

Study Guide – Texas 4-H Entomology ID Contest

Zygentoma

1. Review the Zygentoma YouTube video for your age level at the Bexar Entomology page.
2. Follow along with your 4-H Entomology Study Guide
(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
3. Review the definitions for the key words for Zygentoma.
4. Read the Zygentoma Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Zygentoma and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Zygentoma:

Nymph

Ametabolous

Cerci

Caudal Filament

Mandibulate

Zygentoma Facts:

- Zygentoma are silverfish
- Zygentoma have chewing mouthparts
- Zygentoma are very primitive insects that do not have wings and have scales covering their bodies.
- Silverfish have cerci (three hair like projections) from their abdomen
- Silverfish are ametabolous – no metamorphosis – because there is little change from nymph to adult and adults do not have wings.

Study Guide Questions:

Are Zygentomans that are beneficial.

What do silverfish feed on?

Where do you find Zygentoma?

What type of mouthparts do silverfish have?

What is the common name for Zygentoma?

Study Guide – Texas 4-H Entomology ID Contest
Ephemeroptera

Intermediates & Seniors Only

1. Review the Ephemeroptera YouTube video for your age level at the Bexar Entomology page.
2. Follow along with your 4-H Entomology Study Guide
(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
3. Review the definitions for the key words for Ephemeroptera.
4. Read the Ephemeroptera Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Ephemeroptera and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Ephemeroptera:

Hemimetabolous

Mandibulate

Subimago

Cerci

Ephemeroptera Facts:

- Mayflies are hemimetabolous, but have a subimago phase which is a winged form that can molt.
- Mayflies are short lived as adults.
- Mayflies are aquatic as naiads and adults are found near water and attracted to lights.
- Mayflies are known to emerge from the water as the subimago in massive numbers.
- Mayflies have cerci on their abdomen.

Study Guide Questions:

What type of mouthparts do mayflies have?

What metamorphosis do mayflies have?

Are mayflies beneficial or pests or inconsequential?

What is a subimago?

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Odonata

1. Review the Odonata YouTube video for your age level at the Bexar Entomology page.
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(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
3. Review the definitions for the key words for Odonata.
4. Read the Odonata Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Odonata and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Odonata:

Hemimetabolous

Mandibulate

Naiad

Odonata Facts:

- Odonata are hemimetabolous. They lay eggs in the water and naiads are aquatic. Adults are always found near water for this reason.
- Odonata are considered beneficial as naiads and adults.
- Adults can be very colorful.
- There are two species of Odonata to know.
- Odonata have chewing mouthparts.
- Odonata have front legs turned forward like baskets to catch prey on the fly.
- Odonata have strong wings for fast flying.

Study Guide Questions:

What type of mouthparts do Odonata have?

What metamorphosis does Odonata have?

Are Odonata beneficial or pests?

Where do Odonata live?

Species to Know:

Black winged damselfly

Green darner

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Plecoptera

Intermediates & Seniors Only

1. Review the Plecoptera YouTube video for your age level at the Bexar Entomology page.
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3. Review the definitions for the key words for Plecoptera.
4. Read the Plecoptera Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Plecoptera and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Plecoptera:

Hemimetabolous

Naiad

Mandibulate

Plecoptera Facts:

- Plecoptera are hemimetabolous. They lay eggs in the water and naiads are aquatic. Adults are always found near water for this reason.
- Plecoptera are called stoneflies.
- Stoneflies are inconsequential, which means they are neither beneficial or pests.

Study Guide Questions:

What type of mouthparts do stoneflies have?

What metamorphosis do stoneflies have?

Are stoneflies beneficial or pests or inconsequential?

Where do stoneflies live or where are they found?

