Insect Merit Badge
Mark DuBois
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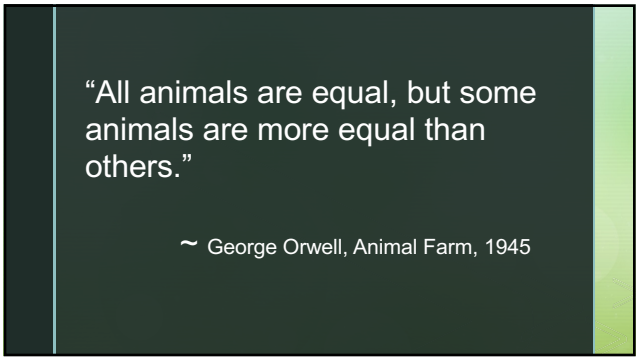
1

Favorite animal?

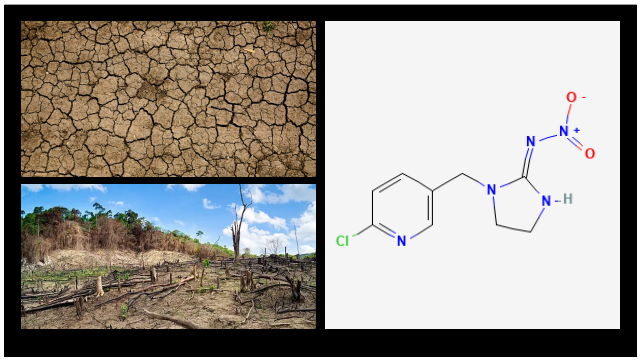
2


“All animals are equal, but some animals are more equal than others.”
~ George Orwell, Animal Farm, 1945

3

Holocene Extinction
SIXTH MAJOR EXTINCTION SPASM
BUTTERFLY POPULATIONS FELL BY 22% FROM 2000 – 2020 (ACROSS 554 SPECIES)
NORTH AMERICAN BIRD POPULATIONS SWINDLED BY 3 BILLION SINCE 1970

4




5

"We all fear what we do not understand."

~ Dan Brown, The Lost Symbol, 2009

6

Insect Classification/ Identification

What is an insect?

7

Insect? **Yes or No**?

**No**

**Immature chigger**
**They also have 6 legs.**
**But adult chiggers have 8 legs.**

8

## Insect? **Yes or No**?

**No**

Springtail (Collembola)
They also have 6 legs.
Mouthparts hidden inside head. Head, thorax, abdomen appear fused. Furcula.

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## Insect? **Yes or No**?

**No**

Protura
They also have 6 legs.
Lack antenna and eyes.
Front legs held as antenna. Mouthparts inside head. Lack spiracles and trachea.

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## Insect? **Yes or No**?

**Yes**

Silverfish
6 legs, 3 main body parts, antennae, hard exoskeleton, spiracles and trachea.

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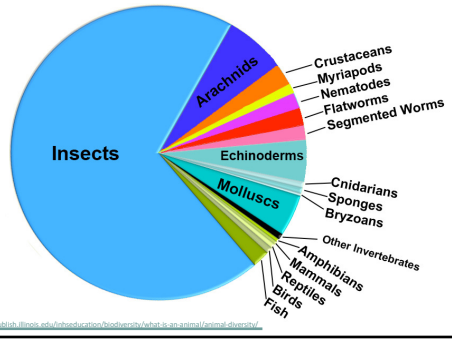
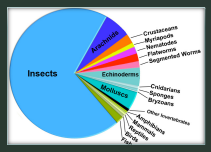



12

- Majority of animal species are insects.
- 1 out of every 4 animals you encounter is likely a beetle.
- Biomass of insects exceeds all other animals.
- Insects are found on every continent (including Antarctica).

**Why are insects so successful?**

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## Importance of insects (roles)

- Pollination – roughly 80% of wild flowering plants and 75% of food crops
- Decomposers – nutrient recycling (consider Australia and cattle)
- Food source for many animals (birds are one example)
- Pest control (many insects are parasitoids and predators)
- Soil health (aeration, add nutrients and much more)
- Great ecosystem health indicators

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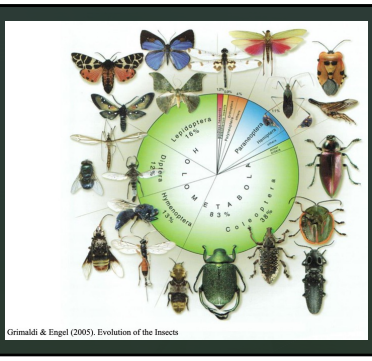


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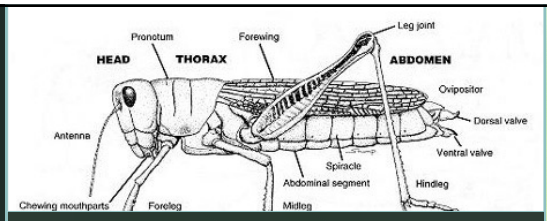


