

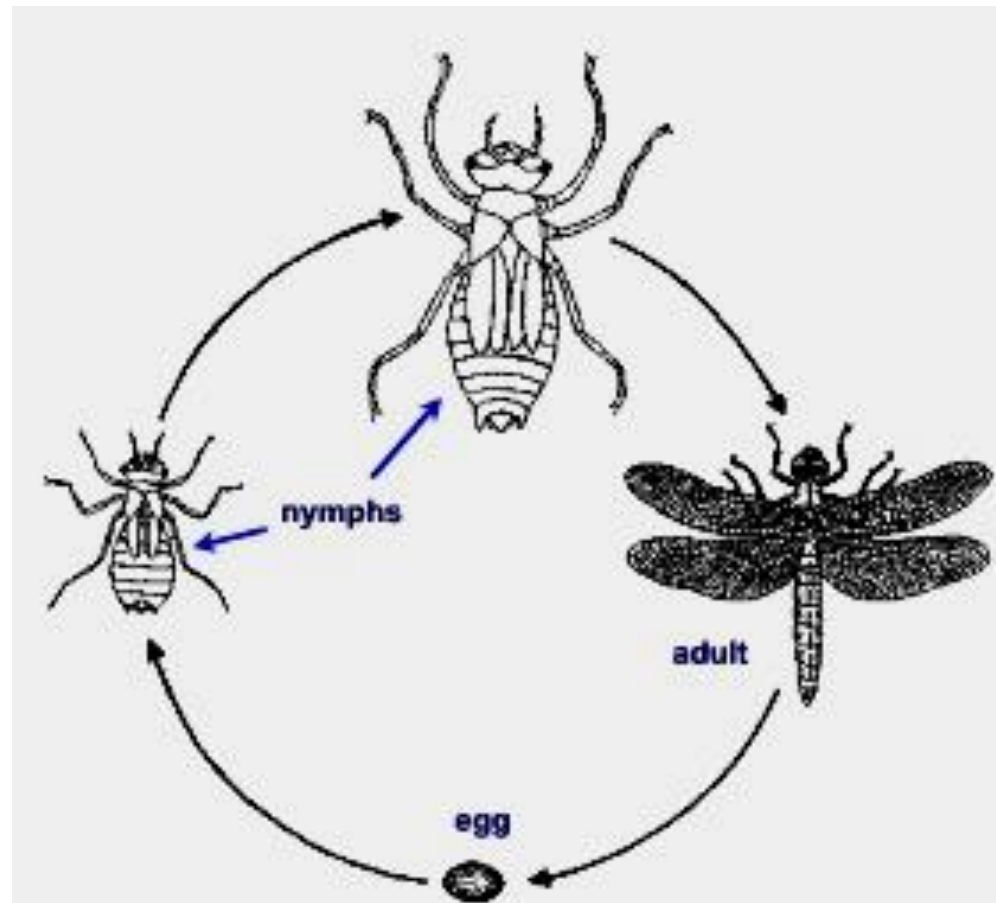


# DEVELOPMENT AND SPECIALIZATION



# EVENTS IN INSECT DEVELOPMENT

- Embryo
- Immature
- Adult





# EVENTS IN INSECT DEVELOPMENT

- **Eclosion**-emergence of the adult from the pupa
- **Instar**-stage of the insect between molts; differ in form and size
- **Metamorphosis**-change in form

