INSECT AND INVERTEBRATE BITES

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- **With forthcoming spring and summer seasons , journeys and picnics visiting increased In wild and gardens synchronized with insects and other invertebrates emergence , causing high bites morbidity ; so my lecture came to elucidate this view .**

Insect and invertebrate bites

- **Learning objectives**

  Identify insect and invertebrate bites and stings and manage their complications

- **Insect-related disease**
- **Insects are arthropods i.e. invertebrates with chitinous exoskeletons, bilateral symmetry, true segmentation and jointed true appendages. Arthropods also comprised arachnids (Spiders and Scorpions) , Myriapoda (centipedes and millipedes) .**
- **The class Insecta includes:**

  Lice (Anoplura); Fleas (Siphonaptera) ;Bedbugs (Hemiptera) ; Flies, mosquitoes (Diptera) ; Bees, wasps and ants (Hymenoptera) ;Beetles (Coleoptera) ; Moths and butterflies (Lepidoptera)

- **Myriapoda Centipedes (chilpoda) have one pair of legs per body segment and millipedes (Diplopoda) have two pairs per segment. Rarely, centipedes may cause painful bites that may ulcerate. Disturbed millibedes do not bite but emit a toxic fluid that irritates the skin and may discolour it brown.**

Flies and mosquitoes

- **Diptera insects have two wings. They are responsible for a lot of discomfort and illness worldwide. E.g. Flies and mosquitoes**
- **Insect bite reactions are a response to irritating salivary secretions injected by the female mosquito to anticoagulate the blood.**
- **Males mosquitoes are harmelss as they do not have piercing mouthparts. The bite may appear urticarial, papular, vesicular, eczematoid or granulomatous.**
- **Other biting flies include sandflies (Plebotomus), midges, horse flies, deer flies and black flies.**
- **Variation in sweat composition causes differential attractiveness to mosquitoes within and between individuals. Higher probability of mosquito bites is associated with increasing age in children, male gender, large body size, pregnancy, and alcohol ingestion**
- **Advice to Cleanse bites thoroughly with soap and water to avoid secondary infection.**

- **Immediate urticarial reaction**

- **Bullous insect bite**

- **Multiple bites**

SKEETER SYNDROME

- **Skeeter syndrome is a mosquito saliva-induced large local inflammatory reaction clinically resembling cellulites.**
- **Lesions are red, itchy, warm swellings appearing within minutes of bite and itchy papules, ecchymotic, vesiculated, and bullous reactions appearing 2 to 6 hours afterwards and persisting for days or weeks with or without fever.**
- **Severe reactions are treated with systemic prednisone**

Papular urticaria

- **Papular urticaria describes clusters of irritable urticated papules, most often due to bites by mosquitoes, sandflies , fleas. mites or sometimes bed bugs.**
- **Each spot is erythematous but may have a pale centre, and elevated (urticated). There is often a central punctum at the site of penetration of the insect bite or sting and a vesicle may appear.**
- **Lines of bites are characteristic. A few individuals may have bullous lesions, especially tourists exposed to new insects.**
- **Older lesions tend to be excoriated firm papules with scabs and crusts**

Papular urticaria

- **Children with papular urticaria**
- **may present with numerous lesions on exposed areas, particularly the lower legs but also arms, cheeks and waistline. Papules may persist for weeks, and older lesions may reappear with new crops presumably in response to new bites.**
- **Post inflammatory hypo- or hyper pigmentation and scars are common. The eruption may be seasonal, dying down in mid-winter to reappear in spring for two or three seasons until immune tolerance occurs.**
- **Histology shows localised perivascular lymphohistiocytic infiltrate with eosinophils, oedema, spongiosis and vesicle formation. Older lesions are modified by effects of scratching with epidermal necrosis, crusting and an increased proportion of neutrophils.**

Differential diagnosis includes:

- Atopic dermatitis
- Scabies
- Dermatitis herpetiformis
- Prurigo mitis
- Chickenpox
- True urticaria
- Delusions of parasitosis
- Papular drug eruption
- Polymorphous light eruption

