CDC

TRAINING PROGRAM

ENVENOMIZATION

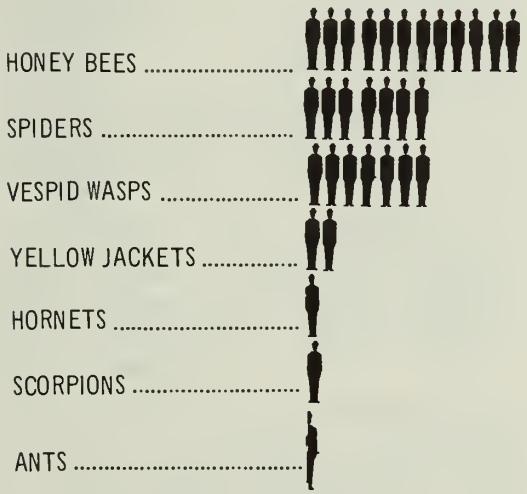
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
COMMUNICABLE DISEASE CENTER
ATLANTA, GEORGIA 30333

ENVENOMIZATION

Harold George Scott, Ph.D. — 1966

ENVENOMIZATION (GENERAL)

Envenomization (injury from venoms produced by insects and other animals) is a common public health hazard. Millions of people in the United States are stung by venomous arthropods each year. About 25,000 of these envenomizations result in severe injury, and about 30 of them result in deaths — 12 from bees, 7 from spiders, 7 from wasps, 2 from yellow jackets, 1 each from hornets and scorpions, and about 1 every 2 years from ants. This mortality contrasts markedly to the usual 14 deaths per year that are caused by venomous snakes. Probably many deaths that are caused by venomous animals are never reported as so caused.



Clinical manifestations associated with envenomization include anaphylactic shock, tick paralysis, necrotic arachnidism, pediculosis, scabies, sugar itch, grain itch, grocer's itch, straw itch, chigger dermatitis, and allergic asthma.

VENOMS (GENERAL)

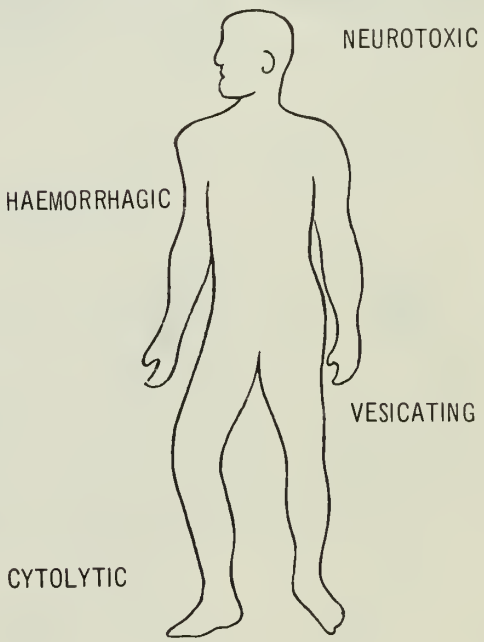
Venoms that are produced by arthropods are mixtures of four toxin types:

Vesicating Toxins — That produce blisters

Neurotoxins — That attack the central nervous system (and which may cause death through respiratory paralysis)

Cytolytic Toxins — That destroy tissue

Haemorrhagic Toxins — That prevent the blood's normal clotting



PICTORIAL KEY TO SOME ADULT BUGS THAT MAY BITE MAN

Harry D. Pratt and Chester J. Stojanovich

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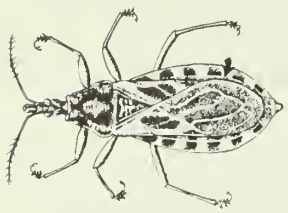
Communicable Disease Center
Atlanta, Georgia
1962

wings usually well-developed; body elongate-oval

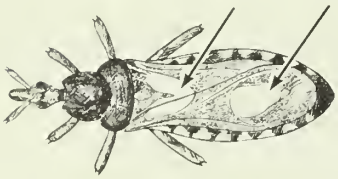


ASSASSIN AND KISSING BUGS–FAMILY REDUVIIDAE

thorax with cog-wheel crest

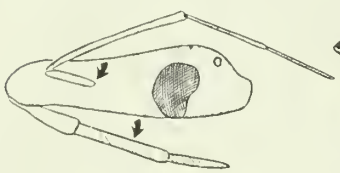
WHEEL BUG
Arilus cristatus

fore-wing with 2 yellow spots



CORSAIR
Rasahus biguttatus

antenna inserted midway between eye and tip of head; beak slender, straight

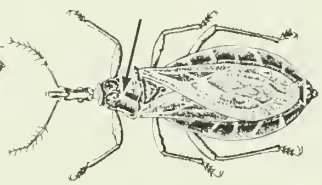


KISSING BUG
Triatoma spp

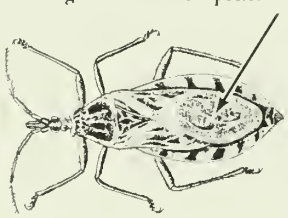
pronotum constricted behind middle

BLACK BUG
Melanolestes picipes

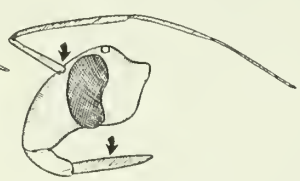
thorax without crest



fore-wing dark in U. S. species



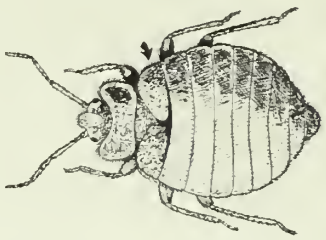
antenna inserted near eye; beak stout, curved



pronotum constricted before middle

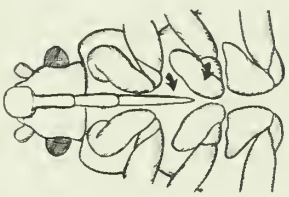
MASKED HUNTER
Reduvius personatus

wings reduced; body broadly-oval



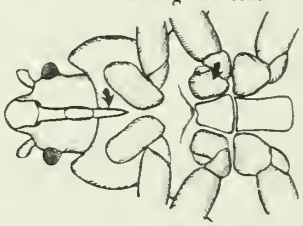
BED BUGS–FAMILY CIMICIDAE

middle coxae nearly touching
beak reaching 2nd coxa



POULTRY BUG
Haematosiphon inodorus

middle coxae widely separated
beak not reaching 2nd coxa

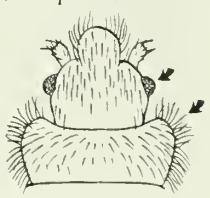


3rd and 4th antennal segments equal

BARN SWALLOW BUG
Oeciacus vicarius

4th antennal segment shorter than 3rd

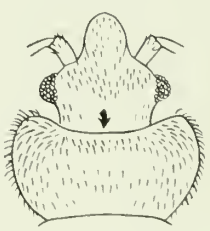
fringe hairs on pronotum longer than, or equal to, width of eye



BAT BUGS
Cimex adjunctus E. N. AM.
Cimex pilosellus W. N. AM.

fringe hairs on pronotum shorter than width of eye

pronotum with anterior margin moderately excavated



TROPICAL BED BUG
Cimex hemipterus
SO. U.S. & TROPICS

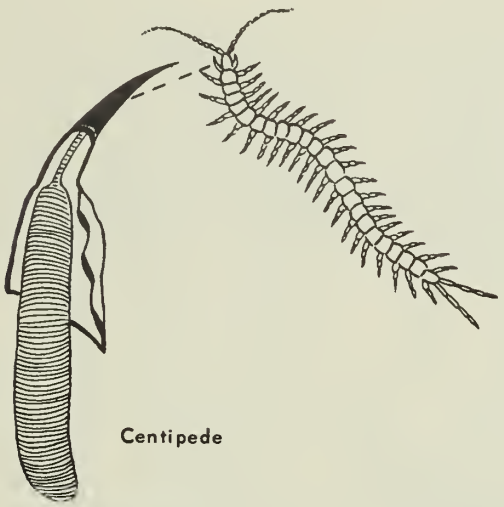
pronotum with anterior margin deeply excavated

BED BUG
Cimex lectularius
TEMPERATE AREAS

The venom of blister beetles is strongly vesicating; that of black widow spiders is strongly neurotoxic. The venom of brown spiders is strongly haemolytic, and that of horse flies is strongly haemorrhagic. The toxicity of venom varies with several factors: geographic source, the seasons of the year, the individual arthropod, and the individual human being. All envenomization should be treated by a physician.

CENTIPEDES

Centipedes, or "hundred-leggers" are fast-moving, elongate arthropods having one pair of legs per body segment. The venomous fangs are modified legs of the first body segment.