# HEMIMETABOLOUS INSECTS

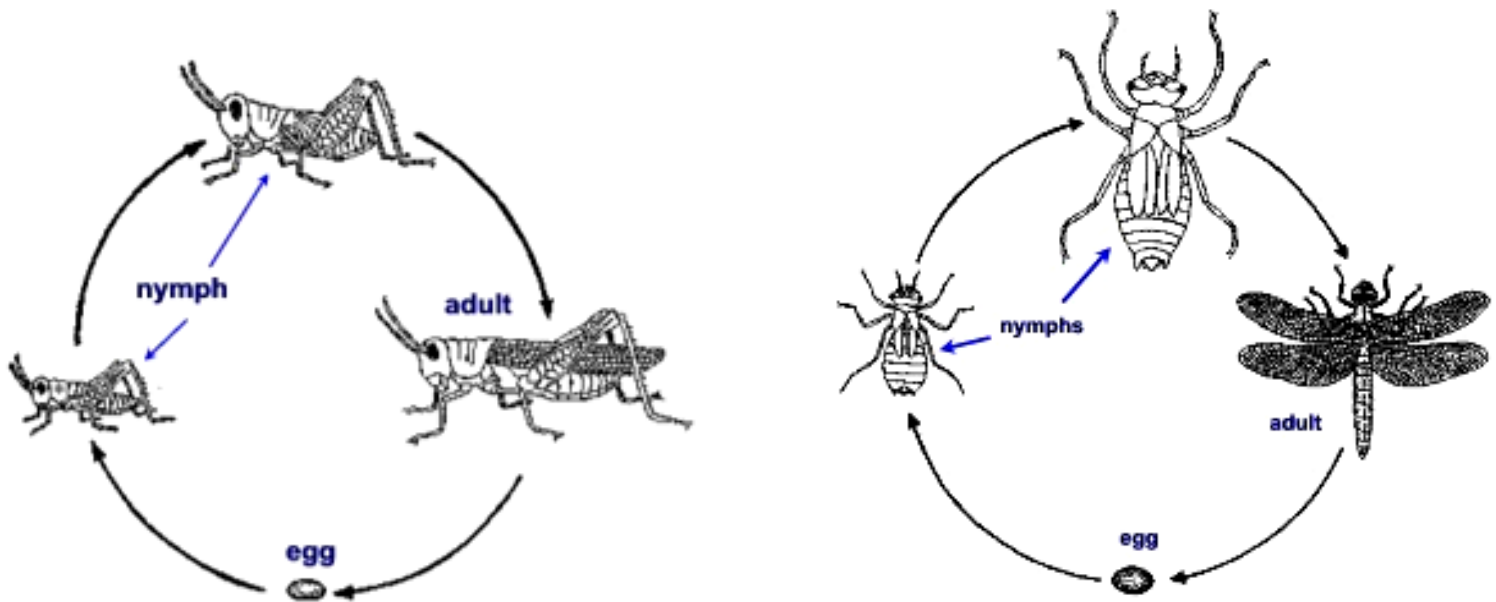
- Insects that have **gradual development or incomplete development**



# HEMIMETABOLOUS INSECTS

## ■ Life stages

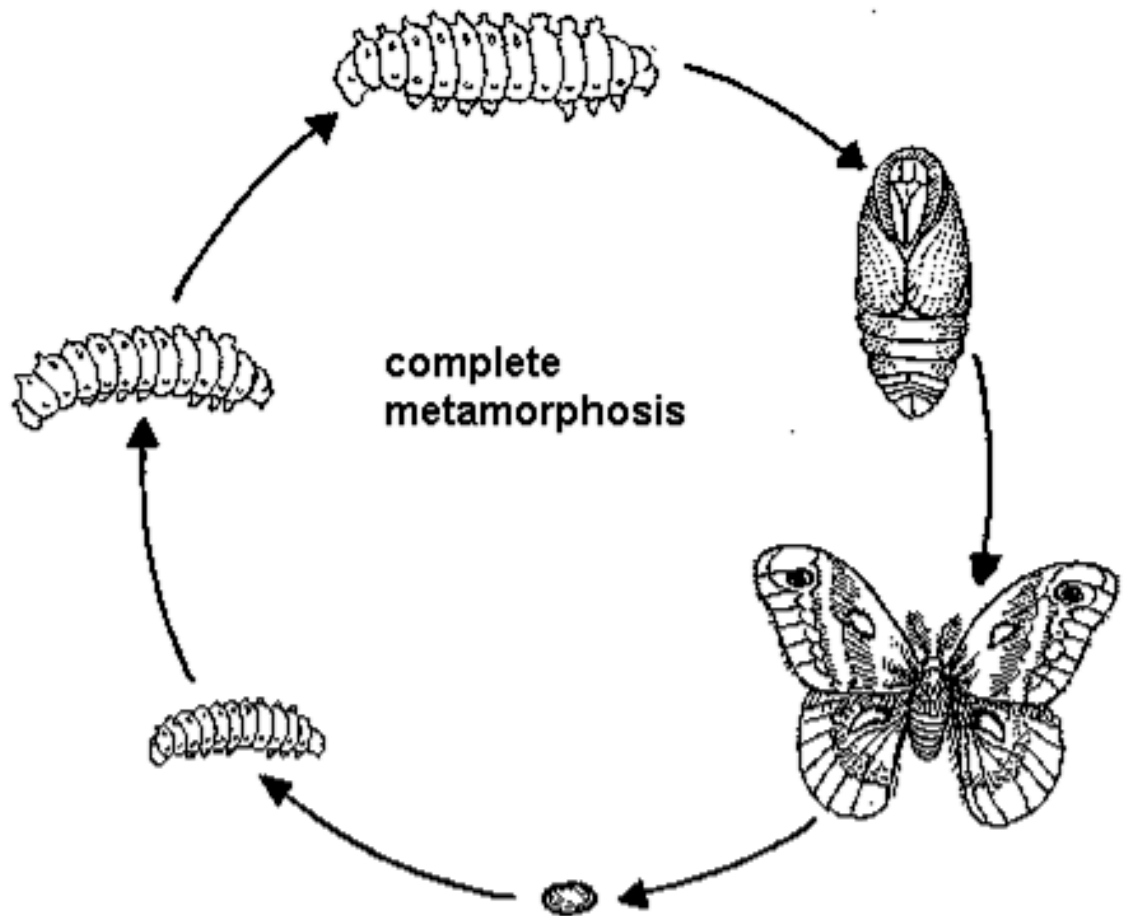
- **Nymphs or naiads** (immatures) are similar to the adult in appearance, food habits, and habitat
- **Adults**



