

# 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*

# *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*



*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*



*You can eat these  
larvae*

*Larvae feed in logs*



*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*

# 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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on tomato leaf



## Hornworms



*Caterpillars are voracious feeders*

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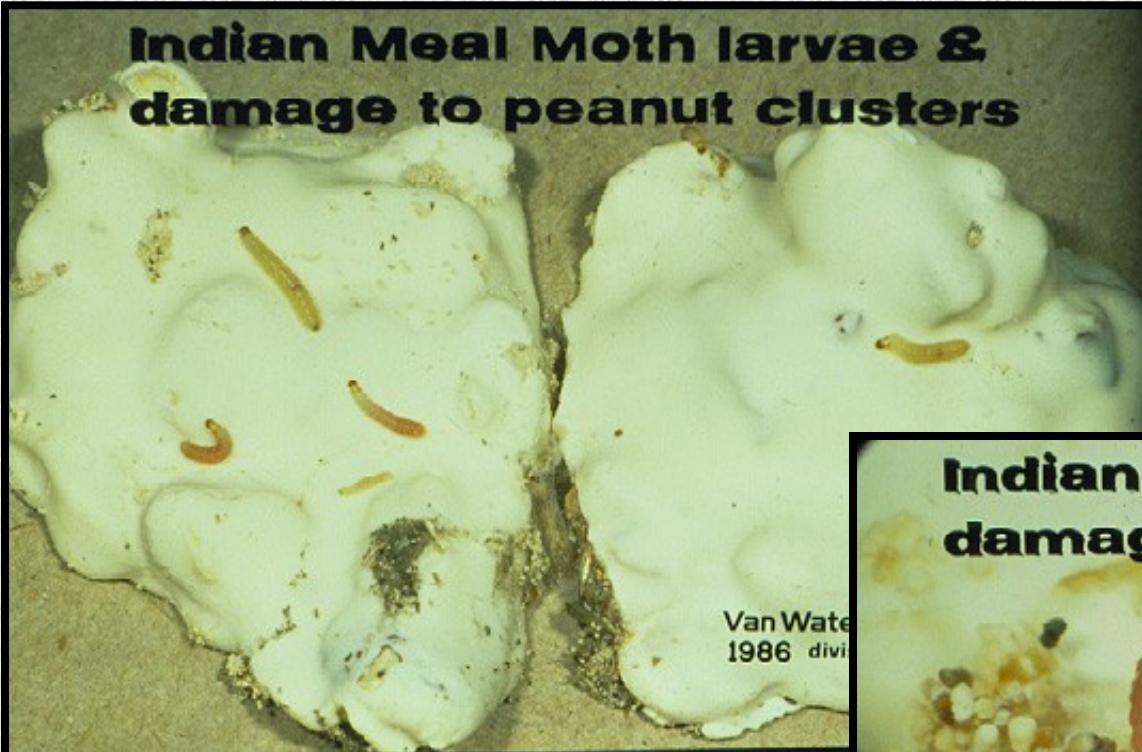
*This beautiful caterpillar is one of the most serious forest pests in the western US*



*DFTM*

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**Indian Meal Moth larvae &  
damage to peanut clusters**