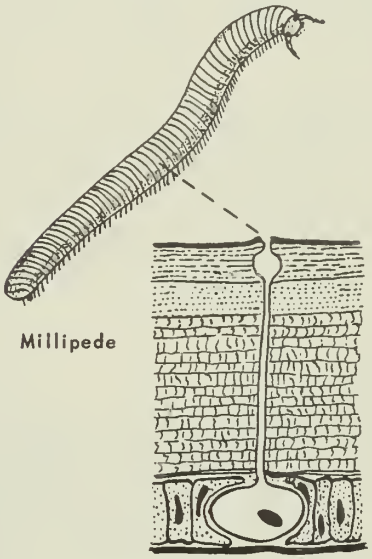
Centipede

Many species are capable of inflicting venomous bites on man, but death from centipede bite rarely occurs. In all cases of centipede bite, the wound should be disinfected and a physician consulted.

Some species of *Scolopendra* (western half of the United States) attain a length of 6 to 8 inches and are greatly feared. The eastern house centipede *(Scutigera cleoptrata)*, which commonly invades homes, does not bite man. Some large centipedes can puncture the skin with their tarsal ("foot") claws. No venom is involved, but secondary infection may occur unless the wounds are disinfected.

MILLIPEDES

Millipedes, or "thousand leggers", are slow-moving elongate arthropods having two pairs of legs per body segment. They are sometimes mistaken for centipedes which they resemble superficially but to which they are only distantly related. Many millipedes exude a vesicating (blistering) venom and may cause injury to persons handling them *(Julus, Orthoporus, Spirobolus, Spirostreptus)*. Some are capable of squirting vesicating venom some distance *(Rhinocricus)* and may cause severe injury to the eyes as well as the skin. In



Millipede

recent years, numerous complaints have been received of millipedes invading homes or climbing the sides of houses in tremendous numbers after nightfall.

SCORPIONS

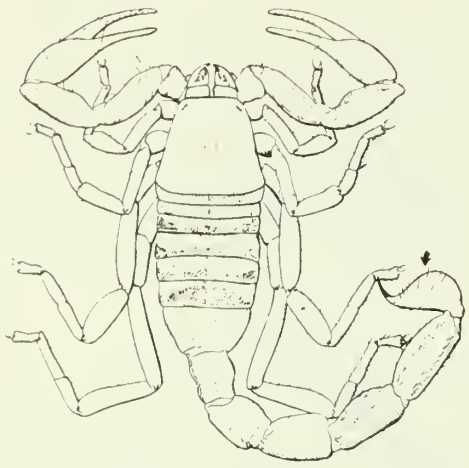
Scorpions are venomous arachnids common in the United States south of a line drawn between Baltimore, St. Louis, Salt Lake City, and San Francisco. They rarely sting man, and then only when provoked. Few species are deadly, but scorpions are common and all scorpion stings should be considered dangerous. Most ground scorpions *(Vejovis, Hadrurus, Diplocentrus)* inject a strongly haemolytic toxin which produces a local reaction (painful swelling, discoloration at site of sting, tissue death) which may be followed by generalized reactions (as semiparalysis of the tongue). Bark scorpions *(Centruroides sculpturatus* and *C. gertschi)*, found only in southern Arizona, inject strongly neurotoxic venom and may

SCORPIONS- PICTORIAL KEY TO SOME COMMON UNITED STATES SPECIES

Chester J. Stojanovich and Harold George Scott

U. S. DEPARTMENT OF HEALTH EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE Communicable Disease Center
Atlanta, Georgia
1963

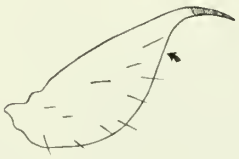
stinger with many setae



Hadrurus arizonensis
OLIVE HAIRY SCORPION

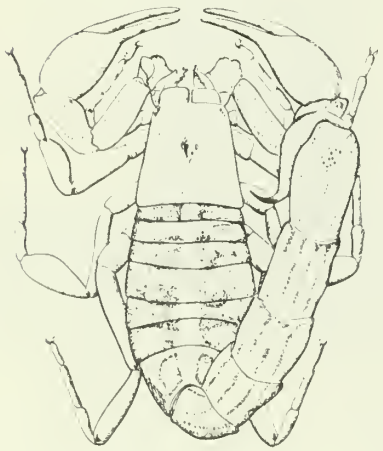
stinger with few setae

stinger without subaculear tooth



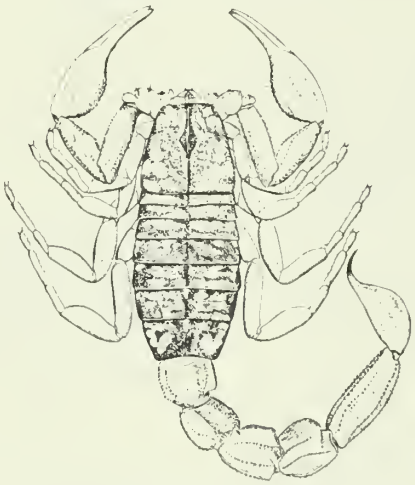
stinger with subaculear tooth

body striped dorsally



Vejovis spinigerus
STRIPE-TAIL DEVIL SCORPION

body patterned dorsally

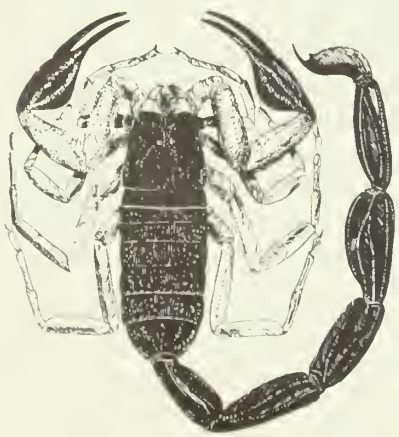


Vejovis carolinianus
SOUTHERN DEVIL SCORPION

body not striped or patterned

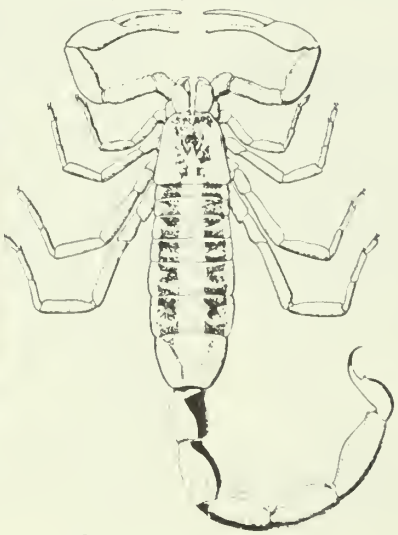
Vejovis flavus
SLENDER DEVIL SCORPION

body black dorsally



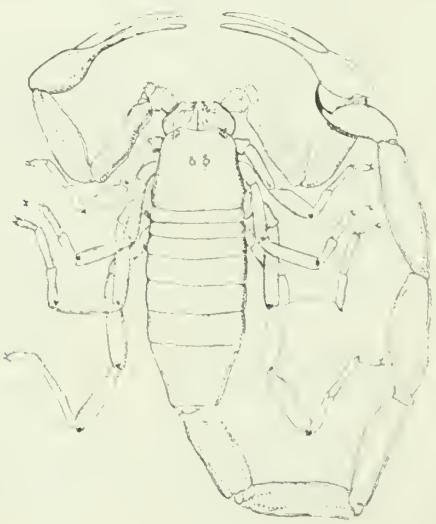
Centruroides margaritatus
BLACK SCORPION

body striped dorsally

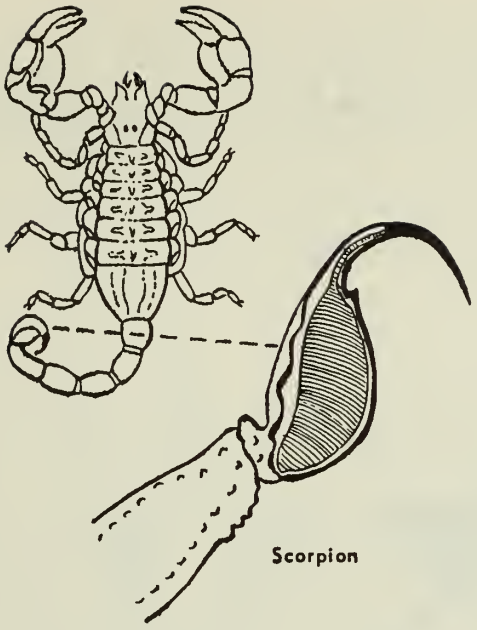


Centruroides vittatus
STRIPE-BACK SCORPION

body yellow dorsally



Centruroides sculpturatus
DEADLY SCULPTURED SCORPION

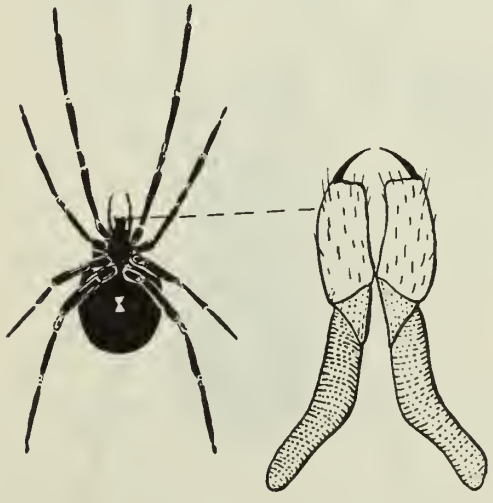


Scorpion

cause death. The Durango scorpion *(Centruroides suffusus)* of Mexico stung 1,500 people (with 800 clinical cases) in 1955. Thousands of persons were stung following floods at Colima, Mexico in 1959. Whip scorpions (vinegaroons) are greatly feared but are not venomous.