- **Management should emphasise identification of the source of bites and prevention.**
- **Protective clothing; avoid wearing bright colours and scents**
- **DEET (diethyltoluamide) insect repellents to exposed skin**
- **Antihistamines to reduce the severity of urticarial wheals**
- **Topical steroids to reduce itching**
- **Antiseptic creams to reduce secondary infection**

Bees, wasps and ants

- **Hymenoptera species have poison glands; their stings produce immediate stinging and pain.**
- **Bees and wasps are prevalent worldwide.**
- **Ants cause little damage, but fire ants in South and North America are very troublesome.**

bees

- **Venoms contain protein antigens which elicit an IgE antibody response**

Major problem is allergic reactions and anaphylaxis
Group I – local response
Group II – Mild systemic reactions ,Generalized itching and urticaria
Group III – Severe systemic reactions
Wheezing, angioneurotic edema
Group IV – Life threatening reactions Laryngoedema, hypotension, shock
Occurs in 0.5-5% of the population from insects

Reactions to hymenoptera **stings** include:

- **Local erythematous wheal that subsides within a few hours (normal reaction)**
- **Extensive swelling and induration that lasts for days due to venom-specific IgE and cell mediated reaction**
- **Bullous reactions**
- **Systemic anaphylaxis including urticaria, angioedema, bronchospasm and hypotension**

- Reactions to bee sting

Localised swelling

Blistering

Management

- Remove the stinger from honey bee stings using a forceps. Cool compresses, calamine lotion, analgesics and antihistamines are helpful. Severe swelling may be reduced by systemic steroids.
- Anaphylaxis should be managed by:
- Subcutaneous adrenaline 0.5 ml 1:1000
- Oral, IV or IM antihistamines
- Oxygen
- Systemic steroids if symptoms persist for longer than 20 minutes
- Venom immunotherapy
- Affected individuals should carry adrenaline for self-administration (EpiPen).

Fire Ants

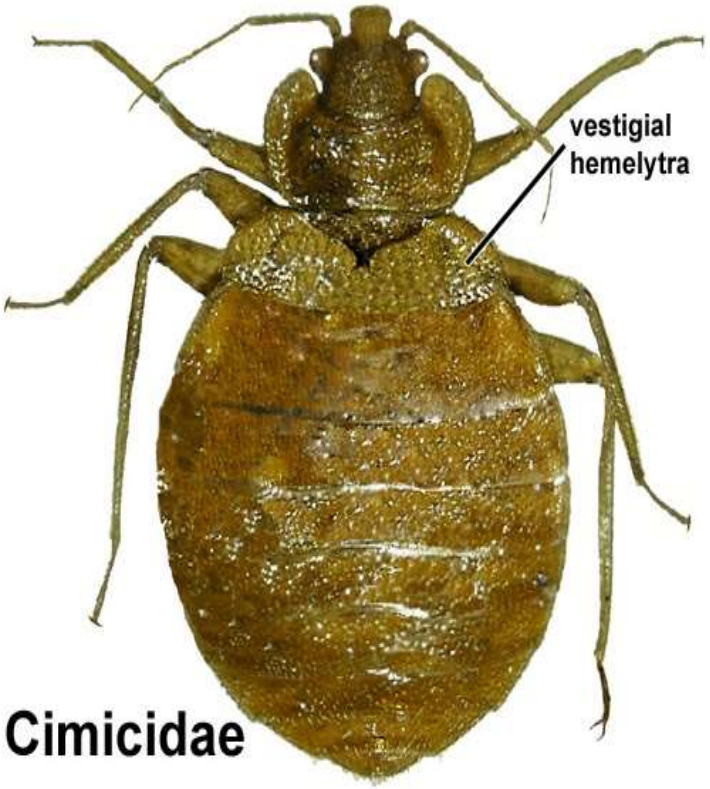
- **Wingless member of *Hymenoptera***
- **Bites with jaws and pivots head to give multiple stings**
- **Venom is an alkaloid with direct effect on mast cell membranes**