# HOLOMETABOUS INSECTS

## ■ Life stage

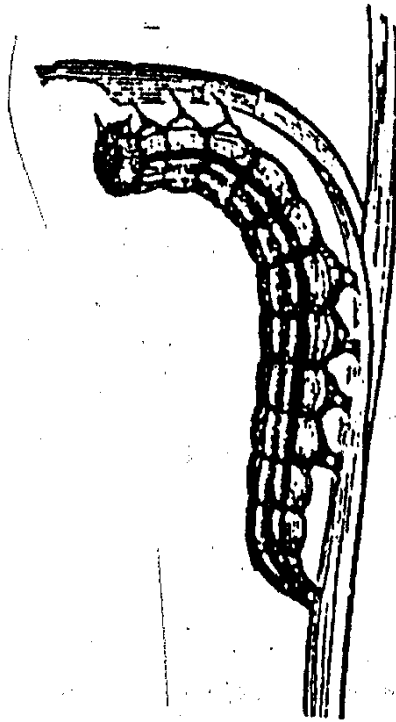
- Egg
- Larva
- Pupa
- Adult



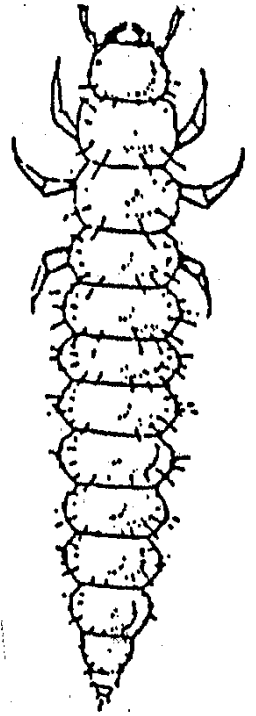
# LARVAL LIFE FORMS



**VERMIFORM  
(MAGGOT)**

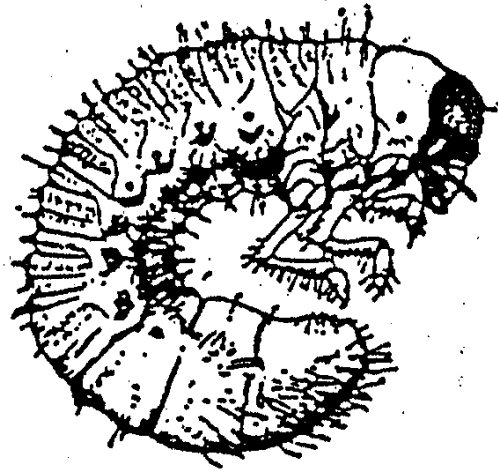


**ERUCIFORM  
(CATERPILLAR)**

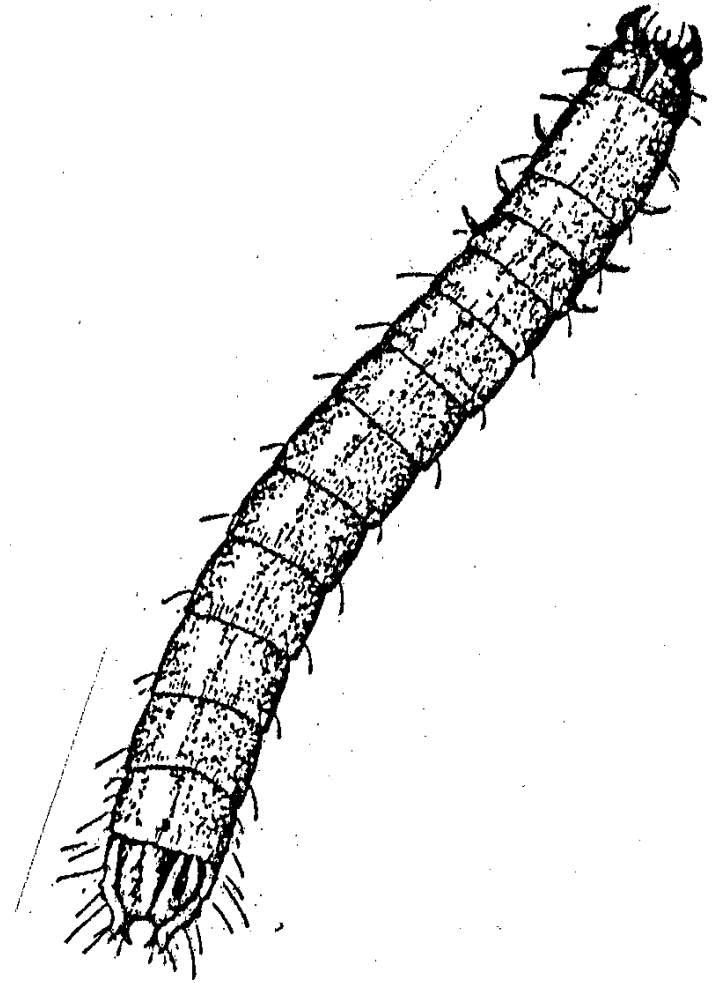


**CARABIFORM  
(LEAF BEETLES)**

# LARVAL LIFE FORMS



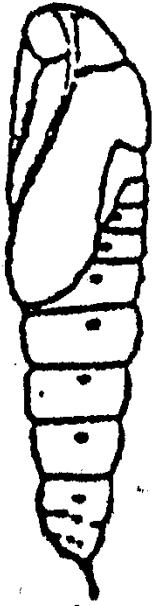