SPIDERS

Spiders are venomous arachnids, common throughout the world. Most are "field" spiders which feed on other arthropods and are generally beneficial to man. A few species, such as the black widow *(Latrodectus mactans)* and brown spider *(Loxosceles reclusa)* can, by biting, cause extreme pain, and can even incapacitate, and kill human beings.



Black Widow Spider

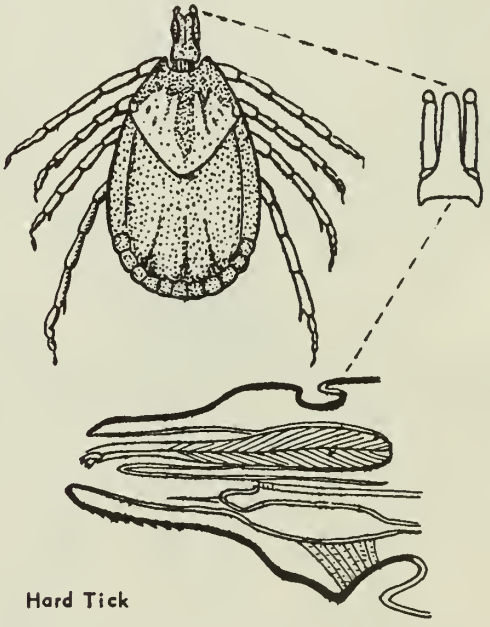
The venom of the black widow spider is strongly neurotoxic and causes severe symptoms (excruciating pain; violent abdominal cramps; rigid, board-like abdomen; profuse perspiration, difficulty in breathing or talking; and a characteristic respiratory grunt). However, death occurs only in about 5 percent of the untreated cases that have been bitten by this spider. A black widow spider bite need never be fatal if it is treated promptly by a physician.

Brown spider venom is strongly haemolytic and vesicating, and inflicts severe tissue damage – but death is rarely caused by the bite of this spider.

Chiracanthium diversum is a dangerous haemolytic spider in Hawaii.

TICKS

Ticks inject a haemorrhagic-neurotoxic venom, reaction to which varies from mild irritation to paralysis. Since they remain attached for long periods of feeding, ticks may inject large amounts of venom.



Hard Tick

Blood loss from tick feeding may result in severe anemia or even death in large mammals. Tick paralysis, usually produced by engorging female ticks, is caused by a neurotoxic fraction in the saliva, possibly a foreign protein

SPIDERS: KEY TO SOME IMPORTANT UNITED STATES SPECIES

Harold George Scott & Chester J. Stojanovich

1. Fangs projecting horizontally (Fig. 1 A). (abdomen without tergites; tarsus with claw tufts and 2 claws) ..... Dugesiella hentzi and others, TARANTULAS

   Fangs projecting vertically (Fig. 1 B) 2

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PUBLIC HEALTH SERVICE, Communicable Disease Center
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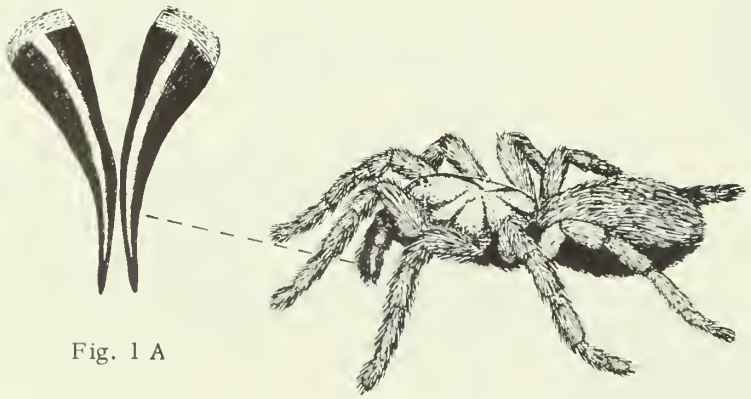


Fig. 1 A

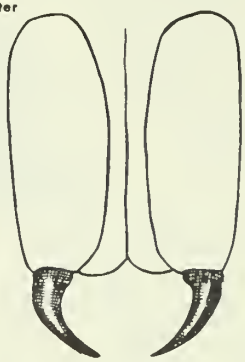


Fig. 1 B

2. Six eyes in 3 pairs; fiddle-shaped marking on cephalothorax (Fig. 2 A) .....
   Loxosceles reclusa ..... BROWN RECLUSE SPIDERS

   Eight eyes (shiny black with red spots; usually with red hourglass on underside of abdomen) (Fig. 2 B).
   Latrodectus mactans ..... BLACK WIDOW SPIDER

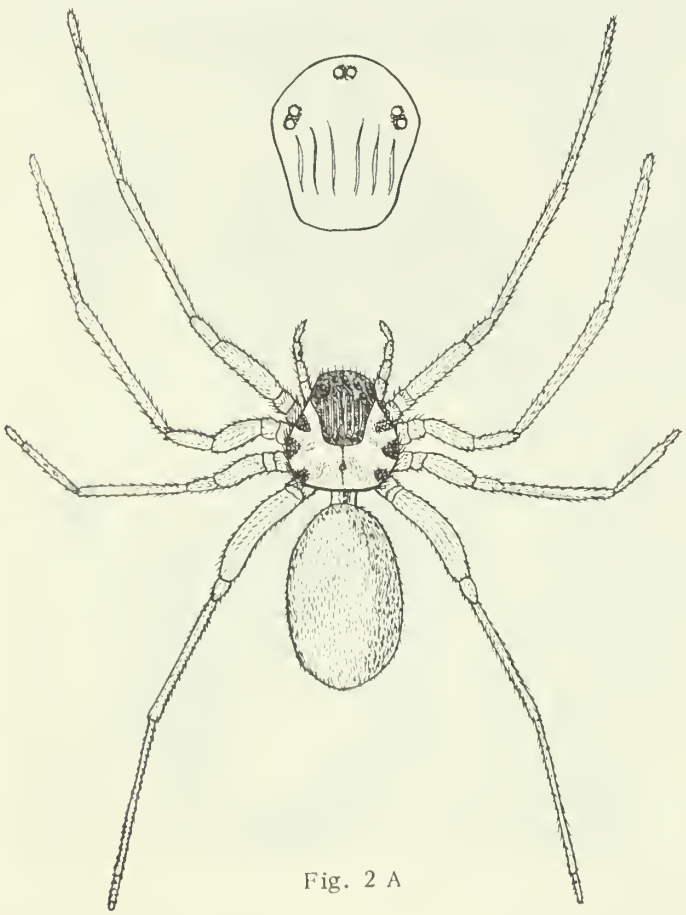


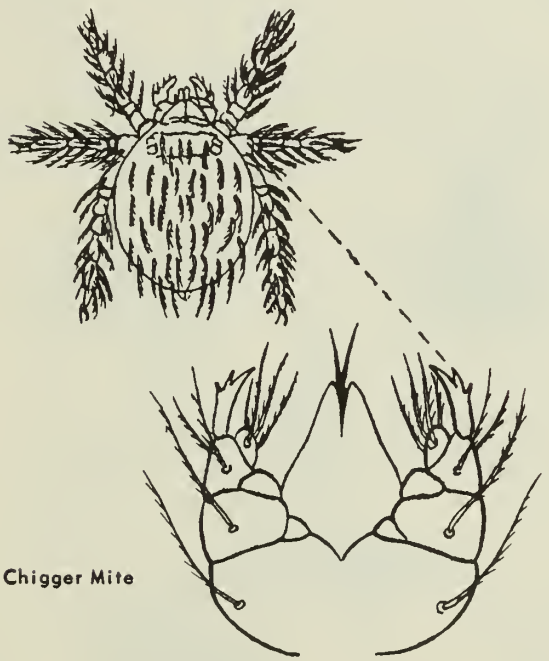
Fig. 2 A

Fig. 2 B

such as partially digested human blood. Onset of paralysis occurs about 6 days after attachment of the tick, and death may result from respiratory and cardiac failure if the tick is not removed. Small girls are most subject to this condition because of their long hair, which conceals the ticks. Fatality is commonest among small children.