Solenopsis richteri and *Solenopsis invicta*

Reactions to Bites

- **Immediate – wheal and flare**
- **4 hrs – vesicle**
- **8-10 hours – vesicle becomes umbilicated pustule**
- **24 hrs – vesicle surrounded by painful erythematous area that lasts 3-10 days**

Bedbugs



- **Hemiptera mostly feed on plant matter.**
- **Bedbugs feed on humans.**
- **The bedbug (*Cimex lectularius*) is readily seen as it is 3-6mm in length, flat, broad and wingless. It hides during the day in cracks within head boards, skirting boards, behind wallpaper, between the sheets, in suitcases and clothing.**

- **Bedbug bites most often present as papules with a central hemorrhagic dot but blisters are sometimes observed.**

Other insects

- **Beetles (Coleoptera) comprise 250,000 species or more. About 200 of them produce blisters on contact with the skin due to the production of cantharidin .**
- **Carpet beetles can cause an allergic papulovesicular dermatitis on exposed areas.**
- **It may be due to the larvae of *Anthrenus spp.* or *Attagenus sp*. The larvae are scattered over the carpet (or other wool, fur and feathers).**
- **Ladybird bites rarely may cause superficial necrotic papules., the species responsible is *Diomus notescens***
- **Affected areas should be washed and bandaged.**

Moths and butterflies (Lepidoptera)

- **may have irritating and allergenic hairs (setae).**
- **Contact with the certain caterpillars e.g. the unwanted gypsy moth (*Lymantria dispar*) causes linear arrays of pruritic papules that persist for several days.**
- **Severely affected people may also have respiratory difficulties.**
- **It is not clear whether the effects are due to mechanical irritation, toxin injection or cell-mediated hypersensitivity.**
- **Symptoms can be relieved with oral antihistamines and local antipruritic lotions. The setae can be removed from the skin by adhesive tape stripping.**

