

Insecta Services and Disservices

Kaylyn Flanigan

Common Services?

- Produce useful substances

Insects produce a number of helpful substances that humans have grown accustomed to and rely upon. These include silk, honey, wax, and dye⁶.



Silkworms, *Bombyx mori*, whose spittle is prized among humans for clothing purposes, have been domesticated for more than 35 centuries¹. Because of this domestication by humans, the silkworm larvae are dependent on human involvement; their thoracic legs are too weak to climb actual branches to receive their meal and their jaws too weak to eat anything but shredded up mulberry leaves⁶. Silkworms belong to the order **lepidoptera** of the class insecta.

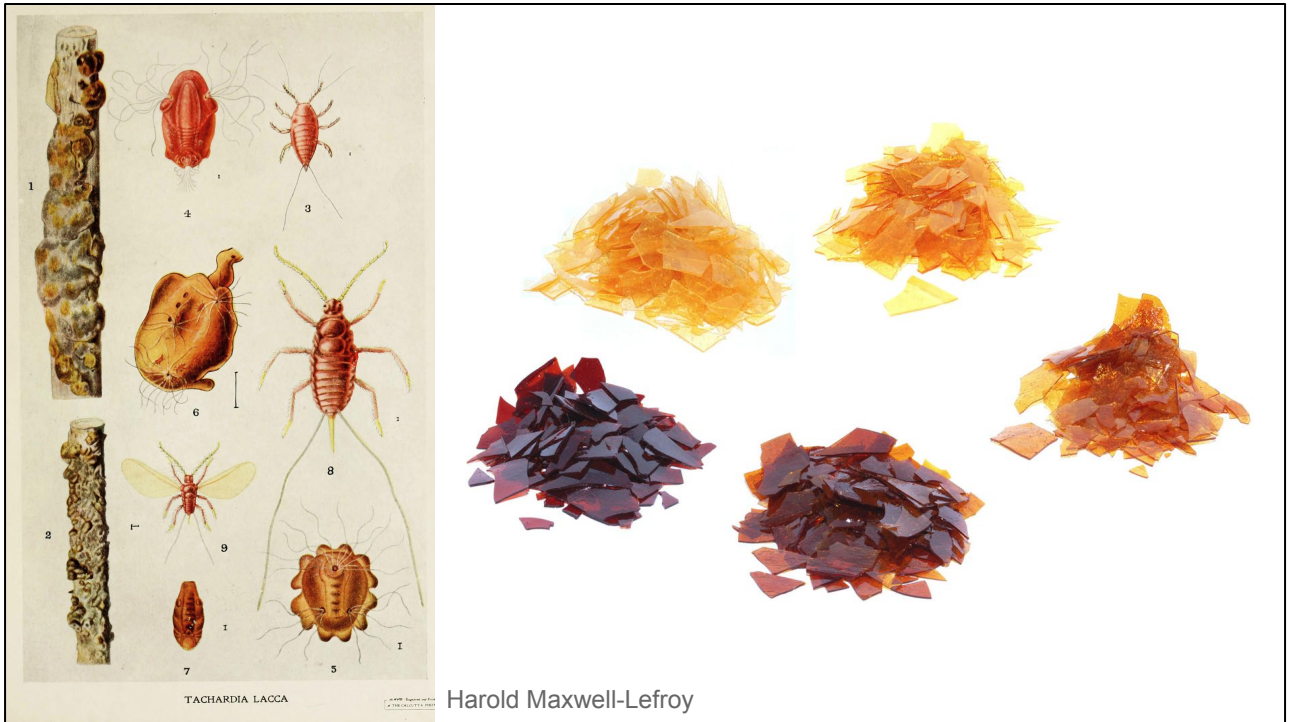
The silk that the silkworms produce are actually made to form the cocoons in which the larvae will moult⁶. Silk is made by other insects; however, only the silk from the silkworms is used in commerce⁶.