MITES

Mites suck blood, causing severe (haemorrhagic, haemolytic) skin irritation. Grocer's itch, straw itch, chigger dermatitis, and scabies result from mite attacks. Non-biting clover mites may infest houses in great numbers. Scabies is the most important disease condition caused by mites. It is endemic throughout the world and becomes epidemic in times of disaster. Infestations of scabies mites may cause only mild reaction or, more commonly severe allergic reactions which often become complicated with impetigo. Between April 1, 1917 and December 31, 1919, the United States Army reported 33,000 cases of scabies.

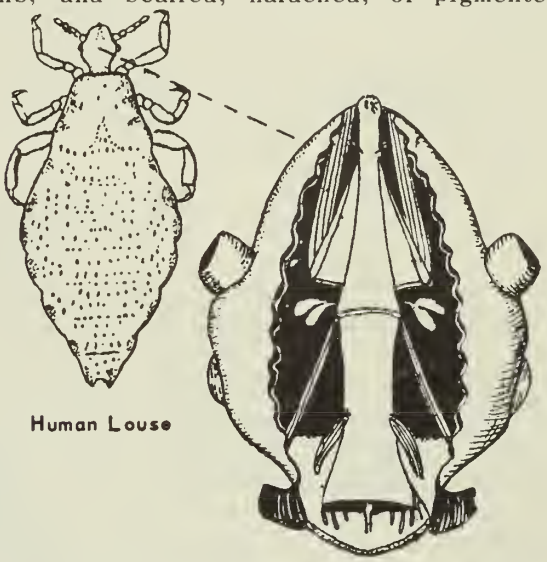


Chigger Mite

Chiggers and other bloodsucking mites may cause minor irritation, extensive cutaneous lesions, or generalized toxic symptoms. Bites should be promptly disinfected, and a physician should be consulted in severe cases.

LICE

Lice inject (during feeding) an irritating haemorrhagic saliva into the skin. This saliva causes considerable itching. Severe infestations may lead to scratching, secondary infections, and scarred, hardened, or pigmented



Human Louse

skin, a condition known as *peaiculosis*. After repeated louse attacks, most individuals develop tolerance, and effects of the bites are minimized. On the other hand, some individuals may become hypersensitive, so that only a few bites will produce the pediculosis effect. There are two species of human lice: (1) head and body louse, *Pediculus humanus,* and (2) crab louse, *Phthirus pubis*. Non-human lice do not bite man. Immediate delousing of infested persons should be accomplished (dust individuals with 10 percent DDT *or* use proprietary benzyl benzoate shampoo or lindane ointment).

BUGS

Bugs may bite severely. *Bed bugs* are worldwide and live in or near the bed of man. Some persons are extremely sensitive to the haemorrhagic bed bug saliva while others are hardly aware of it. Bed bugs may cause nervous disorders in sensitive individuals and contribute to ill health, especially in children and the elderly.

Kissing bugs, particularly the wheel bug, have a strongly haemolytic-neurotoxic venom and effects of their bites may be severe and may produce long-term damage. Usually the site of the bite becomes inflamed and swollen over an area up to twelve inches in diameter.

PICTORIAL KEY TO GROUPS OF HUMAN ECTOPARASITES

Chester J. Stojanovich and Harold George Scott

legs absent — legs present

FLY LARVA
Order Diptera

head definite
3 pairs of legs

head indefinite
4 pairs of legs

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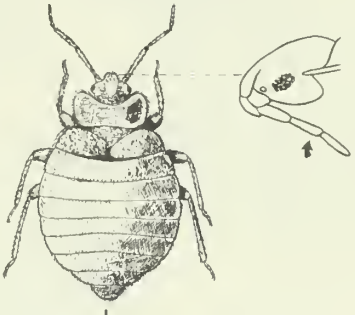
PUBLIC HEALTH SERVICE
Communicable Disease Center
Atlanta, Georgia
1962

flattened laterally — flattened dorsoventrally

FLEA
Order Siphonaptera

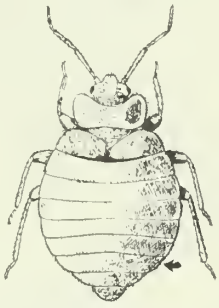
beak jointed



beak not jointed

wings present — wings absent

KISSING BUG
Order Hemiptera



BED BUG
Order Hemiptera

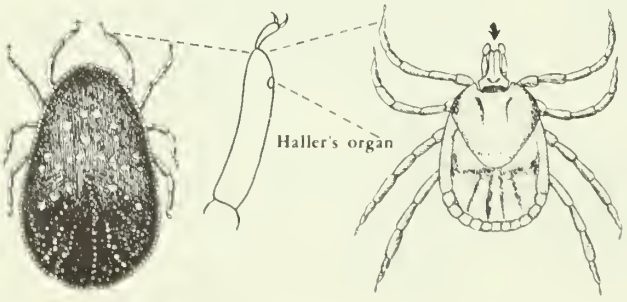
mouthparts projected — mouthparts retracted

LOUSE-FLY
Order Diptera

LOUSE
Order Anoplura

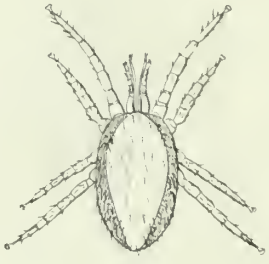
over 4 mm. long; Haller's organ present — under 4mm. long; Haller's organ absent

mouthparts ventral — mouthparts anterior

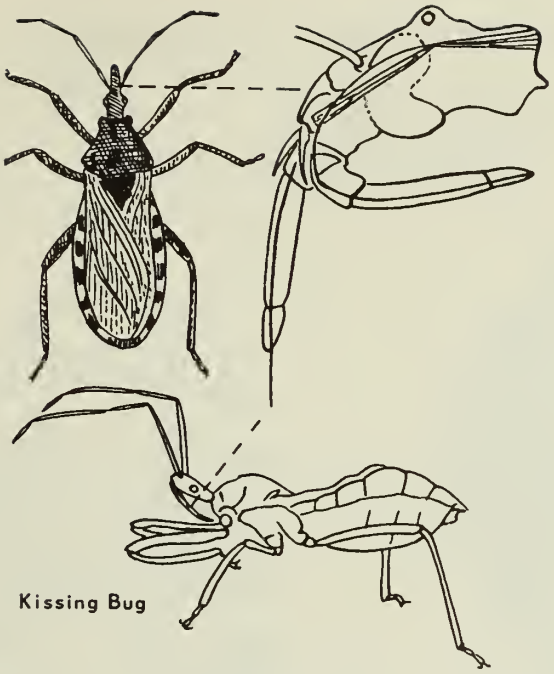


SOFT TICK
Order Acarina

HARD TICK
Order Acarina



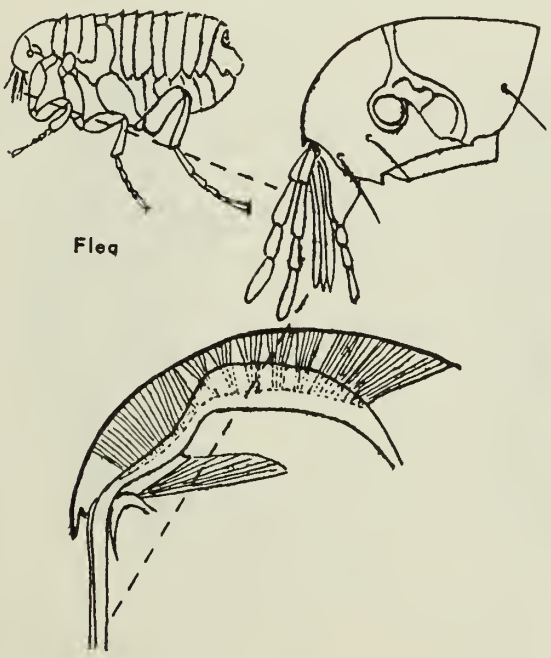
MITE
Order Acarina



Rarely, there is a violent secondary reaction with severe abdominal pain, generalized rash, nausea and vomiting.

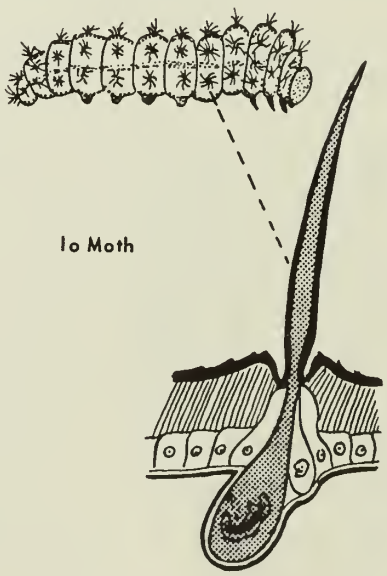
FLEAS

Fleas inject a haemorrhagic saliva which causes severe itching in some persons, almost no reaction in others. Numerous bites may produce a more-or-less generalized rash. Although fleas have preferred hosts, most take blood meals from a wide variety of animals and will bite man readily in the absence of their normal host animal. The chigoe flea, *Tunga penetrans*, may burrow under the toenail and cause severe reaction and damage. Ordinarily flea-bite irritation subsides quickly, leaving a hard red nodule which is soon reabsorbed. Flea bites should be disinfected and, if generalized reaction should occur, a physician should be consulted.