Localised vasculitis to unknown arthropod

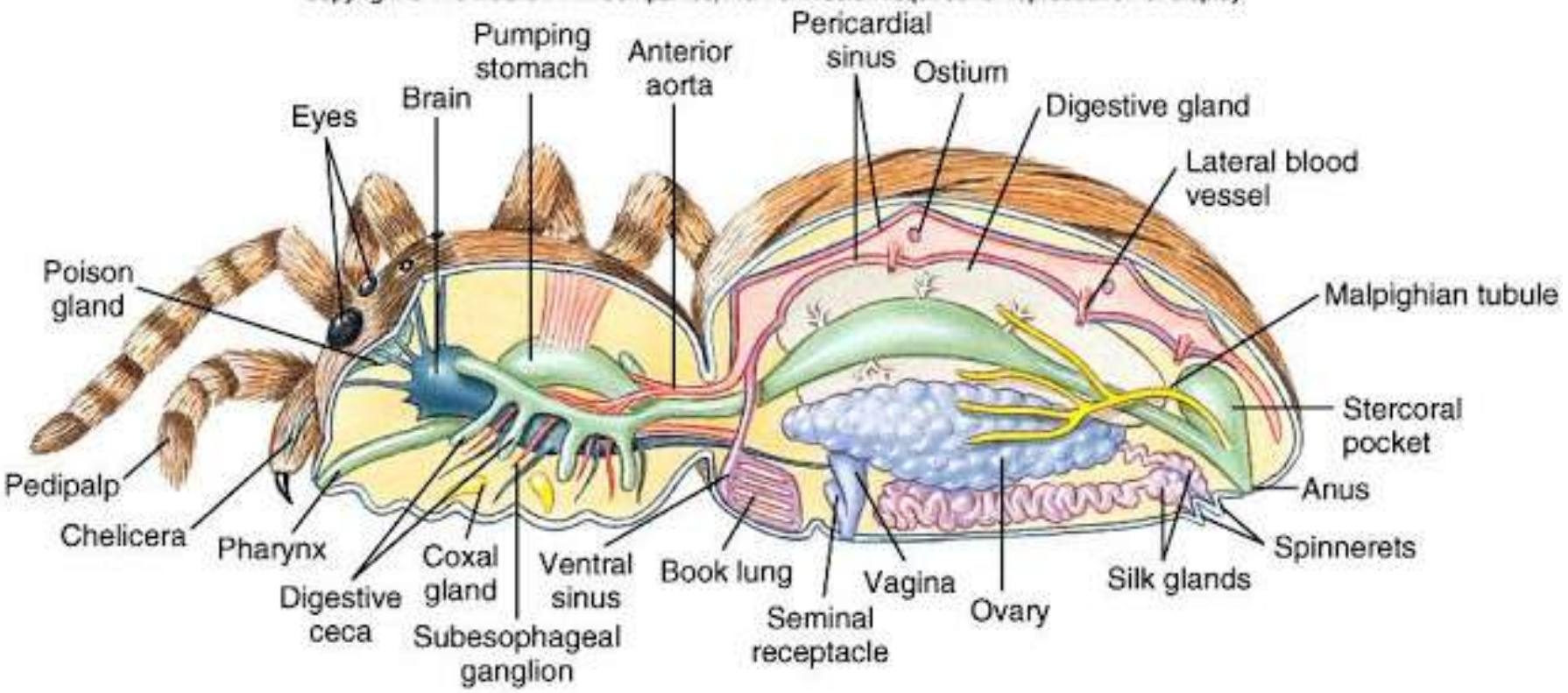
Ladybird bite

Arachnid-related disease

- **The class Arachnida includes spiders, ticks, mites and scorpions.**
- **They are arthropods, which are invertebrates with chitinous exoskeletons, bilateral symmetry, true segmentation and jointed true appendages.**
- **Arachnids adults without wings or antennae, four pairs of legs and two body segments.**
- **They act as parasites by living on the skin (scabies mites) or transiently feeding through the skin (ticks ,lice). Irritant and allergic reactions occur in the human host. Ticks and mites may transmit other contagious diseases.**

Spider bites

- **32 spp. Of 29 genera and 16 families Aveliable in Iraq ;Few spiders are dangerous to humans.**
- **Syndrome called the "Necrotic Arachnidism "**
- **The majority of medically important spider bites can be attributed to Black widow spiders (Latrodectus spp.),*L.mactans* and recluse Brown spiders (Loxosceles spp.)*, L. laeta***
- **Latrodectus bites are painful and may rapidly result in local erythema, sweating and piloerection at the wound site.**
- **Black widow venom causes depletion of acetylcholine at motor nerve endings and release of catecholamines at adrenergic nerve endings. The result is agonising abdominal pain and muscle spasm, headache, paresthesias, nausea, vomiting, hypertenion and paralysis. Luckily death is uncommon.**
- **Treatment is with intravenous calcium gluconate, analgesics and antivenin.**



- **Necrotizing spider bites may arise painlessly but later result in painful erythematous plaques and vesiculation.**
- **Tissue necrosis and mild systemic toxicity arises 3 or 4 days later. The wound forms an scar between the 5th and 7th day.**
- **Histology :neutrophilic perivasculitis , haemorrhage and oedema.**
- **Older lesions have epidermal necrosis, ulceration, arterial wall necrosis and a prominent eosinophlic infiltrate.**