*Indian  
Meal moth*

**Indian Meal Moth larva &  
damage to peanut cluster**

Van Waters & Rogers  
1986 division of Univar



*Some moth larvae  
Are stored product  
pests*

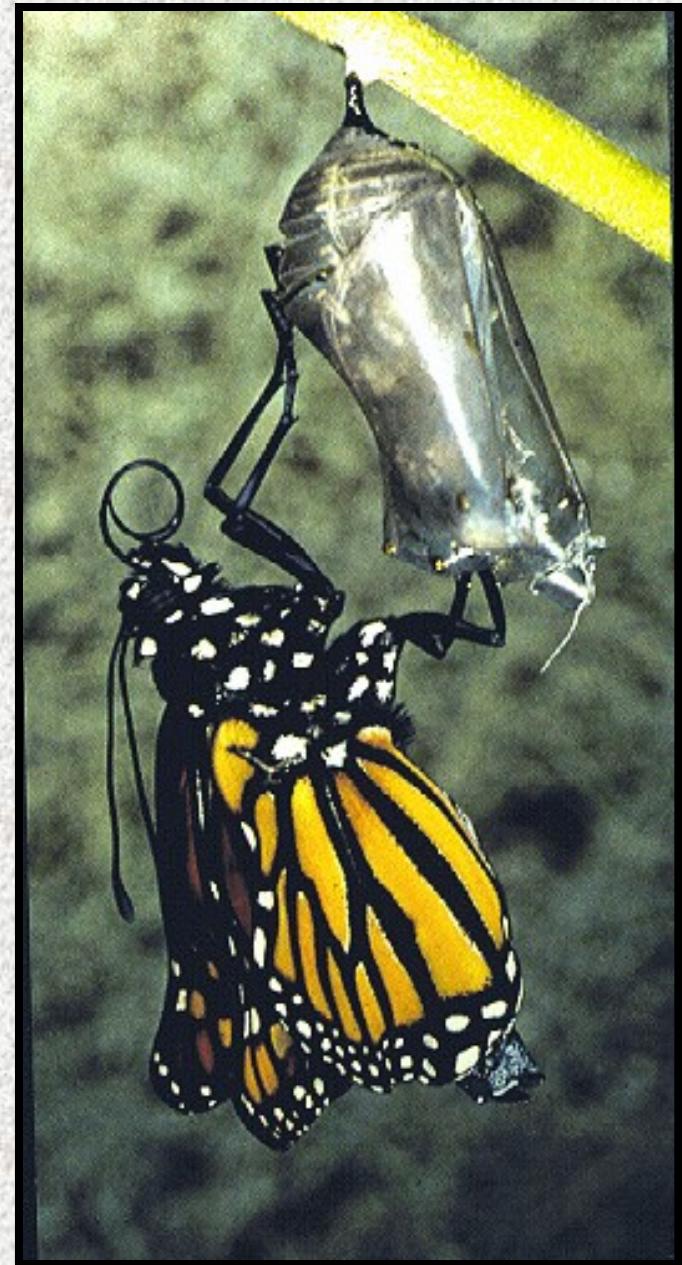
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# *A plume moth*



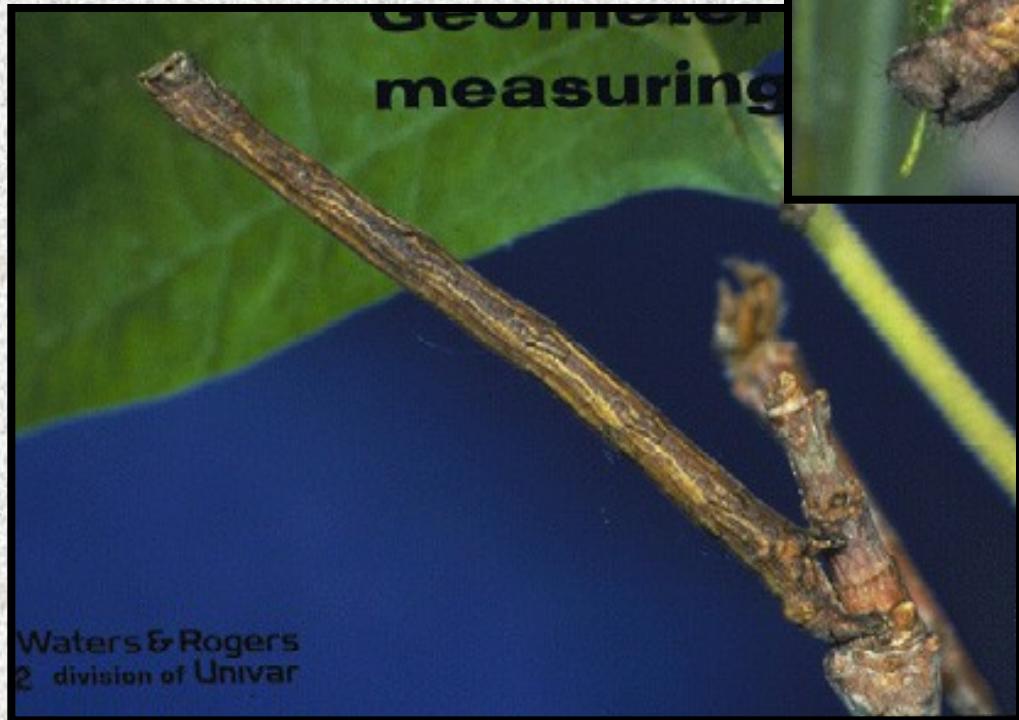
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*Monarch butterfly  
emerging from  
chrysalis*