## Insect External Anatomy

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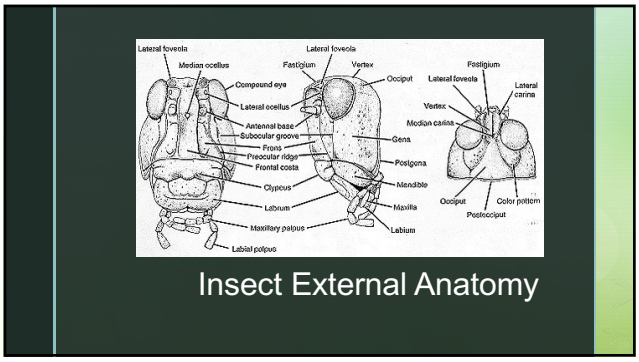
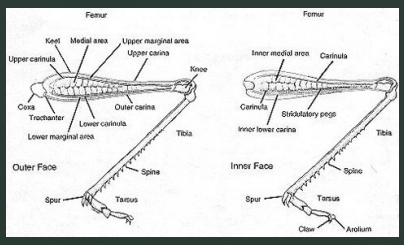



Insect External Anatomy

17




Insect External Anatomy

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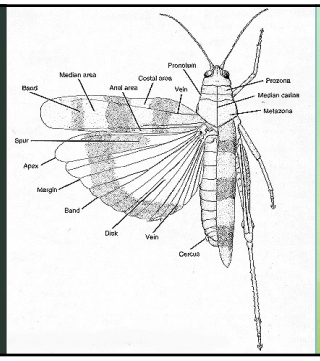
Insect External Anatomy

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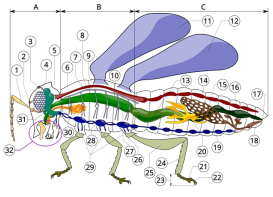
Insect Internal Anatomy

Tagmata: A – Head, B – Thorax, C – Abdomen.

1. antenna
2. ocelli (lower)
3. ocelli (upper)
4. compound eye
5. brain (cerebral ganglia)
6. prothorax
7. dorsal blood vessel
8. tracheal tubes (trunk with spiracle)
9. mesothorax
10. metathorax
11. forewing
12. hindwing
13. mid-gut (stomach)
14. dorsal tube (heart)
15. ovary
16. hind-gut (intestine, rectum & anus)
17. anus
18. oviduct
19. nerve cord (abdominal ganglia)
20. Malpighian tubes
21. tarsal pads
22. claws
23. tarsus
24. tibia
25. femur
26. trochanter
27. fore-gut (crop, gizzard)
28. thoracic ganglion
29. coxa
30. salivary gland
31. subesophageal ganglion
32. mouthparts

From https://en.wikipedia.org/wiki/Insect_morphology

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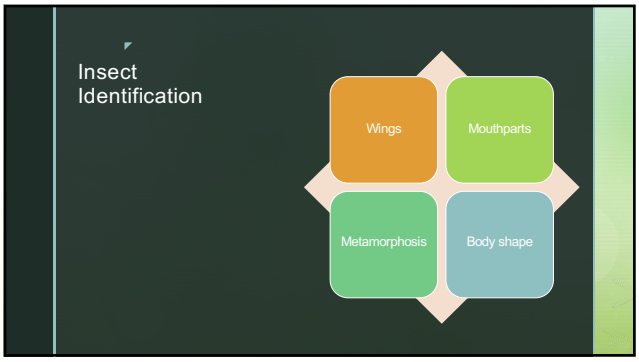
Insect Identification
Wings
Mouthparts
Metamorphosis
Body shape

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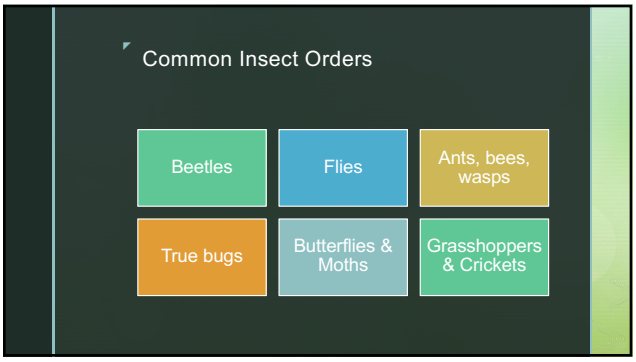
Common Insect Orders
Beetles
Flies
Ants, bees, wasps
True bugs
Butterflies & Moths
Grasshoppers & Crickets

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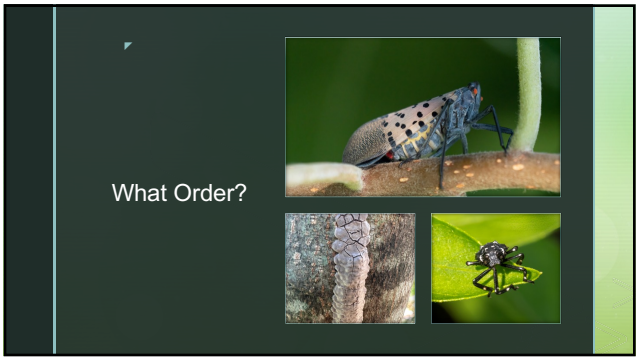
What Order?

