AH, NO—YOU WANTED **ENTOMOLOGY-MAN**, SPELLED WITH AN "N." SEE, IT'S FROM THE GREEK **ENTOMON**, MEANING "INSECT," WHICH IS ITSELF THE NEUTER FORM OF **ENTOMOS**, MEANING "SEGMENTED" OR ...

"Wrong Superhero"

http://xkcd.com/1012/
What is *not* an insect?
Arthropoda

- Insecta (Hexapoda)
- Myriapoda
- Chelicerata
- Crustacea
- Trilobita
- Xiphosura
What is it?
What is it?

Myriapoda
(house centipede)
What is it?
What is it?

Hexapoda (caterpillar)

- Six legs
- False legs (prolegs)
What is it?
What is it?

Chelicerata (spider)

just another leg
What is it?
What is it?

Hexapoda (aphid)

siphunculus
What is it?
What is it?

Crustacea (isopod)
Part 1/3

- **Thysanura** (silverfish)
- **Pterygota** “things with wings”
  - **Odonata** (damselflies, dragonflies)
  - **Neoptera** “things that fold their wings”
    - **Dictyoptera** “net-wing”
      - **Mantodea** (mantises)
      - **Blattaria** (cockroaches)
      - **Isoptera** (termites)
    - [...]
Thysanura: silverfish
cerci
caudal filament
Pterygota
things with wings
Odonata: damselflies and dragonflies

dragonfly

damselfly

short antennae
Neoptera

things that can fold their wings
Dictyoptera

“net wing”

mantises, cockroaches, termites
Mantodea: mantises

- Simple eyes
- Compound eyes
Blattaria: cockroaches

cerci

pronotum

long filiform antennae
Isoptera: termites

alate (winged reproductive)

monoliform (bead-like) antennae
QUIZ #1
Odonata

Dragonfly or damselfly?

damselflies
Thysanura
Isoptera

antennae like beads
Part 2/3

• Neoptera “things that fold their wings”
  – […]
  – Phasmatodea (stick & leaf insects)
  – Orthoptera (grasshoppers, katydids, crickets)
  – Phthiraptera (lice)
  – Hemiptera
    • Heteroptera (“true” bugs)
    • Homoptera (cicadas, aphids)
  – […]
Phasmatodea: stick insects
How do they hear?

tympanum

Orthoptera

katydid

grasshopper

Orthoptera

cricket
Phthiraptera

dorsoventrally flattened; tarsal hooks; biting/sucking mouthparts
Hemiptera

Homoptera + Heteroptera

“true bugs”
Heteroptera: bugs

(Heteroptera + Homoptera = Hemiptera)

"X" wings
Heteroptera: bugs

- leaf-footed bug
- shield bug
- bed bug
- water strider

"X" wings
Homoptera: cicadas & relatives

(Heteroptera + Homoptera = Hemiptera)
Heteroptera + Homoptera = Hemiptera

Homoptera: cicadas & relatives

“tent” wings

aphid

planthopper

(Heteroptera + Homoptera = Hemiptera)
Orthoptera

katydid/cricket or grasshopper/locust?

hooded grasshopper

short antennae

Tympanum?
Homoptera (thorn-mimic treehopper)
Orthoptera
(*mole cricket*)

*tymanum*
BONUS ROUND!

“You’re not an ant”
Orthoptera

**Katydid/cricket or grasshopper/locust?**

Katydid

- Long antennae
Mantodea
All of these have complete metamorphosis!

- **Endopterygota** “things with metamorphosis”
  - Coleoptera (beetles)
  - Hymenoptera (wasps, bees, ants)
  - Lepidoptera (butterflies, moths)
  - Siphonaptera (fleas)
  - Diptera (flies, mosquitoes)
egg – larva – pupa – adult

complete metamorphosis (holometabolism)
The lifecycle of the darkling beetle, *Alphitobius diaperinus* (Panzer), from egg to adult. Scale bars = 1mm.

complete metamorphosis (*holometabolism)*

*egg — larva — pupa — adult*
The life cycle of a bee:

- Egg
- Larva
- Pupa
- Adult

Complete metamorphosis (holometabolism)

egg – larva – pupa – adult
incomplete metamorphosis (hemimetabolism)
incomplete metamorphosis (hemimetabolism)

complete metamorphosis (holometabolism)
Endopterygota

things with metamorphosis
Coleoptera: 

*beetles*

- *elytra*
- *pronotum*
- *scutellum*
Hymenoptera: **bees, ants, wasps**

- **Hamuli**
- Distinctive pinched abdomen
Lepidoptera: butterflies and moths
Lepidoptera: butterflies and moths
Lepidoptera: *butterflies and moths*
Lepidoptera: butterflies and moths
Diptera

halteres
Siphonaptera
sucking mouthparts; jumping legs; laterally flattened
QUIZ #3
Heteroptera
Hymenoptera
*(honeypot ants)*
Coleoptera (giraffe weevil)
Hymenoptera (wasp)
BONUS ROUND!

“You’re not a wasp”
Lepidoptera

Butterfly or moth?

moth
Diptera
Lepidoptera

Butterfly or moth?

moth
Coleoptera
BONUS BONUS ROUND!

“Camouflage”
Orthoptera (katydid)
Lepidoptera
(butterfly)
Know what you don’t know

- Dermaptera (earwigs)
- Neuroptera (lacewings)
- Mecoptera (scorpionflies)
- Trichoptera (caddisflies)
- Strepsiptera (twisted-wings)
- Raphidioptera (snakeflies)
- Megaloptera (alderflies)
- Psocoptera (barkflies)
- Thysanoptera (thunderflies)
- Zoraptera (angel insects)
- Plecoptera (stoneflies)
- Notoptera (rock crawlers)
- Embioptera (webspinners)
LUKE...
I AM YOUR FATHER...

NOOOOO!!!
THAT'S IMPOSSIBLE!!