

Insects with Holometabolous (Complete) Metamorphosis

Insects and People
Complete

Orders with Complete Metamorphosis

Coleoptera (331,478 sp.)

Lepidoptera (272,291 sp.)

Diptera (176,600 sp.)

Hymenoptera (142,449 sp.)

Neuroptera (6,694 sp.)

Siphonaptera (2,250 sp.)

Order Coleoptera

beetles

- Complete metamorphosis
- Largest order of insects (most species)
- Immatures and adults have chewing mouthparts.
- Forewings hardened structures called elytra
- Feeding habits are varied. Some are serious pests, others are beneficial.

Adult beetles have hardened forewings called elytra



*A male
10-lined
June
beetle*

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Colorado Potato beetle is a serious pest

*Adult
and
eggs*



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CPB larvae feed on potato foliage - the pest has spread throughout the world wherever potatoes are grown



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*Ladybird beetles are
predators, especially of
aphids*

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Ladybird beetles congregate for the winter



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Weevils have their mouthparts at the end of a “snout”



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“Carpet” or dermestid beetles feed on woolens and stored products



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*Dung rolling scarab - once revered as the symbol
of a god!*



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Fireflies are known to every child in the Midwest



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Long-horned beetles



Larvae feed in logs



*You can eat these
larvae*

The adult of a tropical round-headed wood borer



*That's a
big beetle!*

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“Giraffe” beetle



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Some beetles are large, beautiful, and collectable

*Stag
beetle*



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Darkling beetles are very common in central Washington



*Some emit a
foul-
smelling
chemical*

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Order Lepidoptera

butterflies and moths

- Complete metamorphosis
- Immatures with chewing mouthparts - feeding habits varied
- Adults with siphoning mouthparts - feed on plant nectar
- Many are serious pests (as larvae)

Moth and butterfly adults have siphoning mouthparts



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*Butterfly and moth wings are covered
with scales*



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*This clearwing moth mimics a
yellowjacket*

*Larvae bore
into trees
and shrubs*



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Hornworms



*Caterpillars are
voracious feeders*

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Hornworm
adult



Hornworm
pupa

*Corn earworm moth larvae attack the ears
feeding on the kernels and leaving fecal material*



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Codling moth is the most destructive pest of apple in WA



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This beautiful caterpillar is one of the most serious forest pests in the western US



DFTM



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Indian Meal Moth larvae & damage to peanut clusters



Van Waters & Rogers
1986 division of Univar

*Indian
Meal moth*

*Some moth larvae
Are stored product
pests*

Indian Meal Moth larva & damage to peanut cluster



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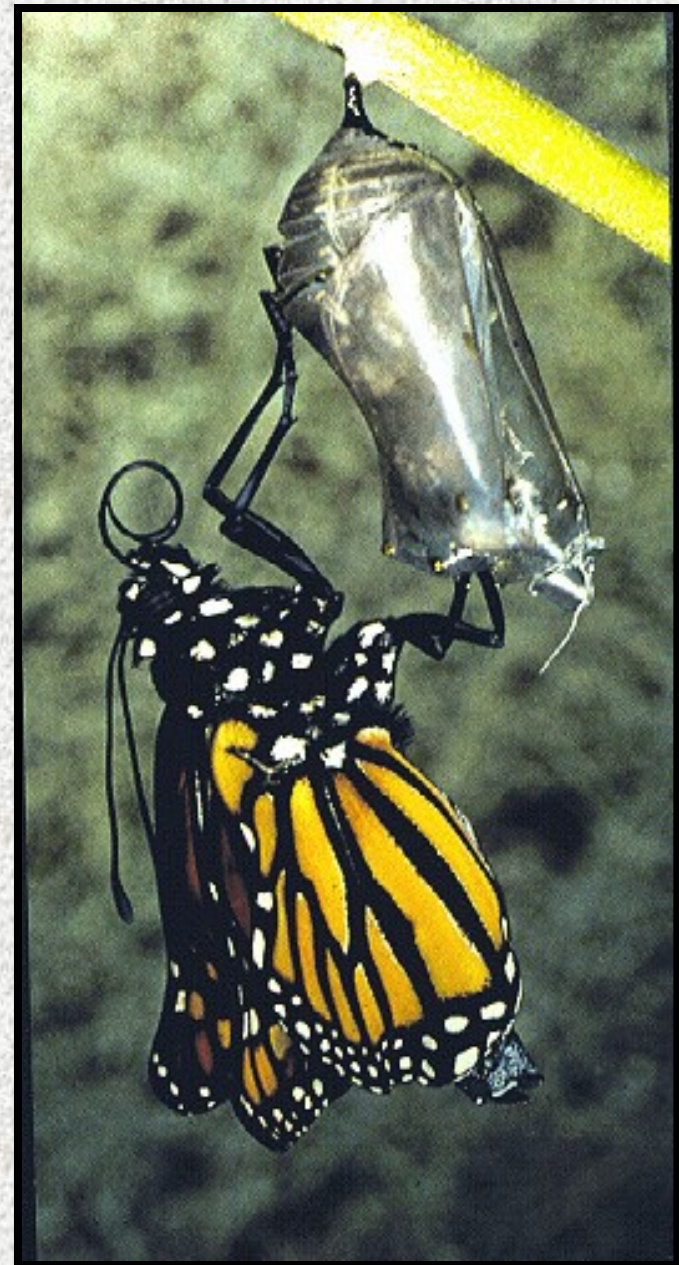
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A plume moth