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What order?

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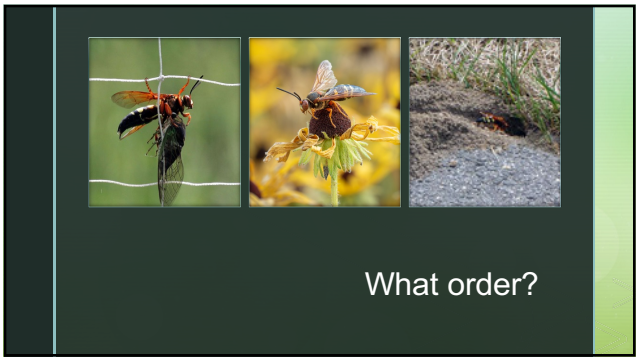
What order?

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Orthoptera
https://songsofinsects.com/

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Hemiptera

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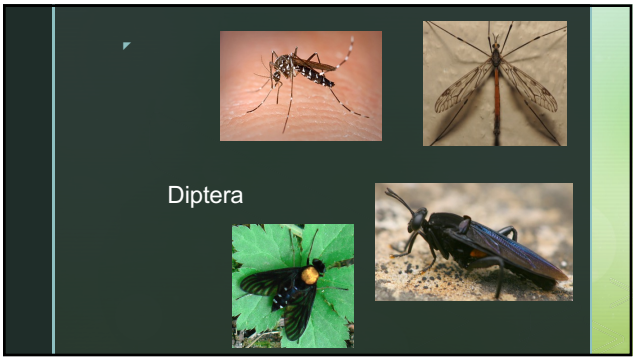
Diptera

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Lepidoptera

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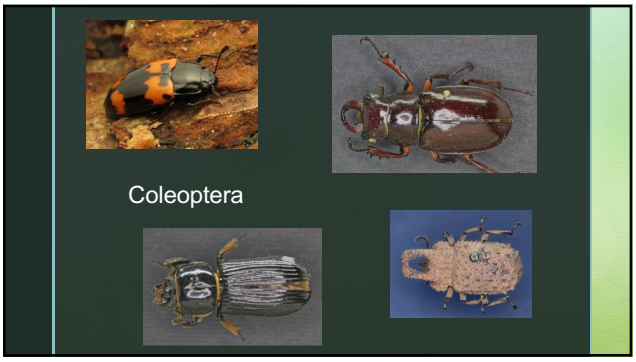
Coleoptera

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Hymenoptera

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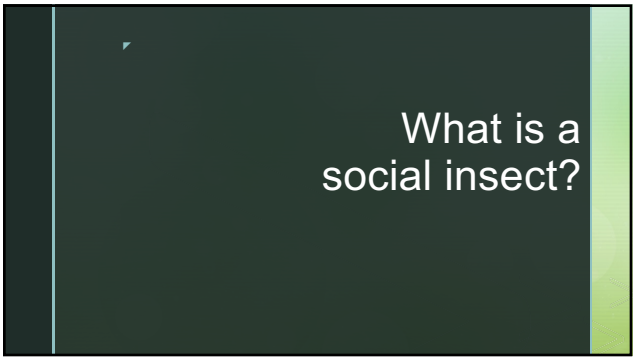
What is a social insect?

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## Social Insects

- TERMITES (SOCIAL COCKROACHES)
- AMBROSIA BEETLES
- SOME APHIDS
- SOME THRIPS
- SOME BEES
- SOME WASPS
- ALL ANTS

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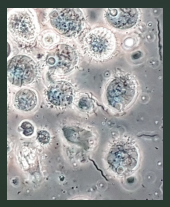
## Termites (Order Blattodea, infraorder Isoptera)



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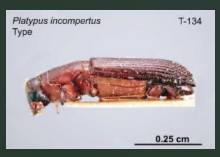
## *Austroplatypus incompertus* (Order Coleoptera: Curculionidae)

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## *Pemphigus spyrothecae* (Order Hemiptera: Aphididae)

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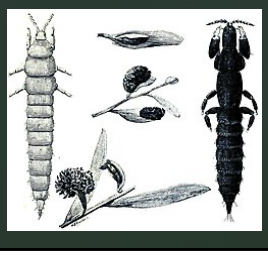
*Kladothrips rugosa* (Order Thysanoptera: Phlaeothripidae)



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Some Bees

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Some Wasps

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Ants

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## Dealing with venom

Most Hymenoptera will defend themselves.
Honeybees sting (vertebrates vs. invertebrates)
Wasps, bees, and ants – most venoms are a combination of Proteins, peptides, enzymes, alkaloids
Intent is to cause pain, not kill
Unfortunately, some humans develop anaphylaxis
(severe whole body reaction including airway constriction, drop in blood pressure and shock)
Symptoms appear suddenly (hives, swelling, dizziness, vomiting, confusion)
If you are allergic, you will likely know it and carry epinephrine

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## Humans and insects

Insects as resources:
- Honey
- Silk
- Dyes
- Medical treatments
- Food (except in western cultures)

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## Careers

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# Insect Merit Badge

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