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# *Inchworm or Measuring-worm*



*“Disturbed”  
Inchworm*

*This butterfly has two heads!*

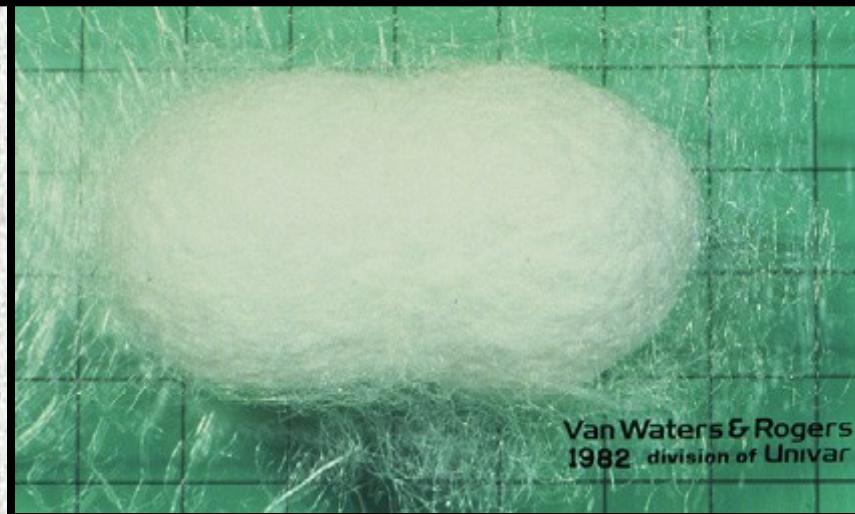


*Why?*

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## **True Silkworm Moth adult mating pair**

Van Waters & Rogers  
1982 division of Univar



Van Waters & Rogers  
1982 division of Univar

## *Silkworm*

### **True Silkworm pupa inside cocoon**

Van Waters &  
1982 division of

*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*



**Mediterranean  
Fruit Fly  
adults on  
lemon**

Van Waters & Rogers  
1980 division of Univar

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

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



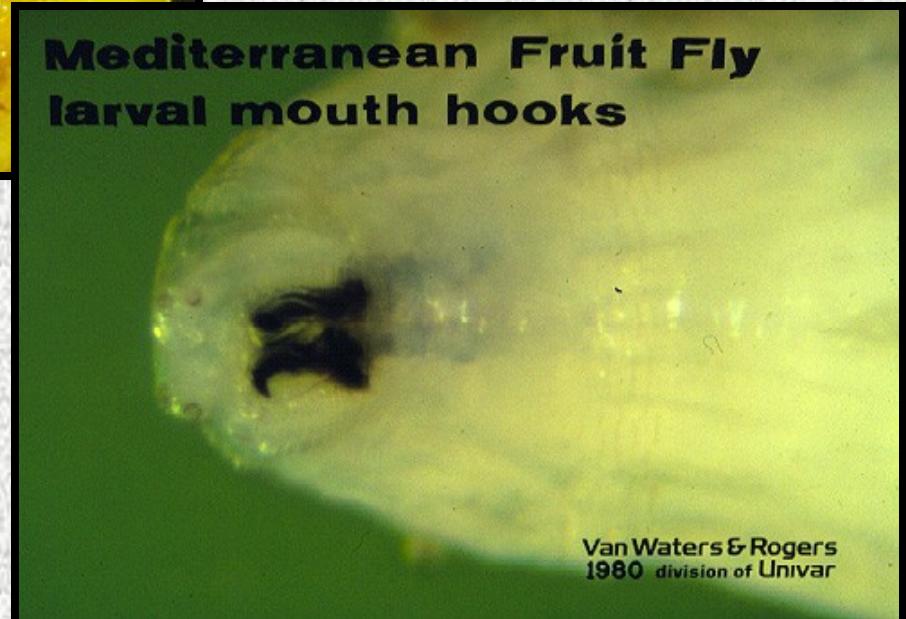
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*Larvae “rasp” at  
fruit with mouth-  
hooks*