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*Monarch butterfly
emerging from
chrysalis*



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*Inchworm or
Measuring-worm*



*“Disturbed”
Inchworm*

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This butterfly has two heads!



Why?

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Silkworm

**True Silkworm Moth
adult mating pair**

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**True Silkworm pupa
inside cocoon**

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*No longer found in
wild*



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Order Diptera

true flies

- Complete metamorphosis
- Immatures (maggots) with “scraping” mouthparts
- Adults with varying mouthparts (sponging, piercing and sucking, cutting and sponging)
- Hindwings modified into halteres
- Extremely varied in habitats

True Flies have only two wings, the second pair is modified and called halteres



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Med fly is one of the world's most pestiferous insects



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Female Med flies deposit eggs just below the skin of fruits and vegetables

Penetration of the fruit by the ovipositor is called a “sting”



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*Larvae feed in
fruit*

*Larvae “rasp” at
fruit with mouth-
hooks*



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Med fly larvae leave the fruit and pupate in the soil.

*Med fly does
not occur in the
continental US*

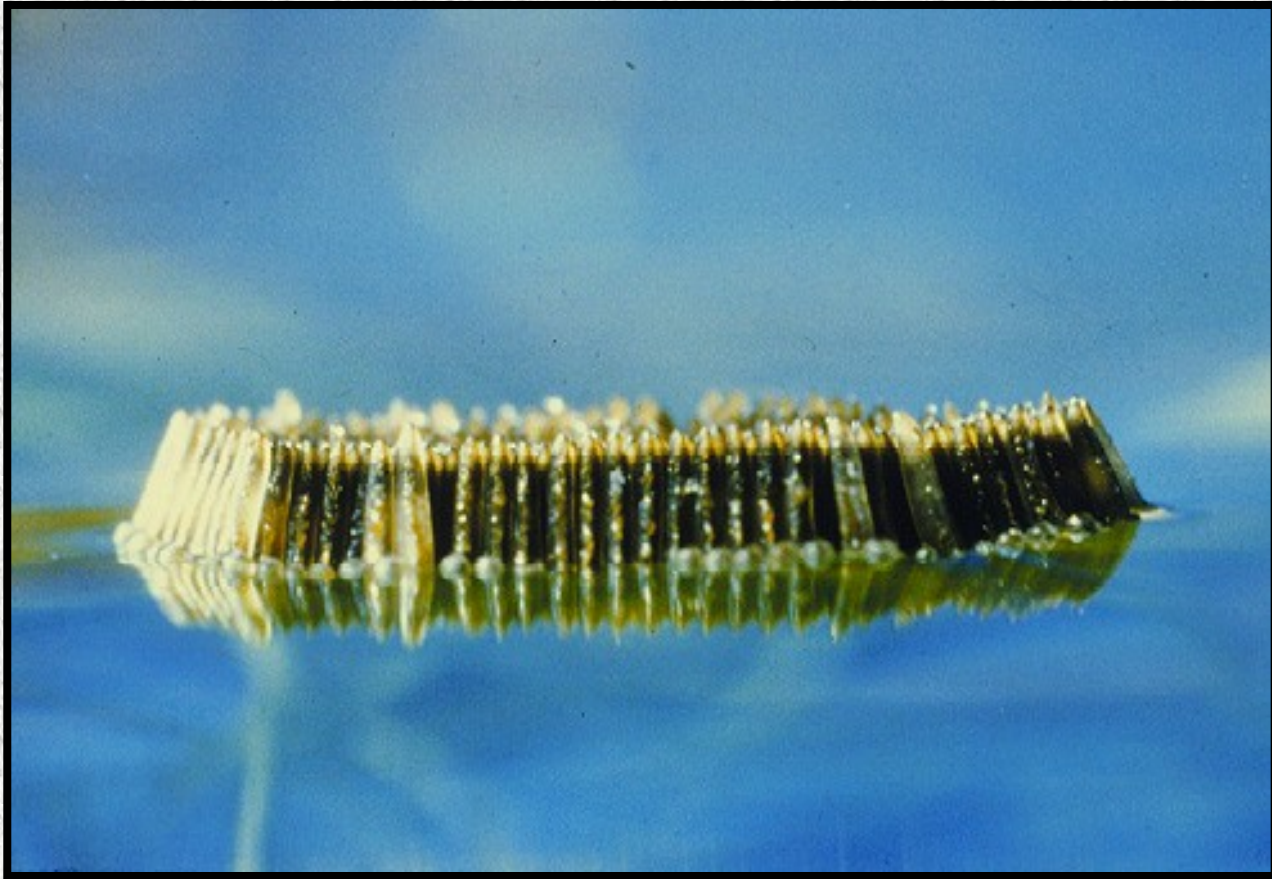


Everyone has been “bitten” by a mosquito!



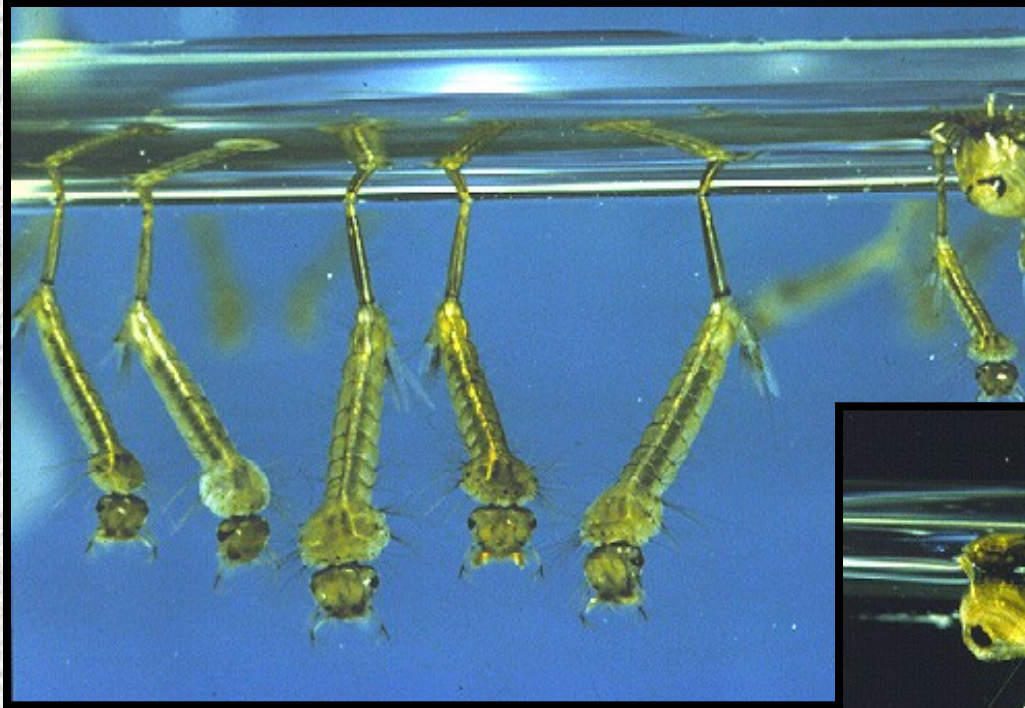
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Mosquito eggs are laid in a “raft” in water or an area that will flood