**SCARABAEIFORM  
(GRUBS)**



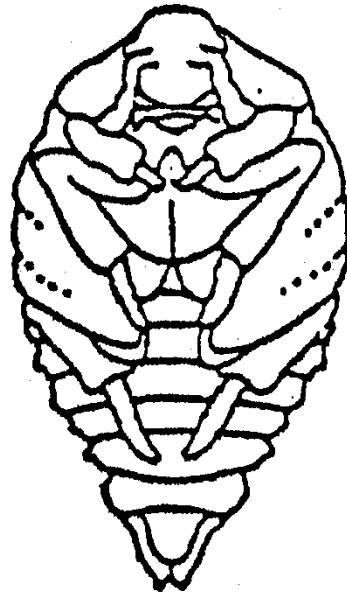
**ELATERIFORM  
(CLICK BEETLE)**



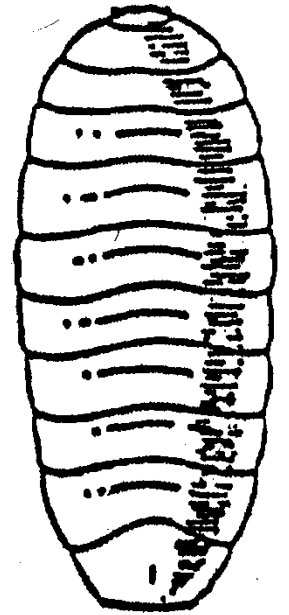
# PUPAL LIFE FORMS



**OBTECT PUPA**  
(MOTH)



**EXARATE PUPA**  
(SCARAB BEETLE)



**COARCTATE PUPA**  
(FLY)

# INSECT DEVELOPMENT

- **Molting**-complex process by which an insect sheds its old cuticle to allow for growth and increase in size