*Larvae feed in  
fruit*

**Mediterranean Fruit Fly  
larval 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*

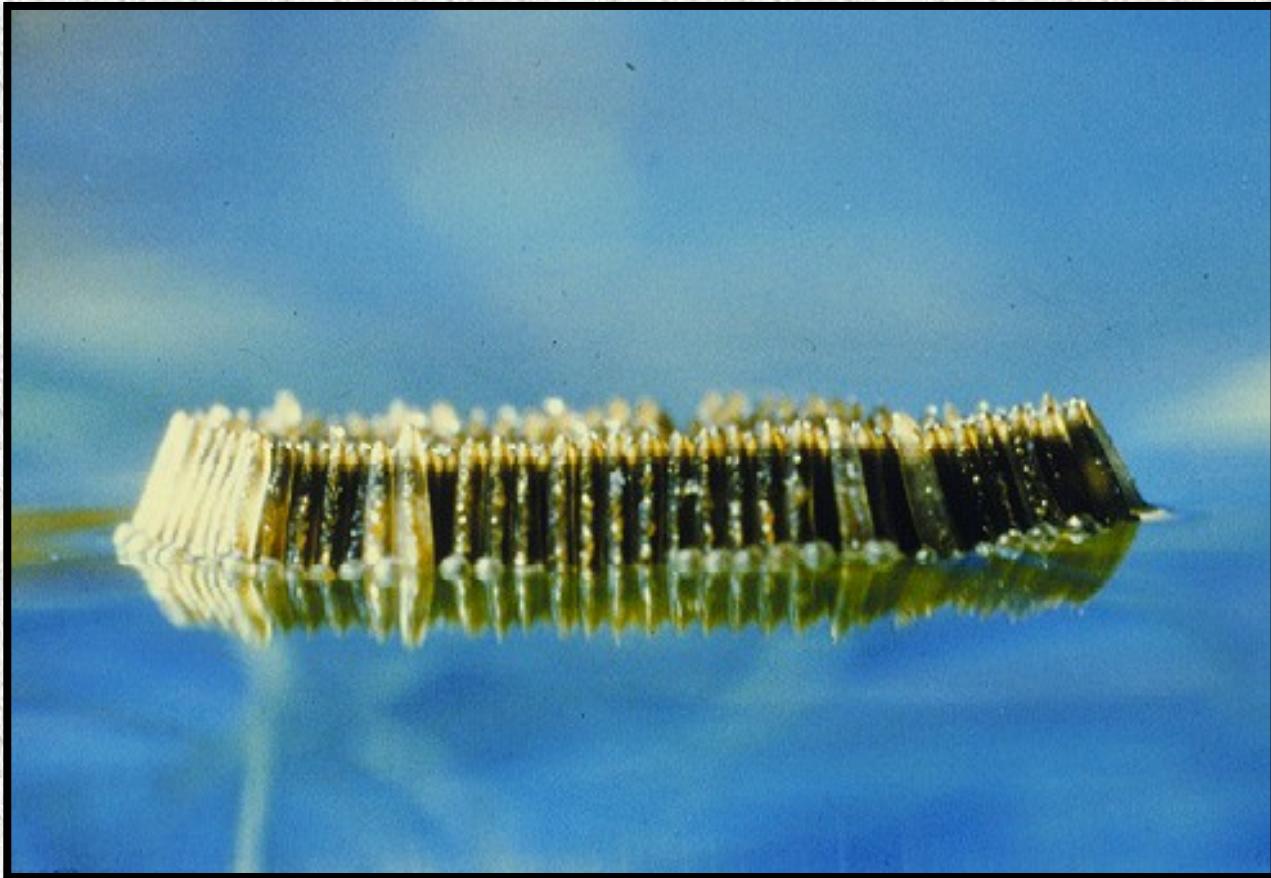


*Everyone has been “bitten” by a mosquito!*