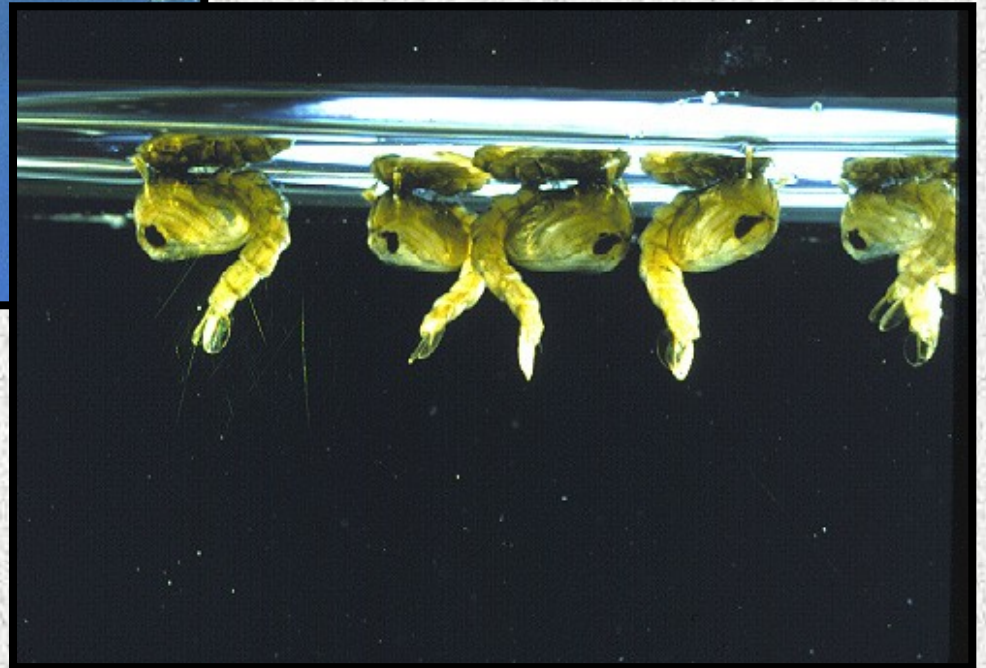


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Larvae and pupae are aquatic



Larvae are filter feeders



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*Adults emerge from
the surface of the
water*



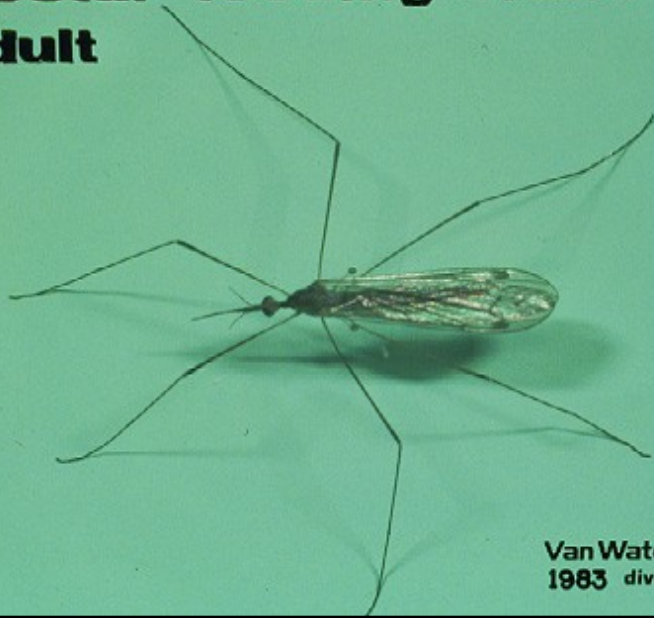
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*Elephantiasis is
mosquito-vectored,
nematode condition*



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**Nectar-feeding Crane Fly
adult**



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*Crane flies are
sometimes called
giant mosquitoes*