<https://www.youtube.com/watch?v=77ktNSPFbwQ>



The honeybee, *Apis mellifera*, is also commonly domesticated insect¹. Most notably, these bees produce honey. They also produce wax which is used in candle making, cosmetics, hygiene products, furniture waxes, polishes and other items used fairly regularly by humans¹. Honey bees belong to the order **hymenoptera** of the insecta class.

<https://www.youtube.com/watch?v=nZIEjDLJCmg>



Laccifer lacca is scale in which the females produce the commercially valuable substance, lac; the males have no commercial value². Resinous shellac is used in the manufacturing of many products. The sap that the scales consume is transformed and exuded from the body in the form of lac; this builds up until it covers the organism and gives the branch the bumpy appearance². Lacs belong to the order **hemiptera** of class insecta.



Coccus cacti and *Coccus ilicis* are harvested for their production of dyes². These dyes are mostly used on fabrics. These two species are in the order **hemiptera** of the class insecta.

- Produce useful substances
- Pollinate plants - including those we eat

This is what your grocery store looks like **WITHOUT BEES**



Earthmanpdx

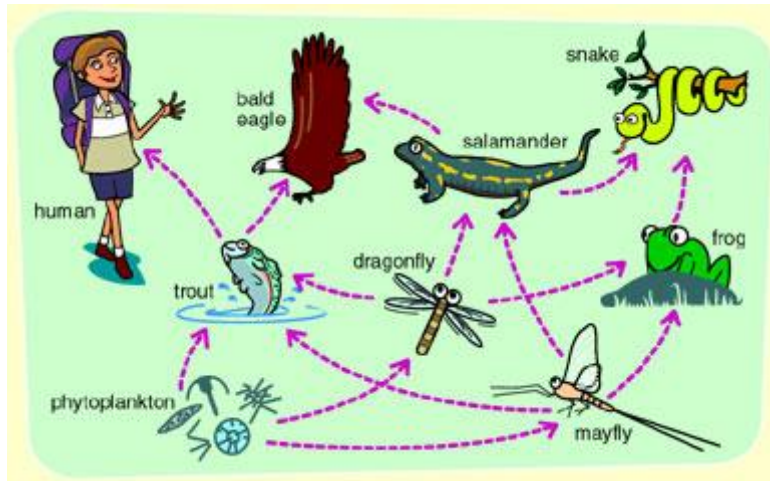
Bees are also pollinators. A Whole Foods market pulled 237 items out of 453 - 52% of items - that were available because of bee pollinators³. 1 in 3 bites of food are possible because of their pollination³.

<https://www.youtube.com/watch?v=Goi0NiGP6BA>

<http://www.wholefoodsmarket.com/pollinators>

But bees are not the only pollinators. Within class insecta, members of the orders **coleoptera**, **diptera**, **hymenoptera**, and **lepidoptera** contribute to pollination⁶.

- Produce useful substances
- Pollinate plants - including those we eat
- Integral part of the food web



EPA

Insects are important parts of the food web. Birds, fish, and other animals consume insects, and those consumers feed humans².

Completely insectivorous animals include mosquito fish, toads, many lizards, many bird species, and bats; similarly, trout, sunfish, moles, bears, foxes, rodents, and primates consume insects and are considered partially insectivorous⁶.

- Produce useful substances
- Pollinate plants - including those we eat
- Integral part of the food web
- Biocontrol for insects and weeds



UC Riverside

Many insects can act as a biocontrol for other insects. These can occur through parasitism or predation¹. Our invertebrate of the week, *Icerya purchasi*, a scale insect belonging to the order **hemiptera**, is commonly preyed upon by the ladybird (bug - depending on where you are) in the order **coleoptera**⁷.



Keith Weller

Some insects can control weed populations in the same way others deplete crops¹. The stem-mining weevil in North Dakota consumes - and lays eggs on - the invasive species, Canadian Thistle⁴.

<https://www.sciencedaily.com/releases/2012/11/121101121146.htm>

- Produce useful substances
- Pollinate plants - including those we eat
- Integral part of the food web
- Biocontrol for insects and weeds
- Research



The insect collection of 19th century Texas naturalist Ludolph Heiligbrodt is housed at the University of Texas at Austin.