CATERPILLARS

Caterpillars of many species can cause mild to severe contact dermatitis, nodular conjunctivitis, respiratory pain, headache, and convulsions, through their tiny stinging hairs which inject a haemolytic venom. Not only the caterpillars, but also the egg covers, cocoons and adults, may possess these stinging hairs, which sometimes become wind borne and are sometimes found in soil after the caterpillar has shed its larval skin or is killed. Possibly some of these caterpillars also exude a vesicating venom much as do blister beetles. Injury by urticating caterpillars is most common among children playing in trees, and among pine forest workers and campers. The occurrence of such injuries is always seasonal, being most common in the spring.

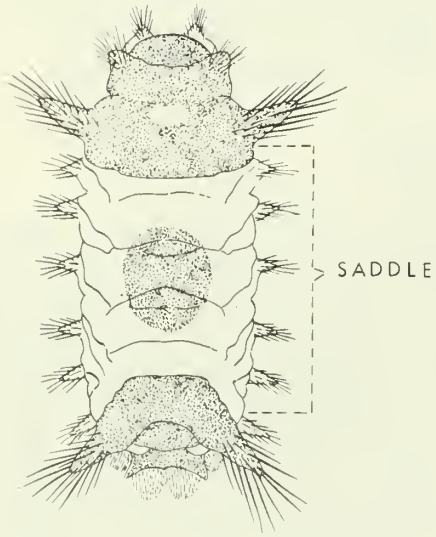


The most important species of these caterpillars, in the United States, are the puss

STINGING CATERPILLARS
PICTORIAL KEY TO SOME IMPORTANT UNITED STATES SPECIES

Harold George Scott & Chester J. Stojonavich

WITH DORSAL SADDLE



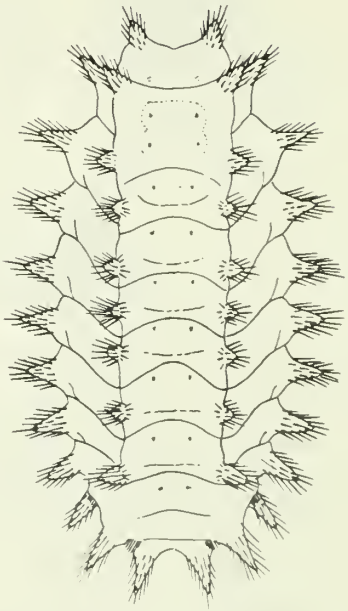
SADDLEBACK CATERPILLAR
Sibine stimulae

WITHOUT DORSAL SADDLE

BODY FUR-LIKE

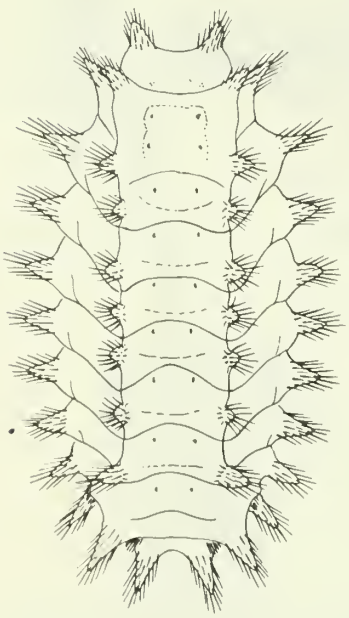
PUSS CATERPILLAR
Megalapyge apercularis

BODY NOT FUR-LIKE



5 PROLEGS

ABOUT 3/4-INCH LONG,
YELLOWISH GREEN

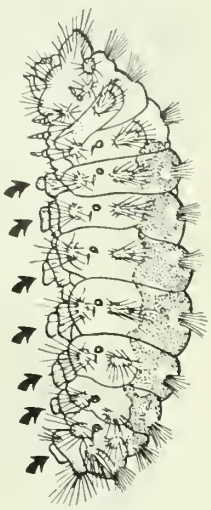


A SLUG CATERPILLAR
Euclea chlaris

ABOUT 2 INCHES LONG,
RED AND WHITE

IO MOTH CATERPILLAR
Automeris io

7 PROLEGS



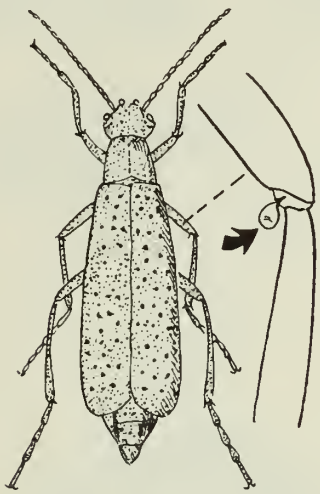
A FLANNEL MOTH CATERPILLAR
Norape cretata

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE, Communicable Disease Center

caterpillar *(Megalopyge opercularis)*, the saddleback caterpillar *(Sibine stimulae)*, the crinkled flannel moth *(Megalopyge crispata)*, a slug caterpillar *(Euclea chloris)*, and a flannel moth *(Norape cretata)*. In one outbreak (Texas, 1958), 2,130 cases of caterpillar envenomization were reported.

BLISTER BEETLES

Blister Beetles exude a vesicating venom (made up primarily of cantharidin) when they are in danger. They do this by filling their



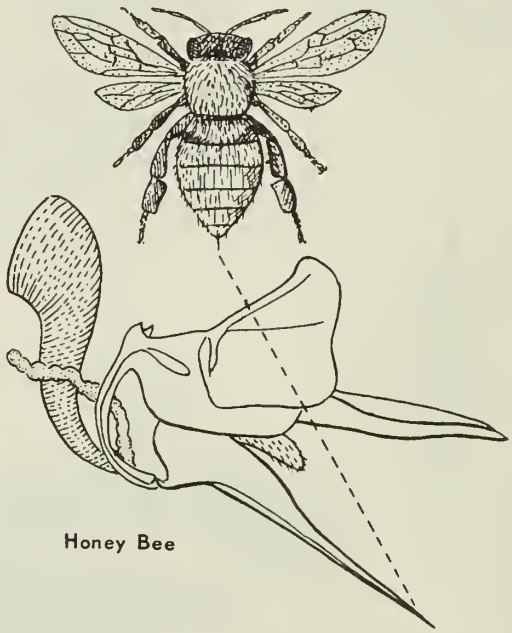
Spotted Blister Beetle

breathing tubes (tracheae) with air, closing their breathing pores (spiracles), and building up body fluid (haemolymphostatic) pressure, until breaks occur at the weakest spots in the exoskeleton (usually at joints). Haemolymph (with cantharidin) spills through the breaks. Then the beetle relieves the haemolymphostatic pressure and the exoskeletal wounds heal. Anyone handling the beetle during or immediately after this process picks up cantharidin on his skin. The venom produces fluid-filled blisters which eventually burst, releasing the fluid which then produces secondary blisters. Secondary infection (especially impetigo) is common. Individuals with beetle blisters should consult a physician. Recently, cantharidin has been used for treatment of warts.

HYMENOPTEROUS INSECTS

Bees, wasps, yellow jackets, hornets, ants and other Hymenoptera are the most common sources of serious envenomization, and the stings of these insects are usually exceedingly painful. Hymenoptera are among the most numerous of insects, and their role in pollination is essential to the continuance of most species of flowering plants.

Although the composition of Hymenoptera venoms vary, most of them are primarily haemolytic, with a lesser fraction of neurotoxin. Bee venom has been used in arthritis therapy. Fire ant venom (which is insecticidal, bactericidal, and fungicidal) contains a potent haemolytic amine.



Honey Bee

Humans differ greatly in their reaction to Hymenoptera venom. One person will show little effect from the sting of a honey bee, but another individual may be killed by the sting of this insect. Such a range of effects might be due to a genetic susceptibility-resistance phenomenon or to a hypersensitivity that has been developed through previous contact with the venom. The most important expression of such hypersensitivity is anaphylactic shock, a violent attack of symptoms (vomiting, passing of urine and feces, abrupt fall in blood pressure, subnormal pulse, weakness and collapse) that is brought on by a second injection of venom into a sensitive person. Most deaths from stings of Hymenoptera are associated with anaphylactic shock.

