #Adenopathy (2^o infection)
- #Differential Diagnosis
- #Seborrhea, eczema, tinea

Pediculosis (Head Lice)

- #Diagnosis
- #Find the louse: Hard to do!
Lice move 9 inches/minute
Fine-tooth wet combing
Combing after alcohol applied
- #Find nits:
Occiput/retroauricular scalp

Pediculosis: Head Lice



Pediculosis: Head Lice



Head (Body) Lice



Head Lice: Rx

- # Permethrin 1% (NIX®)
- # Pyrethroids (A-200®, RID®)
- # Lindane shampoo (> age 6)
- # Traditional therapy loses efficacy when used in given region for an extended period

Head Lice: Rx Failures

- # Permethrin 5% (Elimite®)
- # Malathion 0.5% (Ovide®)
- # Petroleum or Mayonnaise 12 hr, Remove w/ Palmolive Green
- # Administration of TMP-SMX
- # "Bug Busting" (wet combings)
- # Ivermectin 250µg/kg (1 dose)

Benzyl Alcohol 5% in 5% Mineral Oil (Ulesfia®)

- # New treatment for head lice
- # ≥ age 6 months
- # Apply and air dry
- # Rinse off in 10 minutes
- # Asphyxiates lice
- # Not ovicidal (2 Rx; 1 week apart)
- # Non-neurotoxic, Non-flammable
- # Cure: 75-76.2% (Vehicle 4.8-26.2%)
- # Itching, irritation, hypoesthesia

Med Lett Drugs Ther 51:57, 2009
Child Health Alert May, 2009 e-pub

Benzyl alcohol 5% in Mineral oil 5%

#Dosage by hair length!

#0-2 inches	4-6oz	2/3-3/4 bottle
#2-4 inches	6-8oz	¾-1.0 bottle
#4-8 inches	8-12oz	1-1.5 bottles
#8-16 inches	12-24oz	1.5-3.0 bottles
#16-22 inches	24-32oz	3-4 bottles
#>22 inches	32-48oz	4-6 bottles

#~\$30 per bottle w/o insurance

Ulesfia® Package Insert; Accessed 12-2009

Head Lice: Rx

- #Nit removal: "No nit" policy
- #15 minute soak w/ 3-5% acetic acid (Pronto®)
- #Rinse w/ 8% formic acid (Step 2®)
- #Soak in enzyme preparation (Clear®) 3-5 minutes

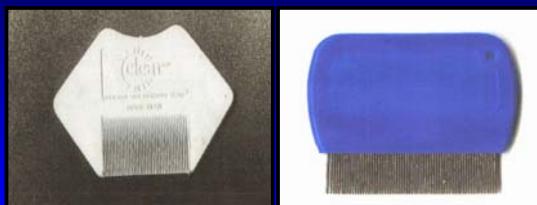
Head Lice: Nit Removal



Head Lice: Nit Removal

- #Many products pre-packaged with plastic comb; Break easily, mainly with long hair
- #Use metal fine-tooth comb
- #Lice Meister® or Acu-Med®
- #Acu-Med has adjustable length teeth; short v. long

Head Lice: Nit Removal

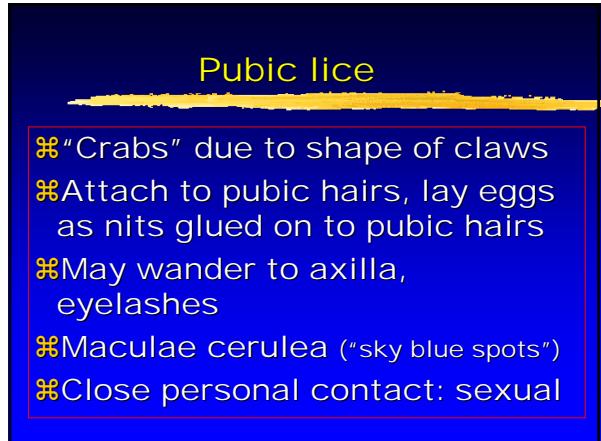
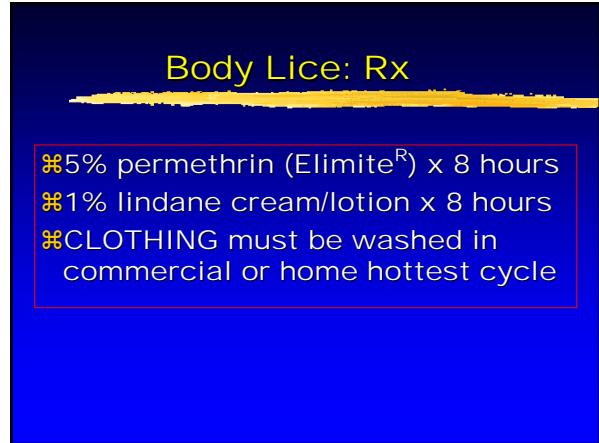
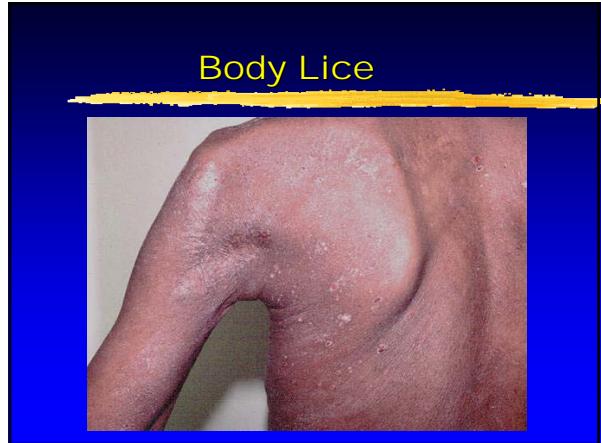