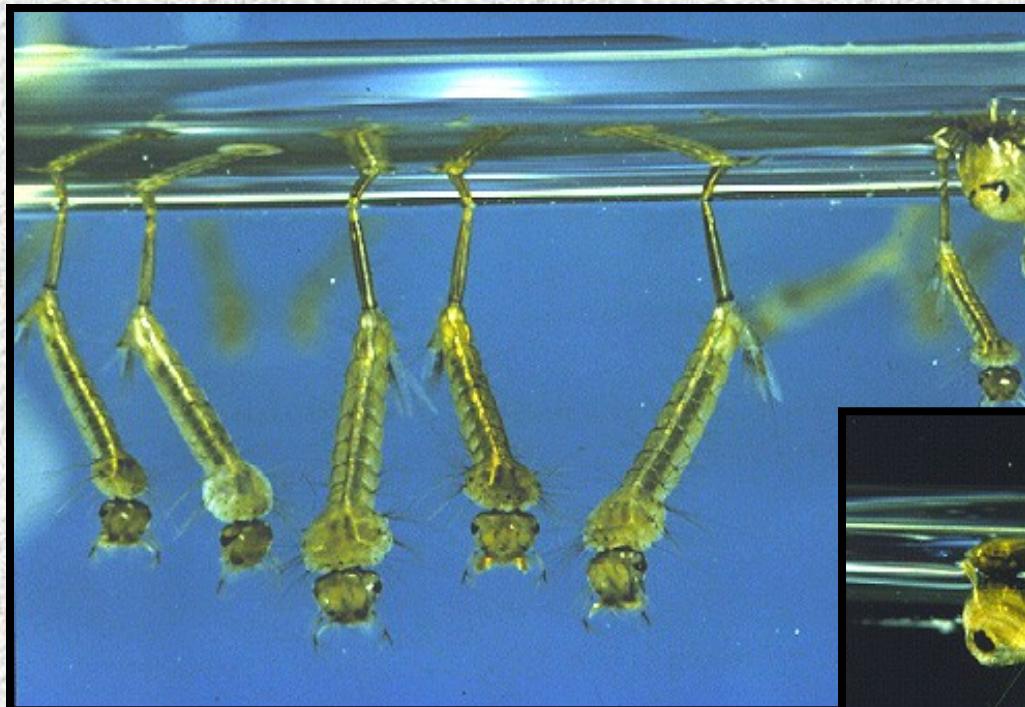
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*Mosquito eggs are laid in a “raft” in water or an area that will flood*