# INSECT DEVELOPMENT

- **Univoltine** - insect completes one generation per year



# INSECT DEVELOPMENT

- **Bivoltine** - insect completes two generations per year



# INSECT DEVELOPMENT

- **Multivoltine** - insect completes more than two generations per year





# DIAPAUSE

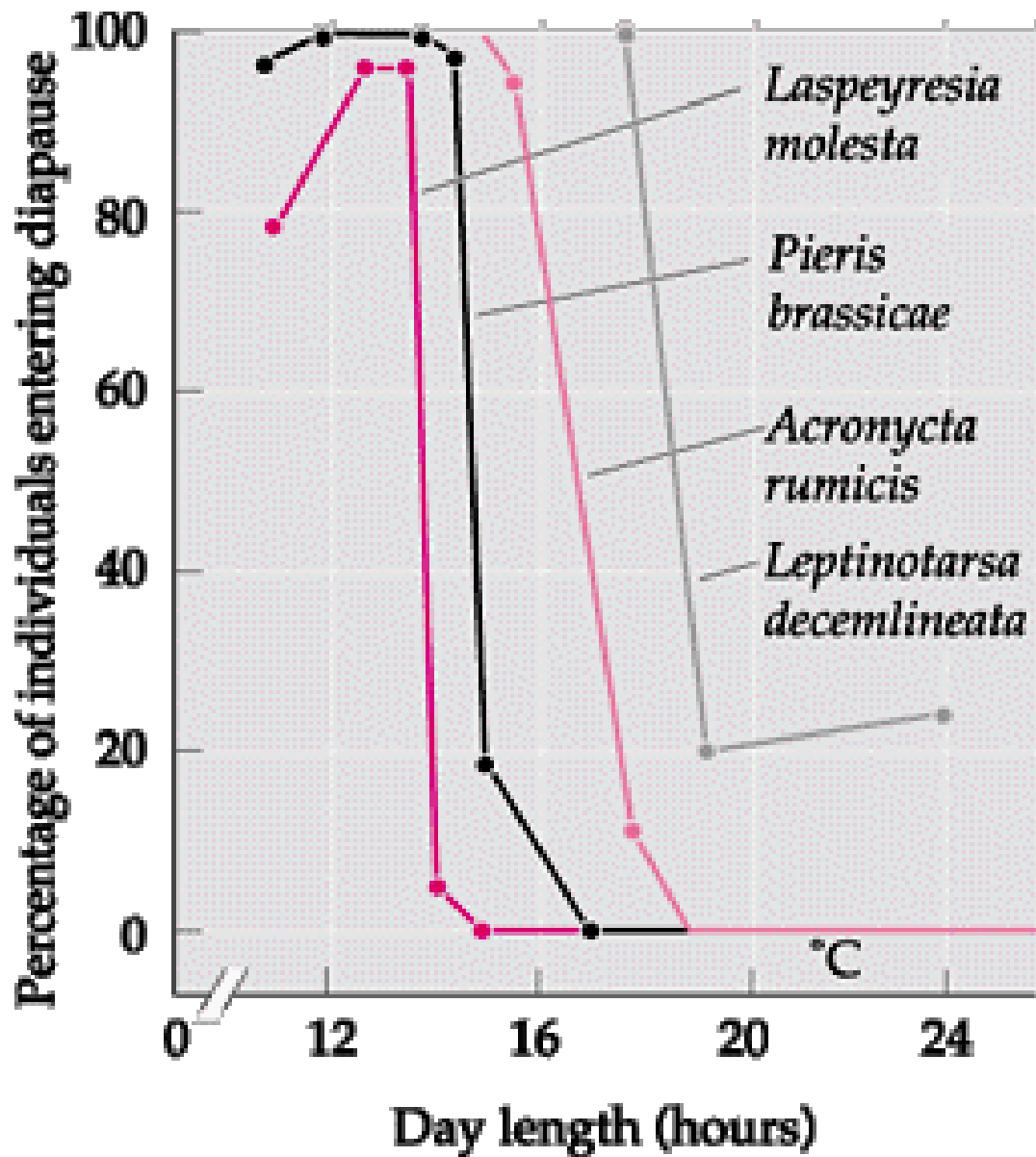
- A state of arrested behavior, growth, and development that occurs at one stage in the life cycle
- Persists until the brain has been activated by a natural or artificial (refrigerator) winter
- **Diapause hormone** – regulates diapause



# DIAPAUSE

- May be entered in any life stage
- Develops in response to **photoperiod**
- **Obligate**-intimately tied to certain environmental factors
- **Facultative**-insect may or may not enter diapause





# END OF PRESENTATION