*Larvae feed on roots
in the soil*

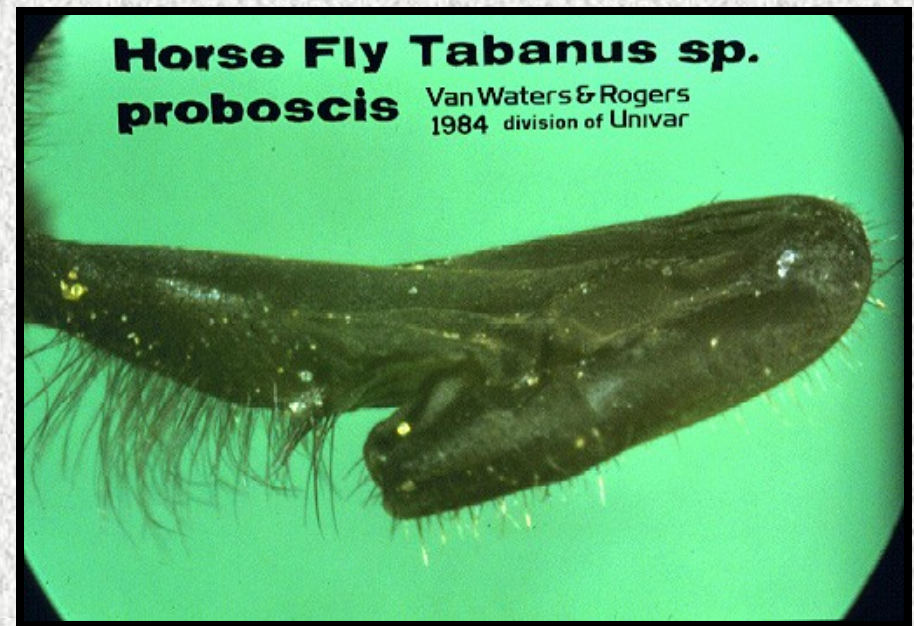


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Horse and deer flies have chewing and cutting mouthparts



Females take blood meals



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Deer and horse flies can cause serious damage to wildlife and domestic animals



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*Cattle grub is a
myiasis causing fly*



*Immatures feed on
living flesh*



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“Bot” flies are myiasis causing flies. Differing bot fly species attack many different animals



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Order Hymenoptera

bees, wasps, ants, sawflies

- Complete metamorphosis
- Immatures with variations of chewing mouthparts
- Adult mouthparts can vary (chewing and lapping)
- Some species are highly social
- Some are among the most beneficial insects (e.g., bees)

*Honeybee -
important and
well known*



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Bumblebees are important native pollinators

*Note pollen
on the
hindleg*



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Ants are social insects
Inside the colony



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Ant larvae are totally dependent on adults



Pavement Ant

Army ant soldier on guard



*Note
Jaws!*

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These "honey ants" serve as storage vessels for the colony

*Called
repletes*



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Yellowjackets are social insects

Yellowjackets are predators through most of their lives



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This large, parasitic wasp places eggs into the larvae of other insects



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A solitary wasp provisioning its nest with a caterpillar



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*Parasitic
wasps*

*Important biological
control organisms*



Order Neuroptera

Lacewings and relatives

- Complete metamorphosis
- Adults and immatures have chewing mouthparts
- Some are very important biological control organisms

*Brown and green
lacewings are common*



Golden eyes



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Lacewing larvae are voracious predators

*Eggs are
placed on
stalks*



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*Larvae are
voracious
predators*

*Many feed on
pest insects such
as aphids and
scales*



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Pupal cases or “cocoons”



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A Mantispid - not a mantid!