Study Guide – Texas 4-H Entomology ID Contest
Blattodea

7. Review the Blattodea YouTube video for your age level at the Bexar Entomology page.
8. Follow along with your 4-H Entomology Study Guide
(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
9. Review the definitions for the key words for Blattodea.
10. Read the Blattodea Facts
11. Answer the study guide questions
12. Quiz yourself to identify the species of Blattodea and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Blattodea :

Paurometabolous

Mandibulate

Ootheca

Blattodea Facts:

- Blattodea contains both termites and cockroaches.
- Blattodea has a paurometabolous or gradual metamorphosis.
- There are several species of cockroaches to know.
- Termites and cockroaches are considered pests, but they can also be considered beneficial because they are recyclers.
- Termites feed on cellulose material (wood and grass and plants).
- Cockroaches can be pests indoors.
- American and smokeybrown cockroaches are large. German cockroaches are much smaller.

Study Guide Questions:

Name the species of Blattodea?

Are Blattodea pests or beneficial?

What mouthparts do Blattodea have?

What type of lifecycle does Blattodea have?

Species to Know:

Juniors: American cockroach

Intermediates & Seniors: American cockroach, German cockroach, Smokeybrown cockroach, Termites

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Mantodea

Intermediates & Seniors Only

1. Review the Mantodea YouTube video for your age level at the Bexar Entomology page.
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3. Review the definitions for the key words for Mantodea.
4. Read the Mantodea Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Mantodea and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Mantodea:

Sit and wait predator

Paurometabolous

Chewing

Mandibulate

Beneficial

Raptorial

Ootheca

Mantodea Facts:

- Praying mantises are sit and wait predators, meaning they do not hunt for prey
- Praying mantises have triangle shaped heads and raptorial legs
- Praying mantises have an gradual or paurometabolous lifecycle
- Praying mantises are considered beneficial because they are predators but are not specific about what food they consume and may even eat other beneficial insects
- Praying mantis females lay egg cases called ootheca

Study Guide Questions:

How do praying mantises get their food?

What type of mouthparts do praying mantises have?

What is the lifecycle of a praying mantis?

What is an ootheca?

Study Guide – Texas 4-H Entomology ID Contest
Dermaptera
Intermediates & Seniors Only

1. Review the Dermaptera YouTube video for your age level at the Bexar Entomology page.
2. Follow along with your 4-H Entomology Study Guide
(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
3. Review the definitions for the key words for Dermaptera.
4. Read the Dermaptera Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Dermaptera and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Dermaptera:

Mandibulate
Hemimetabolous
Cerci
Nymph

Dermaptera Facts:

- There is only one species to know: earwigs
- Dermaptera are paurometabolous or have a gradual lifecycle.
- Dermaptera have chewing or mandibulate mouthparts
- Dermaptera are considered inconsequential – some species are predator and some are plant feeders, but neither are considered significantly harmful.
- Dermaptera live in leaf litter, under rocks, and under debris (areas that are cooler and wetter)
- Dermaptera have modified appendages on their abdomen called cerci that are for defense.

Study Guide Questions:

What is the common name for Dermaptera?

Are Dermaptera beneficial, pests, or inconsequential.

What are the pinchers on the end of Dermaptera abdomens called?

Why are those pinchers used?

Study Guide – Texas 4-H Entomology ID Contest

Orthoptera

1. Review the Orthoptera YouTube video for your age level at the Bexar Entomology page.
2. Follow along with your 4-H Entomology Study Guide
(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
3. Review the definitions for the key words for Orthoptera.
4. Read the Orthoptera Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Orthoptera and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Orthoptera:

Saltatorial

Mandibulate

Paurometabolous

Omnivorous

Herbivorous

Orthoptera Facts:

- Orthoptera are paurometabolous or have a gradual lifecycle.
- Orthoptera are made up of grasshoppers, crickets and katydids.
- Katydids have stout/fat bodies and wings that mimic leaves.
- All Orthoptera are considered pests
- All Orthoptera have chewing or mandibulate mouthparts
- All Orthoptera have hind legs modified for jumping, called saltatorial.

Study Guide Questions:

Name the species of Orthoptera you are required to know based on your 4-H level.