Public domain image by Alex Wild, produced as part of the Insects Unlocked project at the University of Texas at Austin.

Insects are invaluable in research facilities. Many orders of species are used in the laboratory to conduct research. Insects are typically used as model systems to explore questions about genetics, behavior, ecology, toxicology, and endocrinology⁶.

- Produce useful substances
- Pollinate plants - including those we eat
- Integral part of the food web
- Biocontrol for insects and weeds
- Research
- Aesthetic



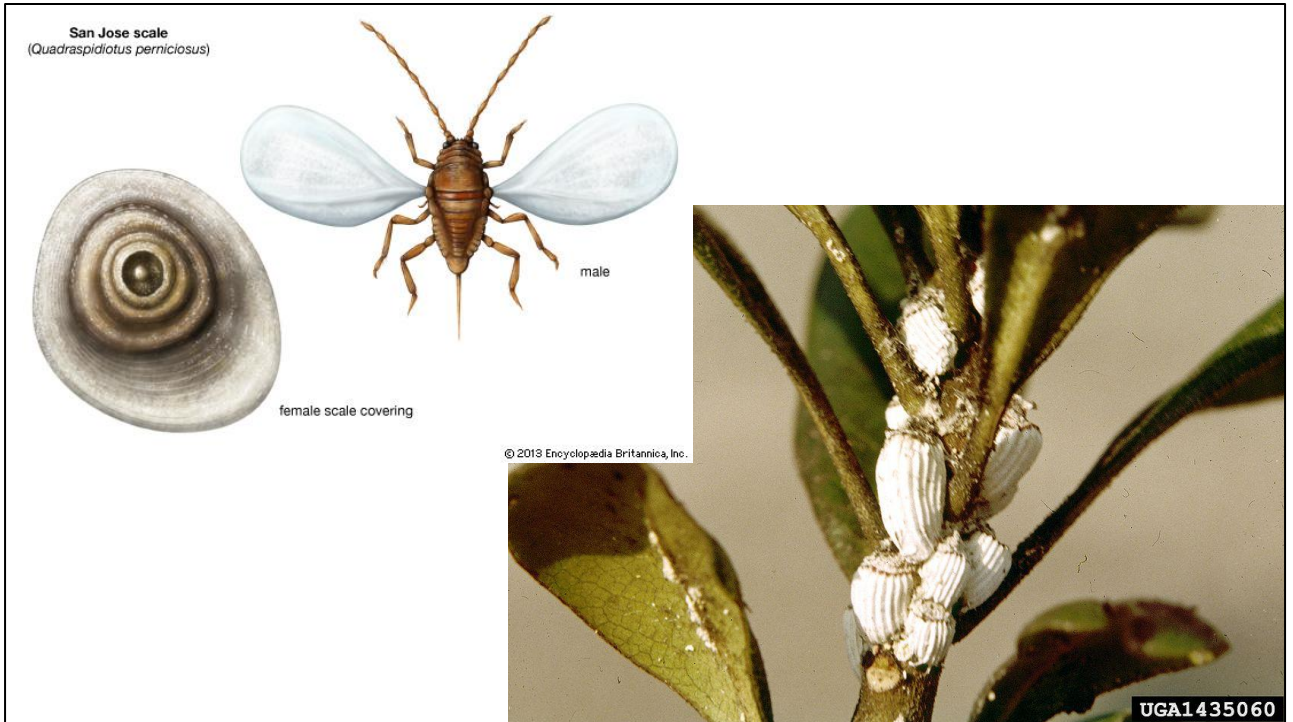
Anderson, M.

There are many butterfly houses around the world. They are at zoos, botanical gardens, or function independently. Below is a link to discover all of the butterfly houses in each state.

<https://www.thebutterflysite.com/butterfly-houses.html>

Common Disservices

- Pests of valuable crops



San Jose scale and *Icerya purchasi*, scale insects, are sucking insects that attach to branches, twigs, bark of trees and shrubs and can cause severe damage to the host⁵.