BLISTER BEETLES: KEY TO SOME COMMON UNITED STATES SPECIES

Harold George Scott and Chester J. Stojanovich

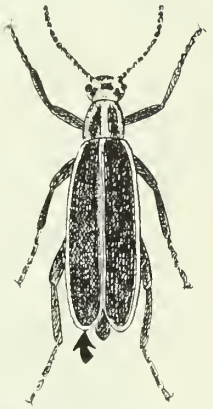
U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
Communicable Disease Center
Atlanta 22, Georgia

1963

striped

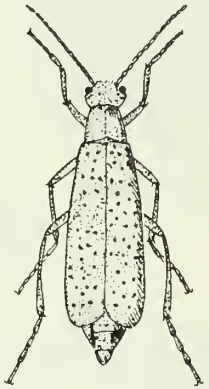
Epicauta vittata
STRIPED BLISTER BEETLE

margined



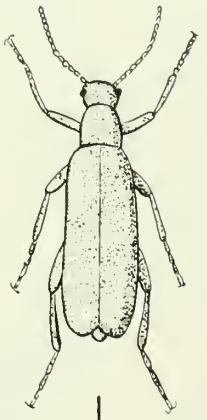
Epicauta pestifera
MARGINED BLISTER BEETLE

spotted



Epicauta cinerea maculata
SPOTTED BLISTER BEETLE

essentially unicolorous



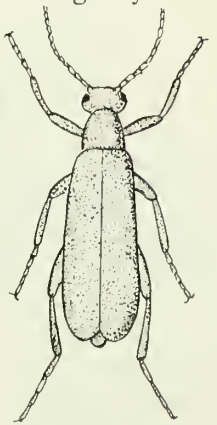
black

Epicauta pennsylvanica
BLACK BLISTER BEETLE

black with gray pubescense

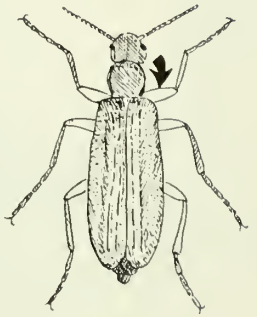
Epicauta cinerea cinerea
CLEMATIS BLISTER BEETLE

gray



Epicauta fabrici
ASH-GRAY BLISTER BEETLE

metallic blue with red-yellow leg bases



Pomphopoea sayi
SAY BLISTER BEETLE

STINGING HYMENOPTERA
PICTORIAL KEY TO SOME COMMON UNITED STATES FAMILIES

Harold George Scott and Chester J. Stojanovich

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
Communicable Disease Center
Atlanta, Georgia
1962

wings absent

body fur-like
without node

Mutillidae
VELVET ANTS

body not fur-like
with node

Formicidae
ANTS

wings present

hairs not feathered
(use 20 X magnification)

pronotum long, reaching tegula

Vespidae
WASPS, YELLOW JACKETS, HORNETS

pronotum short, not reaching tegula

Sphecidae
SPHECID WASPS

hairs feathered
(use 20 X magnification)

hind tibia with spurs

eye not reaching mandible

Bombidae
BUMBLE BEES

eye reaching mandible

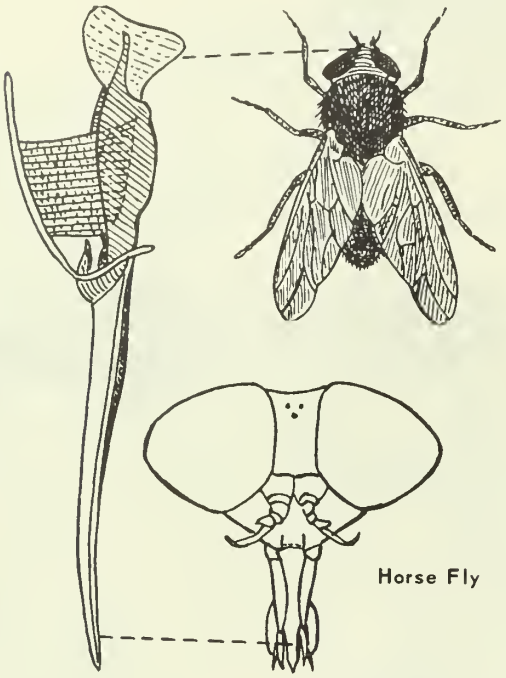
Andrenidae
SWEAT BEES

hind tibia without spurs

Apidae
HONEY BEES

FLIES

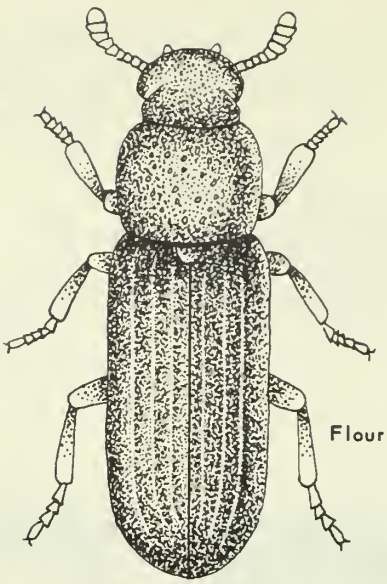
Flies and mosquitoes commonly bite man. Not all flies bite, but those which do can cause serious trouble. The effect of a fly's bite is an allergic response to the haemorrhagic saliva that is poured into the wound to prevent clotting of the blood during feeding. Stable flies are common around homes and bite severely. Black flies bite viciously, often attacking in such large numbers that they kill the victim. In the Balkans, 1923-24, thirty thousand domestic animals died as the result of black fly attack. Mosquitoes, deer flies, horse flies, horn flies, sandflies, punkies, and other biting flies, often attack man and cause great discomfort. In some individuals the bites produce severe lesions, high fever, and even general disability. To avoid a secondary infection, disinfect all bites immediately and do not scratch. If the reaction is severe, consult a physician.



Horse Fly

ALLERGENS

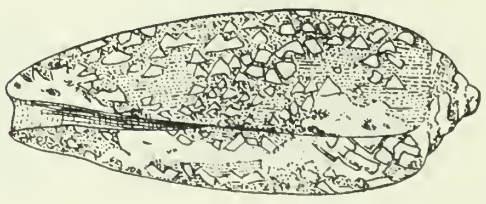
Insect extracts cause skin-test reactions in many allergic patients, and insect allergy may be a significant causative factor in clinical allergic respiratory disease, especially of the seasonal type. Insects producing such effects include *mayflies* (asthma associated with breakup of adult insects after mayfly "blooms"); *caddisflies* (coryza and asthma); *bees* (hypersensitivity to airborne fragments); *aphids; beetles; Mexican bean weevils* (rhinitis and asthma); *mushroom flies* (asthma); and *house flies* ("nasal allergy") *Stored-food insects* may be a significant factor in milldust allergy. *Household insects* may contribute greatly to house-dust allergy.



Flour Beetle

OTHER VENOMOUS INVERTEBRATES

Other venomous invertebrates include *termites* (soldiers inflict a mild bite); *walking sticks* (some squirt vesicating fluid) *thrips* and *aphids* (adventitious haemorrhagic bites which may be painful); *microcrustacea* (allergenic); *jellyfish, corals,* and *sea anemones* (severe neurotoxic stings which occasionally produce death); *sea urchins* and *starfish* (neurotoxic stings); *poison cone shells* (found on beaches of Pacific islands including Hawaii, may produce severe neurotoxic poisoning and even



Poison Cone Shell

SOME DANGEROUS JELLYFISH

Dactylmetra quinquecirrha

SEA NETTLE

Carybdea alta

SEA WASP

Physalia physalis

PORTUGUESE-MAN-O'-WAR

Cyanea capillata

SEA BLUBBER

By: Chester J. Stojanovich and Dr. Harold George Scott

death). Numerous insect pests of plants will occasionally bite man. This is strictly accidental and the effect is usually haemorrhagic and mild. Rarely a severe and even generalized envenomization results from such adventitious bites.

Leeches suck blood but do not inject venom.

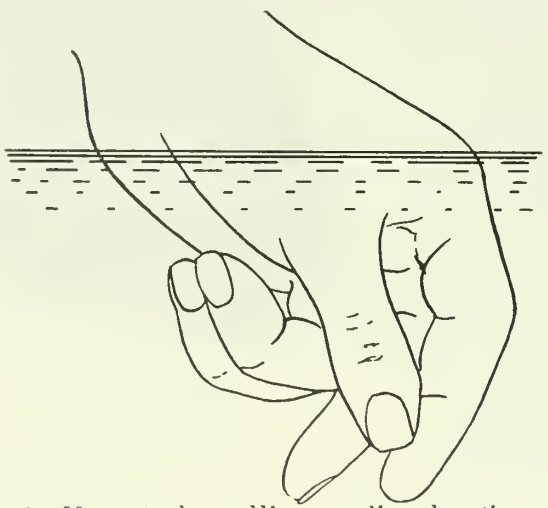
VENOMOUS VERTEBRATES

Numerous species of elasmobranchs, fishes, reptiles, amphibians, and mammals are found throughout the world. Of these the snakes are by far the most important. The accompanying pictorial key differentiates venomous from non-venomous species occurring in the United States. The venom of rattlesnakes and coral snakes are primarily neurotoxic while those of copperheads and water moccasins are primarily cytolytic.