Loxosceles reclusa

- **White tail spider**

Tarantulas

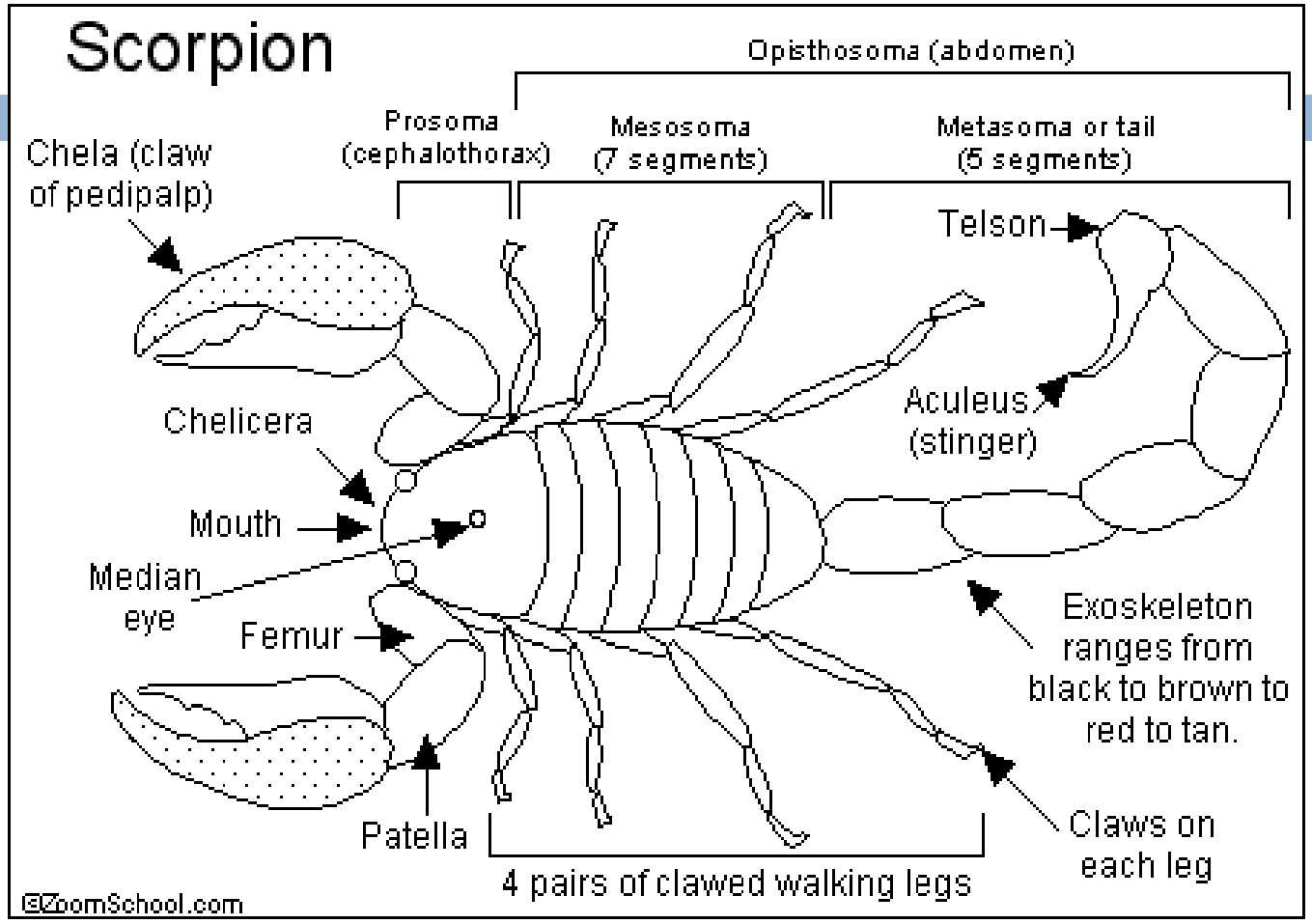
Ticks

- **Ticks are very important vectors of systemic disease and ingest blood from diverse vertebrate hosts.**
- **They are attracted to the host by sweat, white colour and body heat. They look for a protected site to feed such as a skinfold, engorge themselves with blood and drop off a day or so later.**
- **The bites are not painful. Tick neurotoxin intoxication, Ixodes, Dermacentre**
- **Tick releases neurotoxin producing cerebellar dysfunction and ASCENDING Weakness Latent period for 4-7 days**
- **They may induce foreign body and hypersensitivity reactions, usually a red papule at the bite site. The lesion may persist for months forming a granuloma.**
- **The most effective tick repellents are permethrin applied to clothing and DEET on exposed skin surfaces.**

- Ticks are responsible for the spread of many contagious diseases, including:
- Lyme disease, babesiosis, and human granulocytic ehrlichiosis (Ixodes hard ticks)
- Tularemia
- Rickettsial diseases including Rocky Mountain spotted fever & typhus