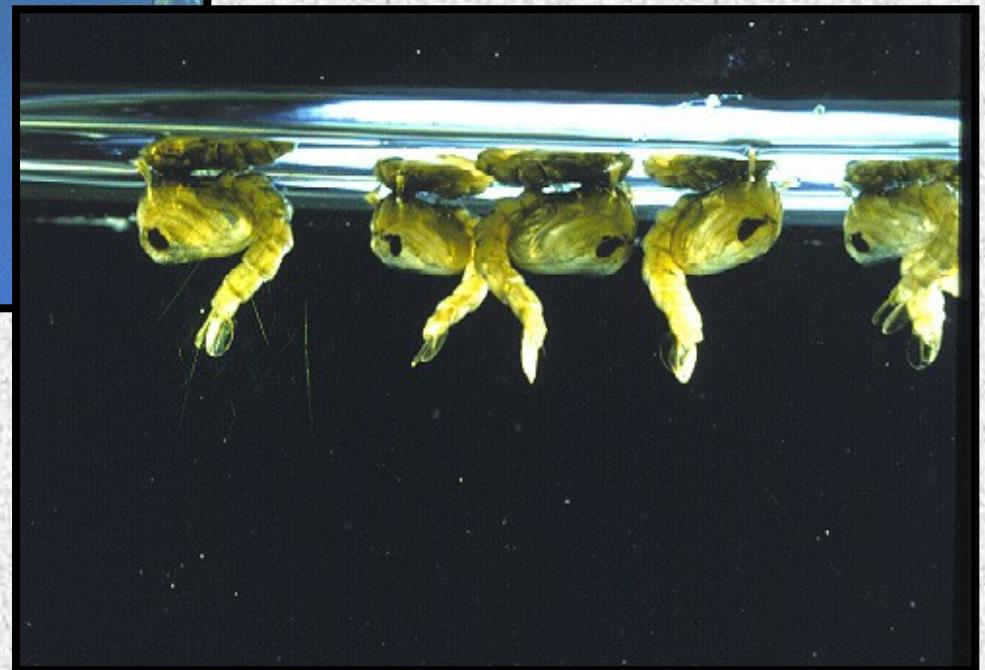


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*Larvae and pupae are aquatic*



*Larvae are filter feeders*



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*Adults emerge from  
the surface of the  
water*



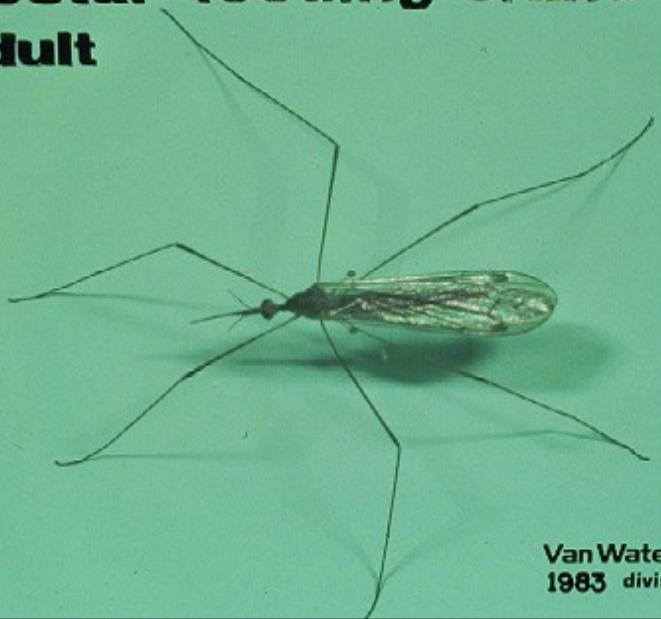
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*Elephantiasis is  
mosquito-vectored,  
nematode condition*



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## Nectar-feeding Crane Fly adult