*Mantispid
larvae feed
on spider
eggs*



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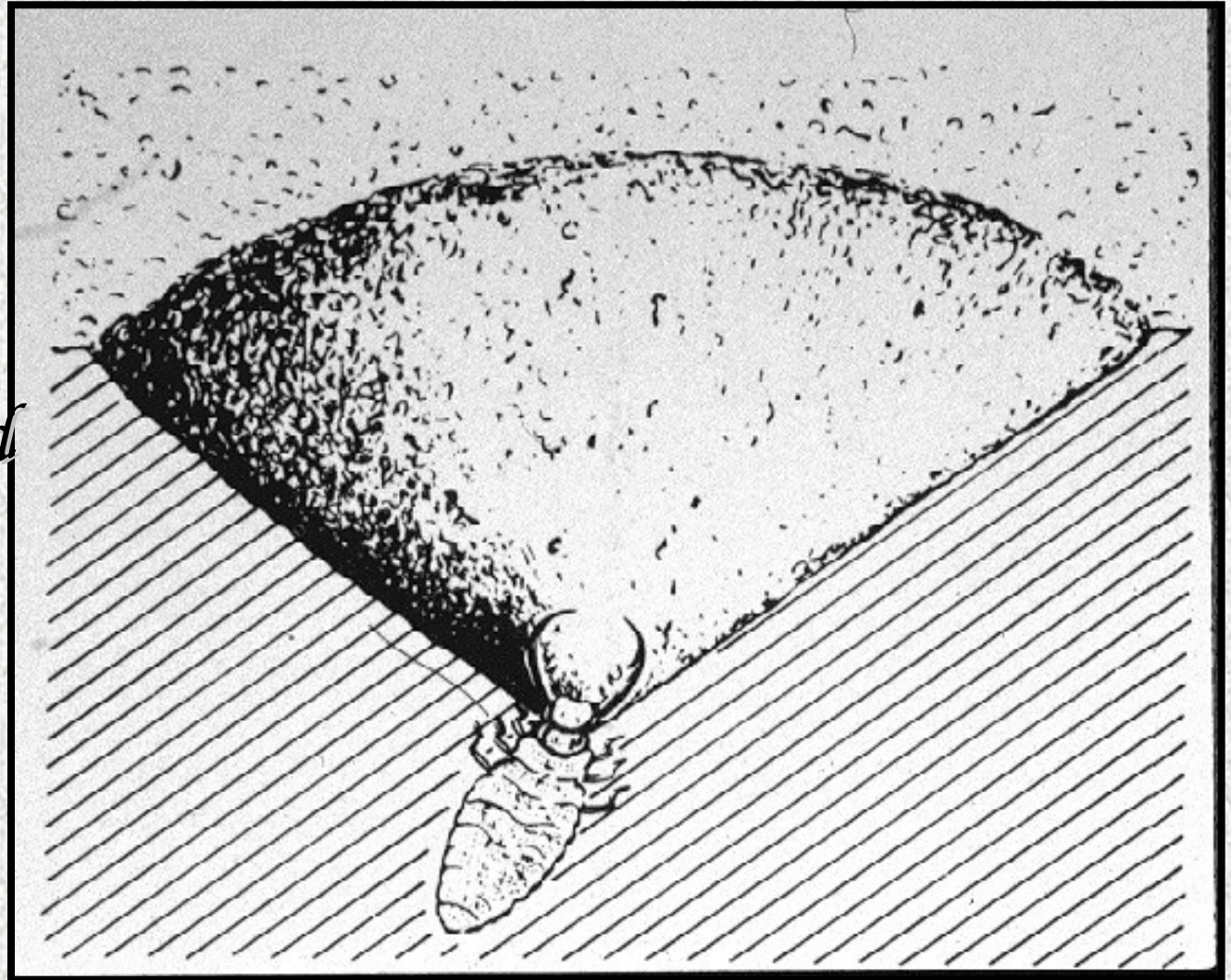
Antlion Larva



*Sometimes called
a “doodlebug”*

The pit of an antlion larva

*Look for
these on sand
dunes*



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Order Siphonaptera fleas

- Complete metamorphosis
- Immatures with chewing mouthparts, feed in nests of animals
- Adults with piercing and sucking mouthparts, feed on blood
- Secondarily wingless
- A serious pest and a nuisance



*Adult fleas have
piercing
and sucking
mouthparts*

*Eggs are laid in
animal bedding
or nests*



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Flea larvae have chewing mouthparts and feed on debris



Pupae can remain inactive for years

Flea adults are blood feeding parasites



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Chigo fleas penetrate the skin and live within the body



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Fleas vector “plague,” perhaps the world’s most devastating disease, historically



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