Scorpions

- **Scorpions such as *Centruroides sculpturatus* available in Iraq; & especially the species *Hemiscorpius lepturus* with local call " Al – jarar " is distributed in Mandeli a town in Diyala**
- **have a bulbous sac and pointed stinger at the end of the tail-like abdomens produce neurotoxins, and strong claws to grasp their prey.**
- **Pseudoscorpions can be confused but don't have a stinging tail.**
- **Scorpion stings produce immediate pain followed by spreading numbness due to neurotoxins.**
- **Some species in arid areas of the USA and North Africa result in generalised neurotoxicity and death.**
- **Specific antivenin is available.**


Scorpion
Opisthosoma (abdomen)
Prosoma (cephalothorax)
Mesosoma (7 segments)
Metasoma or tail (5 segments)
Chela (claw of pedipalp)
Telson
Chelicera
Aculeus (stinger)
Mouth
Median eye
Femur
Exoskeleton ranges from black to brown to red to tan.
Patella
Claws on each leg
4 pairs of clawed walking legs
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Immdiate Scorpions neurotoxin intoxication

- **Injects an excitatory neurotoxin affecting autonomic and skeletal nervous systems**
- **-minimal local edema**
- **Pain, restlessness, hyperactivity, roving eye movements, respiratory distress/failure**
- **Convulsions, drooling, hyperthermia, tachycardia**

Follow up Scorpions neurotoxin intoxication

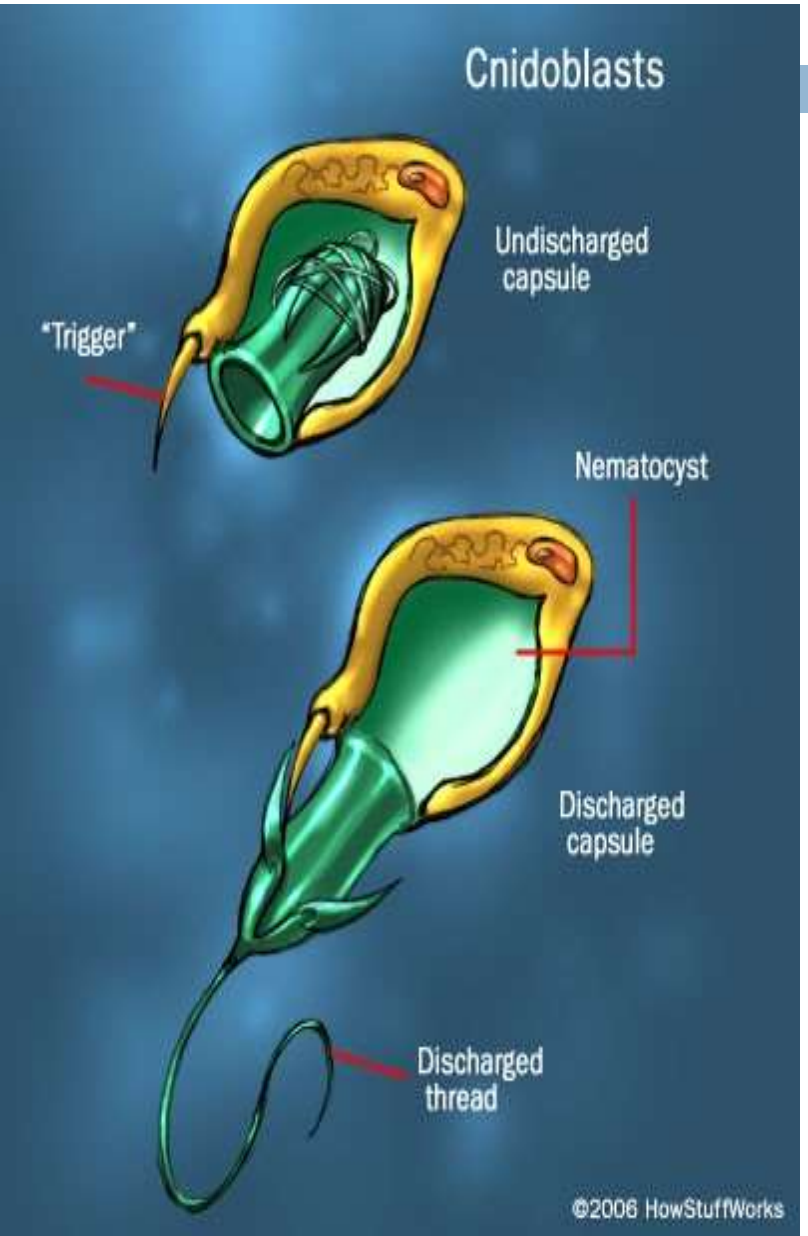
- 2-8 hours
  - Local reaction with mild-moderate pain
  - Erythema, central blister or pustule
- 24 hours
  - Fever, chills, malaise weakness, N/V, rash with petechiae, joint pain, DIC, hematuria, renal failure, hemolysis, respiratory failure
  - Subcutaneous discoloration that spreads over
- 3-4 days
  - Spreads to 10-15 cm
  - Pustule drains leaving ulcerated crater that scars
- Scar formation is rare if no necrosis after 72 hrs
- Reaction varies according to amount of envenomation