Are crickets/grasshoppers/katydid beneficial?

Which species of Orthoptera has front legs modified for digging?

Which species of Orthoptera feed on leaves/plants?

What is the name for the type of legs Orthoptera have?

What is the name for the type of front legs mole crickets have?

Which species of grasshopper has a barb under their chin?

Junior Species (3): Differential grasshopper, long-horned grasshopper, field cricket

Intermediate & Senior Species (5): Banded winged grasshopper, differential grasshopper, long-horned grasshopper, field cricket, mole cricket, true katydid

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Thysanoptera

Intermediates & Seniors Only

1. Review the Thysanoptera YouTube video for your age level at the Bexar Entomology page.
2. Follow along with your 4-H Entomology Study Guide
(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
3. Review the definitions for the key words for Thysanoptera.
4. Read the Thysanoptera Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Thysanoptera and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Thysanoptera:

Paurometabolous

Haustellate

Rasping Mouthparts

Thysanoptera Facts:

- Thysanoptera have are paurometabolous or have a gradual lifecycle.
- Thysanoptera are called thrips. Thrips is singular and plural.
- Thysanoptera have rasping mouthparts, which are most closely like haustellate.
- Many species of Thysanoptera are plant feeders and considered pests.
- Thysanoptera have fringed wings.

Study Guide Questions:

What type of mouthparts do thrips have?

What metamorphosis do thrips have?

Are thrips beneficial or pests?

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Hemiptera

7. Review the Hemiptera YouTube video for your age level at the Bexar Entomology page.
8. Follow along with your 4-H Entomology Study Guide
(<https://entomology.tamu.edu/extension/youth/4-h/4h-contest/>)
9. Review the definitions for the key words for Hemiptera.
10. Read the Hemiptera Facts
11. Answer the study guide questions
12. Quiz yourself to identify the species of Hemiptera and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Hemiptera:

Hemelytra

Paurometabolous

Haustellate

Piercing Sucking Mouthparts

Nymph

Hemiptera Facts:

- There are many species of Hemiptera to know, this is a large group of insects.
- All Hemipterans are paurometabolous (gradual lifecycle) and have haustellate (sucking) mouthparts.
- Hemipterans feed on plants, other insects, or blood. They are pests and beneficial.
- For Intermediates and Seniors: Hemipterans can be grouped into three suborders: Heteroptera, Sternorrhyncha, and Auchenorrhyncha.
 - Heteroptera have hemelytra. Half the wing is hard and half is soft/membranous. This means they form a triangle when they fold over the back of the body.
 - Sternorrhyncha are very small, usually immobile, and soft bodied.
 - Auchenorrhyncha are treehoppers, leafhoppers, cicadas and more. They have membranous wings and are all plant feeders.

Study Guide Questions:

Name 5 Hemipterans that are beneficial.

Name 5 Hemipterans that are pests.

What type of mouthparts do Hemipterans have?

What type of metamorphosis do Hemipterans have?

Name 3 aquatic Hemipterans.

Seniors: name 3 Heteroptera, name 3 Auchenorrhyncha, name 3 Sternorrhyncha

Study Guide – Texas 4-H Entomology ID Contest
Phasmatodea

1. Review the Phasmatodea YouTube video for your age level at the Bexar Entomology page.
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3. Review the definitions for the key words for Phasmatodea.
4. Read the Phasmatodea Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Phasmatodea and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Phasmatodea:

Mandibulate

Paurometabolous

Herbivorous

Camouflage

Phasmatodea Facts:

- The only common name you need to give these insects is walkstick.
- Phasmatodea are paurometabolous or have a gradual lifecycle.
- Phasmatodea are considered inconsequential.
- Phasmatodea have chewing or mandibulate mouthparts
- Phasmatodea are camouflaged.

Study Guide Questions:

What do walking sticks eat?

Why are walking sticks camouflaged?

What type of lifecycle do walking sticks have?

Do walking sticks have wings?