Van Waters & Rogers  
1983 division of Univar

*Crane flies are  
sometimes called  
giant mosquitoes*

*Larvae feed on roots  
in the soil*

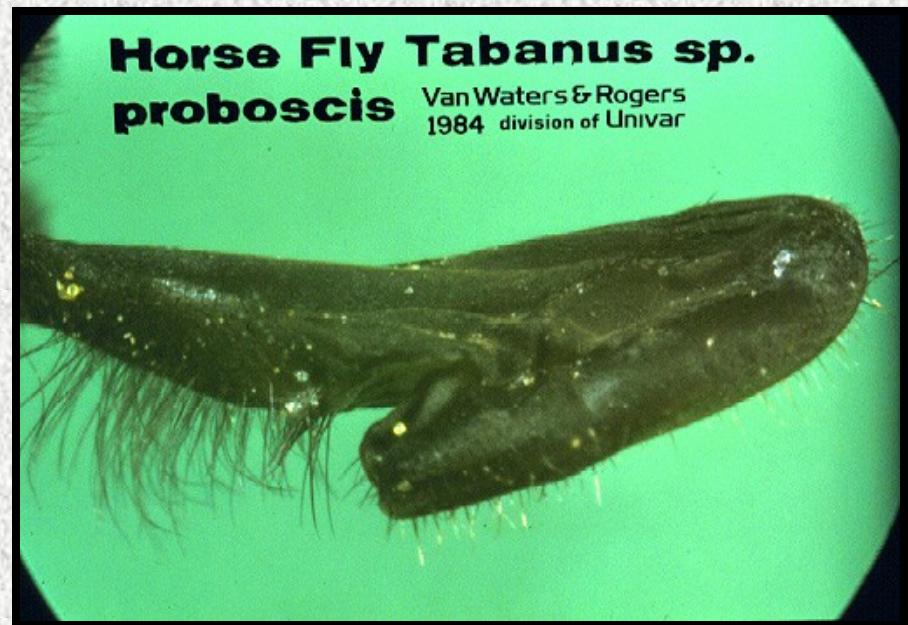


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*Horse and deer flies have chewing and cutting mouthparts*



*Females take blood meals*



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



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*Immatures feed on  
living flesh*

*Cattle grub is a  
myiasis causing fly*



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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*



*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  
replete*



Insects and People  
Complete



*Yellowjackets are social insects*



*Yellowjackets are predators through most of their lives*

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Complete

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



Insects and People  
Complete

*A solitary wasp provisioning its nest with a caterpillar*



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Complete

## *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*



*Larvae are  
voracious  
predators*

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



# *Pupal cases or “cocoons”*



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*A Mantispid - not a mantid!*