Follow up Scorpions neurotoxin intoxication

Class Myriapoda

- Centipedes
  - Bites with jaws that act like stinging pincers
  - Extremely painful
  - Toxin is innocuous – local reaction only
- Millipedes - harmless
- Treatment
  - Local anesthetic at wound site
  - Local wound care

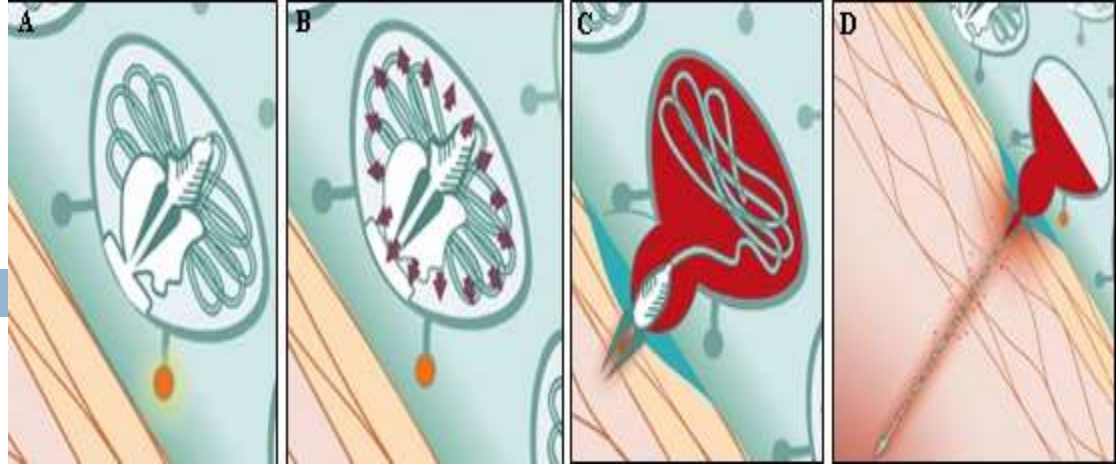
Jellyfish Sting



Jellyfish Stings: Hi-Tech Microinjections

- **Jellyfish, sea lice, sea nettle, coral, sea anemone and other organisms belonging to the phylum Cnidaria are all equipped with stinging cells (nematocysts).**
- **These stinging cells comprise a capsule containing a tightly-packed tubule with an eversible needle, and potent toxins.**
- **The needle discharges when the hydrostatic pressure inside the capsule has built up to 200 atmospheres. This is about 100 times the pressure in a car tire, and is similar to the pressure in scuba diving tanks.**
- **When the jellyfish comes into contact with its target, the needle is fired from the capsule at an acceleration of up to 40 000 x g, similar to the acceleration of a shell fired from a cannon.**
- **The jellyfish toxins are delivered into the prey through the needle, which resembles a multi-headed poisonous arrow.**

How Jellyfish Sting



- A. **Stimulants** from the skin initiate discharge process
- B. High internal **pressure** of 200 atmospheres builds up in the capsule
- C. With an acceleration of 40 000 x g, the **needle pierces** the skin
- D. The tubule follows the needle, and **poison is injected** into the body