What do walking sticks feed on?

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Psocodea

Intermediates & Seniors Only

1. Review the Psocodea YouTube video for your age level at the Bexar Entomology page.
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3. Review the definitions for the key words for Psocodea.
4. Read the Psocodea Facts
5. Answer the study guide questions
6. Quiz yourself to identify the species of Psocodea and if they are a pest/beneficial/inconsequential and where they are found in nature and/or their host.

Key Words to Know for Psocodea:

Mandibulate

Haustellate

Paurometabolous

Parasite

Harmful

Host

Psocodea Facts:

- Psocodea are paurometabolous or have a gradual lifecycle.
- There are two groups within Psocodea: book & bark lice and the true lice.
- Psocodea have both chewing/mandibulate or sucking/haustellate mouthparts
- Book and bark lice are very small insects and can be considered pests in some situations (mainly book lice)
- Bark lice may feed on fungal material on bark
- Book lice may feed on moldy grains in a pantry, or book pages (especially when in humid environments)
- All true lice are parasitic and pests
- There are chewing and sucking lice and each have different mouthparts
- Lice are host specific, meaning they have locations and animals they feed on
- Lice do not have wings, because wings would make it harder to hide on the body of the host
- Lice are considered medically important pests

Study Guide Questions:

Name the places book/bark lice can be found. (not for juniors)

Name the food book/bark lice can feed on. (not for juniors)

Are Psocodea beneficial?

What lifecycle does Psocodea have?

What mouthparts do book and bark lice have?

Which louse has chewing mouthparts? (not for juniors)

Which lice have piercing sucking mouthparts?

Which lice are found on humans?

Which lice are found on swine? (not for juniors)

Which lice are found on cattle? (not for juniors)

Junior Species (1): Head louse

Intermediate Species: (5): Book/bark lice, Head louse, chewing louse, hog louse, short-nosed cattle louse

Senior Species: (5): book/bark lice, Head louse, chicken head louse, hog louse, short-nosed cattle louse

Study Guide – Texas 4-H Entomology ID Contest
Hemiptera Species to Know:

Junior Species (10):

- | | |
|--------------------|----------------|
| 1. backswimmer | 6. squash bug |
| 2. bed bug | 7. toad bug |
| 3. giant water bug | 8. cicadas |
| 4. green stink bug | 9. leafhoppers |
| 5. harlequin bug | 10. aphids |

Intermediate Species (19):

- | | |
|----------------------|--------------------|
| 1. backswimmer | 11. toad bug |
| 2. bed bug | 12. water striders |
| 3. chinch bug | 13. cicadas |
| 4. cotton fleahopper | 14. leafhoppers |
| 5. giant water bug | 15. aphids |
| 6. green stink bug | 16. greenbug |
| 7. harlequin bug | 17. psyllids |
| 8. kissing bug | 18. armored scales |
| 9. leaffotted bug | 19. soft scales |
| 10. squash bug | |

Senior Species (36):

- | | |
|------------------------|-------------------------|
| 1. ambush bug | 19. tarnished plant bug |
| 2. assassin bug | 20. toad bug |
| 3. backswimmer | 21. water boatman |
| 4. bed bug | 22. water scorpions |
| 5. big-eyed bug | 23. water striders |
| 6. boxelder bug | 24. wheel bug |
| 7. burrower bug | 25. cicadas |
| 8. chinch bug | 26. leafhoppers |
| 9. cotton fleahopper | 27. planthoppers |
| 10. false chinch bug | 28. spittlebugs |
| 11. giant water bug | 29. treehoppers |
| 12. green stink bug | 30. aphids |
| 13. harlequin bug | 31. greenbug |
| 14. kissing bug | 32. pecan phylloxera |
| 15. large milkweed bug | 33. psyllids |
| 16. leaffotted bug | 34. armored scales |
| 17. minute pirate bug | 35. soft scales |
| 18. squash bug | 36. whiteflies |