*Mantispid  
larvae feed  
on spider  
eggs*



Insects and People  
Complete

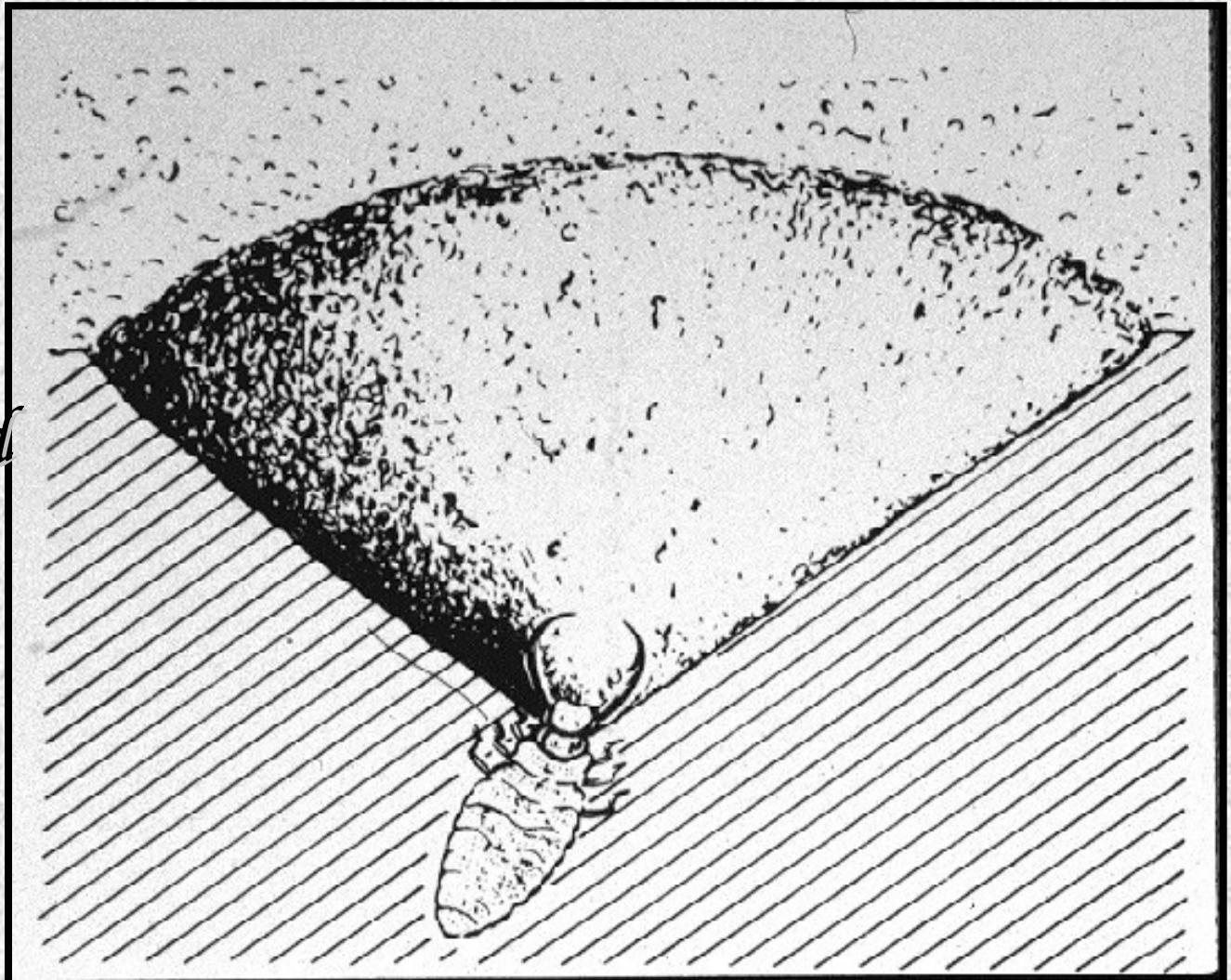
# *Antlion Larva*



*Sometimes called  
a “doodlebug”*

# *The pit of an antlion larva*

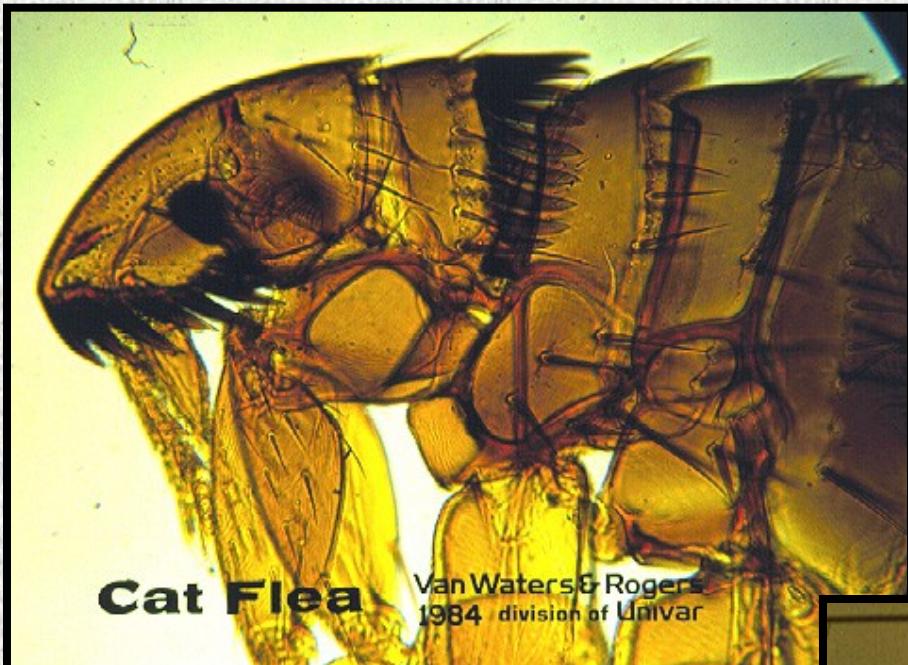
*Look for  
these on sand  
dunes*



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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



**Cat Flea**

Van Waters & Rogers  
1984 division of UniVar

*Adult fleas have piercing and sucking mouthparts*

*Eggs are laid in animal bedding or nests*



*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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