FIRST AID

FIRST AID for envenomization depends upon the nature of the venom but the following general procedures can be recommended:

1. Take the victim to a physician immediately. If for any reason this can't be done, call a physician immediately.

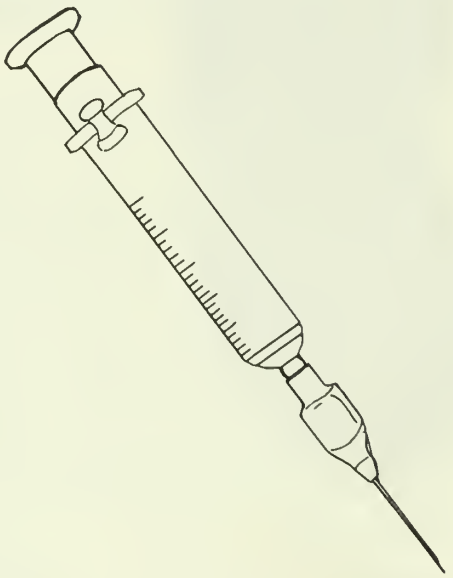


2. If marked swelling or discoloration occurs at the site of the envenomization, the venom is probably haemolytic, haemorrhagic or vesicating. Keep the victim warm and quiet until a physician is reached.
3. If little or no swelling or discoloration occur at site of envenomization, the venom is probably neurotoxic. Apply ice to site of envenomization; or, if possible, immerse the affected part of body in ice water. Do not let these measures delay the patient's getting to a physician.
4. If anaphylactic shock symptoms occur, the situation is critical and a physician must be reached at once.

Cyclic recurrences in the course of envenomization may complicate treatment.

TREATMENT

Treatment of envenomization by the physician varies with the type of envenomization and the nature and severity of the symptoms. *Ectoparasites* are killed and/or removed usually with chemicals. *Neurotoxic envenomization* is treated with specific antivenins, or with intravenously injected gluconate, epinephrine or adrenalin. *Cytolytic envenomization* often requires prolonged symptomatic treatment. *Haemorrhagic envenomization,* when severe, is treated with vitamin K. *Urtication* by

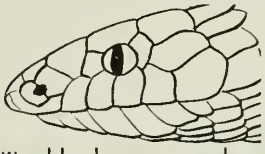


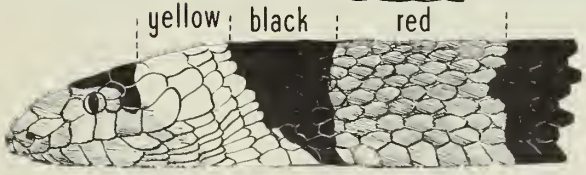
stinging caterpillars is treated by washing the skin to remove remaining hairs, and administration of antihistamines. *Vesicating envenomization* is treated by draining blisters with a hypodermic needle, applying magnesium sulfate compresses and by careful disinfection to prevent secondary infection. *Anaphylactic shock* is treated by use of a tourniquet and

PICTORIAL KEY TO VENOMOUS SNAKES IN UNITED STATES
PART I

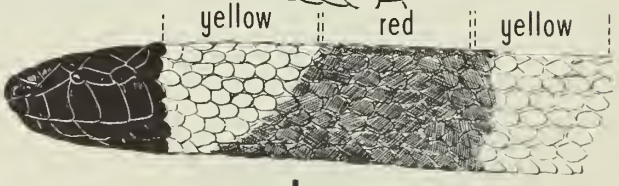
Chester J. Stojanovich and Margaret A. Parsons

loreal pit absent, if ringed red and yellow rings always separated by black





loreal pit present, if absent red and yellow rings touch



NON-VENOMOUS SNAKES

loreal pit present

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Communicable Disease Center
Atlanta, Georgia
1964

REVISED JUNE 1965

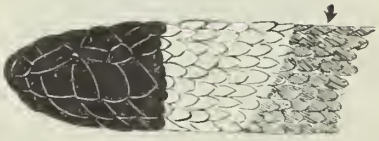
loreal pit absent

neck ring black

Micrurus fulvius
TRUE CORAL SNAKE

M. f. fulvius	*M. f. barbouri*	*M. f. tenere*
Southeastern	Florida	Arkansas, Texas

neck ring red



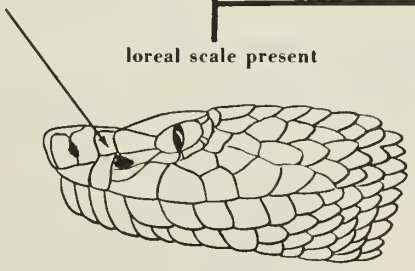
Micruroides euryxanthus
ARIZONA CORAL SNAKE

tail pointed

tail blunt or with rattle

SEE PART II

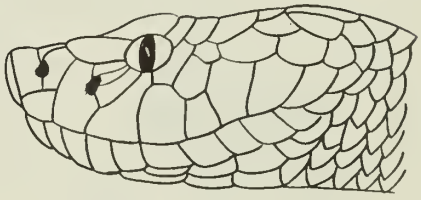
loreal scale present



Agkistrodon contortrix
COPPERHEAD

A. c. contortrix	*A. c. laticinctus*	*A. c. mokasen*	*A. c. pictigaster*
Southeastern	Texas, Oklahoma, Kansas	Eastern	Texas

loreal scale absent



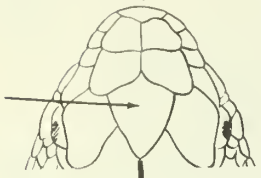
Agkistrodon piscivorus
WATER MOCCASIN

A. p. piscivorus	*A. p. leucostoma*
Southeastern	Southeastern

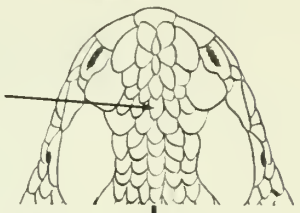
PICTORIAL KEY TO VENOMOUS SNAKES IN UNITED STATES
PART II

Chester J. Stojanovich and Margaret A. Parsons

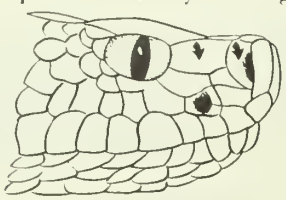
head with large scales medially



head with small scales medially



upper preocular usually touching postnasal



Sistrurus catenatus
MASSASAUGA RATTLESNAKE

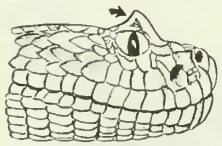
S. c. catenatus	*S. c. edwardsii*	*S. c. tergeminus*
Great Lakes & Central U.S.	Arizona, Colarada, New Mexica, Texas	Colarada, Kansas, Nebraska, New Mexica, Oklahoma, Texas

upper preocular and postnasal separated

Sistrurus miliarius
PIGMY RATTLESNAKE

S. m. miliarius	*S. m. barbouri*	*S. m. streckeri*
Sautheastern	Sautheastern	Sautheastern

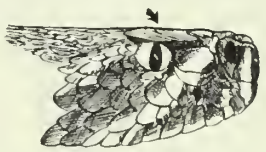
supraocular scale modified into a hornlike ridge



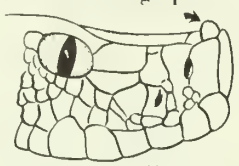
Crotalus cerastes
SIDEWINDER RATTLESNAKE

C. c. cerastes	*C. c. cercobombus*	*C. c. laterorepens*
Arizona, Califarnia, Nevada, Utah	Arizona	Arizona, Califarnia

supraocular scale not modified into a hornlike ridge



internasal ridge present

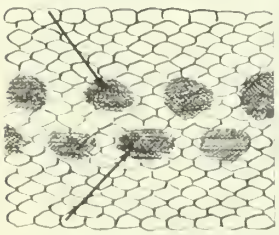


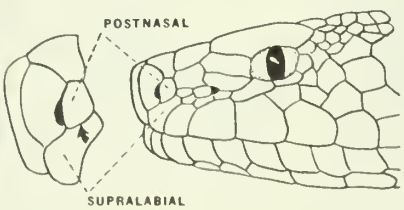
Crotalus willardi
RIDGE-NOSED RATTLESNAKE

C. w. silus	*C. w. willardi*
New Mexica	Arizona,

internasal ridge absent

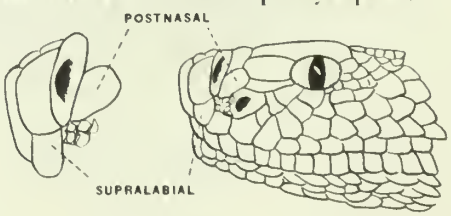
dorsal blotches on body divided into 2 parallel rows
first supralabial scale broadly attached to postnasal scale





Crotalus pricei
TWIN-SPOTTED RATTLESNAKE Arizona

dorsal blotches on body not divided into 2 parallel rows
first supralabial scale not broadly attached to
postnasal scale, sometimes completely separated