Plastic teeth

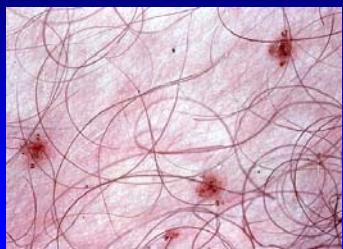
Metal teeth

Body Lice

- #Obligate human pest: blood meal
- #Morphologically = head louse
- #Lice live in seams of clothing; breed and lay eggs in clothing; come to skin just to feed
- #Common crowding/poor hygiene; transmit disease (eg. typhus)



Pubic Lice (Crabs)



Pubic Lice (Crabs)



- # Topical lindane
- # Topical permethrin
- # Topical pilocarpine
- # Ivermectin?
- # Disinfect clothing
- # Disinfect bedlinen

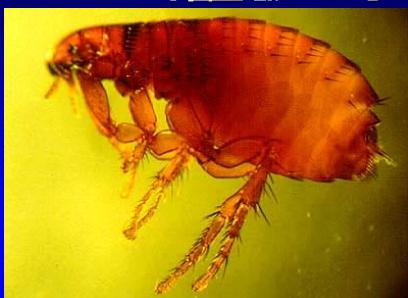
Pubic lice: Rx

- # 5% permethrin (Elimite^R) x 8-10 hrs
- # 1% lindane cream x 8 hours or lindane shampoo x 10 minutes
- # Best to repeat either Rx in 4-7 days
- # Petrolatum to eyelashes TID + manual extraction of smothered lice
- # Daily application of pilocarpine gel

Fleas

- # Common pests of mammals, including house pets
- # *Ctenocephalides canis* (dog)
Ctenocephalides felis (cat)
- # 1/13 inch, flattened, large legs
- # Prolific breeders: lay 1000's eggs
- # Bites: nonspecific; may blister

Flea



Aside from an exterminator...



Bedbug

- # Human bedbug *Cimex lectularis*
- Tropical bedbug *Cimex hemipterus*
- African bedbug *Leptocimex boueti*
- # Pale yellow color, 4-7mm; Hidden in cracks; Lifespan 10 months; Female lays 10 eggs per day;
- # Blood meal at night, painless bite
- # Leaves small wheal/papule, often in groups of 3-4 bite sites
- # NO transmission of human disease*

Bedbug

- # NO transmission of human disease*
- # Debate exists as to whether the bug can transmit endemic/epidemic typhus, plague, Q fever, Hepatitis (A,B or C), and HIV
- # Although there are case reports of each of these, experts' consensus is that this is NOT common

Bedbugs



C. lectularis



C. hemipterus

Bedbug: Feeding



Bedbug Bites



Caterpillars

- # Kingdom: Animal
- # Phylum: Arthropoda
- # Class: Insecta
- # Order: Lepidoptera
- Moths and butterflies
- 140,000 species but 150 "toxic" species

Caterpillars

- # "Lepidopterism"
- # Skin: caterpillar dermatitis
- # May be itchy, burning or painful
- # May be associated with swelling
- # Resolves 2 hours to 10 days
- # Toxin in poison-bearing hairs (setae)

Caterpillars

- # No "universal" toxin common to all pathogenic species
- # Thermolabile proteins
- # Histamine or histamine releasers?
- # Kinin activators?
- # Other vasoactive peptides?

Caterpillars

- # Megalopygidae: most toxic
- # *M. opercularis*, *M. urens*, *M. crispata*
- # Puss caterpillar, asp, wooly slug
- # Atlantic coast to Gulf Coast
- # 20-35mm; thick yellow to grey-colored hairs
- # Erythematous papules
- # 5% shock, 0.25% seizures

Puss Caterpillar



Puss Caterpillar Domain



Puss Caterpillar Sting



Other toxic caterpillars



Io Moth



Saddleback

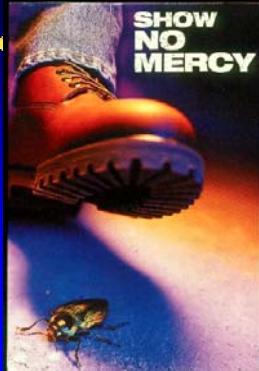
Caterpillar Sting



Caterpillars

- #Treatment: *M. opercularis* sting
- #Supportive, as needed (eg. shock)
- #IM triamcinolone acetonide
- #Calcium gluconate IM?
- #Narcotic analgesics
- #Skin stripping with Scotch tape to remove any additional toxic hairs

SKINsects



THE END