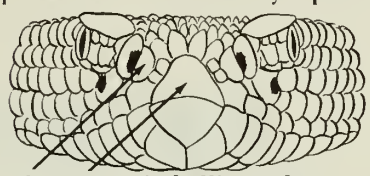


SEE PART III

PICTORIAL KEY TO VENOMOUS SNAKES IN UNITED STATES
PART III

Chester J. Stojanovich and Margaret A. Parsons

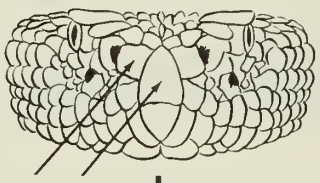
prenasal and rostral usually separated



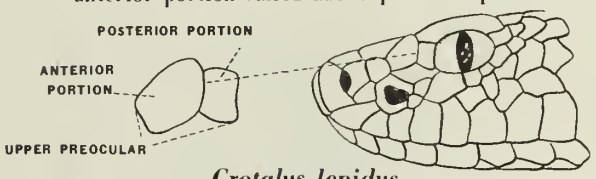
Crotalus mitchelli pyrrhus

SOUTHWESTERN SPECKLED RATTLESNAKE Arizona, California, Nevada, Utah

prenasal and rostral attached



upper preocular usually separated vertically, anterior portion raised above posterior portion

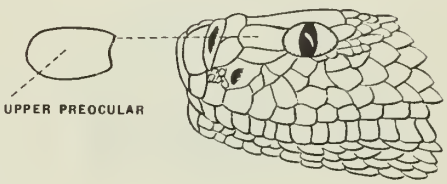


Crotalus lepidus

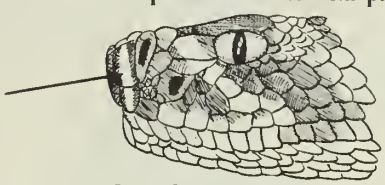
ROCK RATTLESNAKE

C. l. lepidus	*C. l. klauberi*
New Mexico, Texas	Arizona, New Mexico, Texas

upper preocular usually not separated, if separated anterior portion not raised above posterior portion



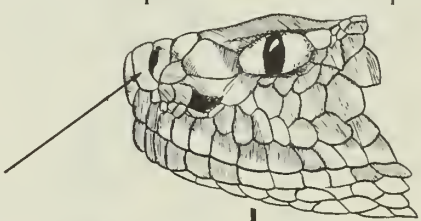
prenasal and supralabial scales with pale stripe



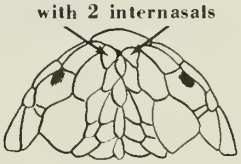
Crotalus adamanteus

EASTERN DIAMONDBACK RATTLESNAKE Southeastern

prenasal and supralabial scales without pale stripe



with 2 internasals



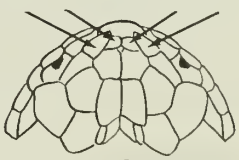
Crotalus viridis

WESTERN RATTLESNAKE

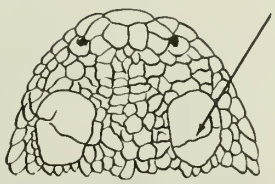
C. v. viridis	*C. v. abyssus*	*C. v. cerberus*	*C. v. concolor*
West Central U.S.	Arizona	Arizona	Calarada, Utah

C. v. helleri	*C. v. lutosus*	*C. v. nuntius*	*C. v. oreganus*
Califarnia	Nevada & adjaining states	Arizona	Califarnia, Idaha, Oregan, Washington

with more than 2 internasals



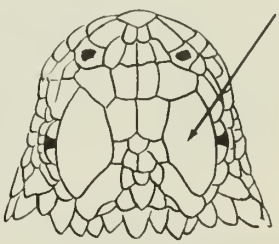
supraocular scale divided, pitted or margins uneven



Crotalus mitchelli stephensi

PANAMINT RATTLESNAKE California, Nevada

supraocular scale not divided, pitted or margins uneven



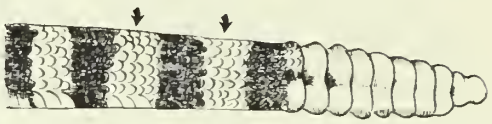
SEE PART IV

PICTORIAL KEY TO VENOMOUS SNAKES IN UNITED STATES
PART IV

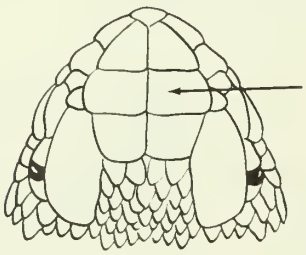
Chester J. Stojanovich and Margaret A. Parsons

tail without distinct rings

tail with distinct rings



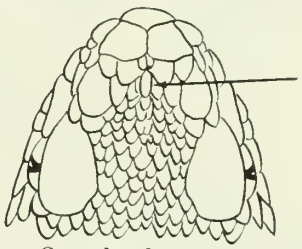
anterior frontal area with large scales



Crotalus molossus

BLACK-TAILED RATTLESNAKE Southwestern

anterior frontal area with scales not much larger than posterior scales

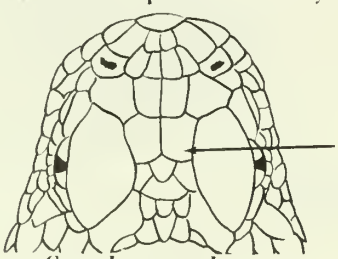


Crotalus horridus

CANEBRAKE OR TIMBER RATTLESNAKE

C. h. horridus	*C. h. atricaudatus*
Eastern	Southeastern

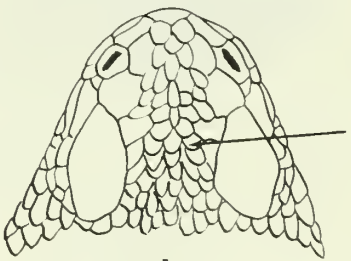
scales between supraoculars usually 2



Crotalus scutulatus

MOHAVE RATTLESNAKE Arizona, California, Nevada, New Mexico, Texas

scales between supraoculars usually 4, or more



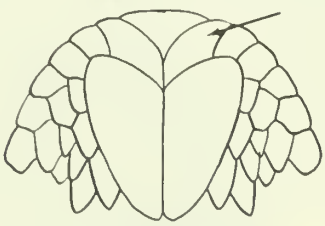
tail not in sharp contrast to posterior part of body

Crotalus tigris

TIGER RATTLESNAKE Arizona

tail in sharp contrast to posterior part of body

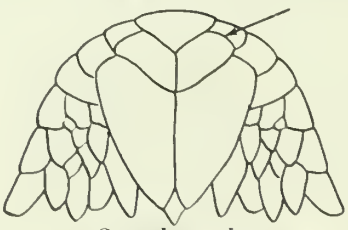
first infralabial scale rarely divided, body color grayish



Crotalus atrox

WESTERN DIAMONDBACK RATTLESNAKE Southwestern

first infralabial scale usually divided, body color pink or red



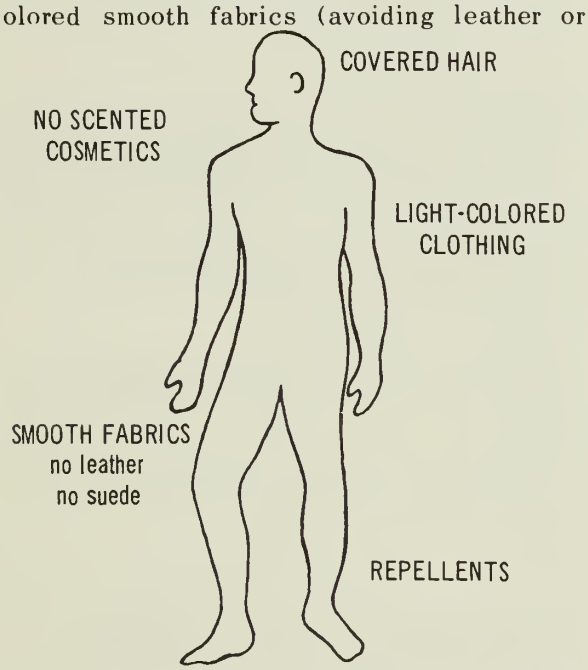
Crotalus ruber

RED DIAMONDBACK RATTLESNAKE California

subcutaneous injections of epinephrine. *Allergy* is treated symptomatically with antihistaminic, adrenergic, spasmolytic, and anticholinergic drugs.

PREVENTION

Prevention of envenomization differs with the species of arthropod involved. Education, especially of children, to avoid venomous forms is the best technique. Also, screen houses; use repellents (diethyltoluamide, indalone, Rutgers 612, 622); keep home free of rodents, pest birds, and bats; keep premises clean (free of litter, garbage, manure, weeds, loose rocks, debris); vacuum-clean floors and rugs weekly if pets are allowed in house; and destroy mite-infested food. Individuals who are hypersensitive to stinging Hymenoptera should wear light-colored smooth fabrics (avoiding leather or



suede); keep their hair covered; avoid scented cosmetics; either stand still or move slowly when approached by bees, wasps, etc.; confine outdoor activity to times when temperature is below 60° F.

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