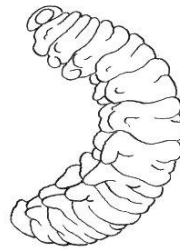


Lepidopteran - a cabbage worm. This little guy - with the help of his friends - can consume large heads of cabbage. This causes a detriment to the plant and its harvesters.

The eleven most notorious pests of crops in North America are⁶:

1. European corn borer - **lepidoptera**
2. Corn earworm - **lepidoptera**
3. Tomato fruitworm - **lepidoptera**
4. Cotton bollworm - **lepidoptera**
5. Pink bollworm - **lepidoptera**
6. Cotton boll weevil - **coleoptera**
7. Tobacco hornworm - **lepidoptera**
8. Tobacco budworm - **lepidoptera**
9. Cabbage looper - **lepidoptera**
10. Codling moth - **lepidoptera**
11. Sugarcane borer - **lepidoptera**

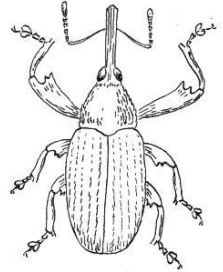
Aphids (**hemiptera**) eat nearly all crops and scale insects - this week's invertebrate - (**hemiptera**) tend to favor perennial plants⁶.



LARVA



PUPA



ADULT

Pearson Scott Foresman

Cotton boll weevil is one of the most common agricultural crop pests in North America⁶. Adults lay their eggs in the cotton; eggs are indistinguishable which perpetuates the infestation⁷. The pest originated in Mexico and is entirely dependent on the cotton plant⁷. The boll weevil is of the order **coleoptera**. The boll weevils also consume the cotton as nutrients⁷.

- Pests of valuable crops
- Pests of commercial material



Termites are common in the temperate zones of the world, but interestingly are more prevalent in the tropics⁶. There are two types of termites: subterranean and damp/dry wood⁶. The subterranean termites live in the soil and do not all consume wood; however, damp/dry termites live within the wood and actively feed only on the wood.

Termites will eat cellulose in the form of paper, plants, books, and cardboard, but the most common is wood.

Termites are of order **isoptera**.

Carpenter ants are also common inhabitants of wood. They do not eat the wood, rather they form a colony inside the wood⁶.

Carpenter ants are of the order **hymenoptera**.

- Pests of valuable crops
- Pests of commercial material
- Vectors for plant and animal disease

Oriental Rat Flea



CDC, WHO, 2012

Tsetse Fly



Oregon State University, 2011.



J.J. Harrison, 2009

Black plague - caused by the oriental rat flea⁶ - **siphonaptera**.

Yellow Fever - caused by a mosquito⁶ - **diptera**

African sleeping sickness - tsetse flies⁶ - **diptera**

Malaria and West Nile and Zika - mosquito⁶ - **diptera**

Green Peach Aphid causes more than 150 plant diseases¹. - **hemiptera**

The World Health Organization estimates there were 212 million cases of malaria in 2015⁸.

<http://www.who.int/mediacentre/factsheets/fs094/en/>

- Pests of valuable crops
- Pests of commercial material
- Vectors for plant and animal disease
- Pests that sting and bite



Alvesgaspar, 2009

Stinging and Biting insects include:⁶

- Ants - **hymenoptera**
- Honeybees - have venom of lecithinase and histamine (why it swells) - **hymenoptera**
- Wasps - have venom - **hymenoptera**
- Tropical termites - **blattodea**
- Mosquitoes - **diptera**
- Caterpillars - some have hairs that inject irritating chemicals into the skin - **lepidoptera**
- Bed bugs - **hemiptera**

Most stinging insects are within the order **hymenoptera**⁶.

Of 460 deaths attributed to animals over a ten-year period, 229 were caused by stinging **hymenoptera**⁶.

Diptera - mosquitoes

Hemiptera - bed bug, assassin bug,

Anoplura - blood sucking lice

- Pests of valuable crops
- Pests of commercial material
- Vectors for plant and animal disease
- Biting
- Annoyance



CBS



Gladson Machado, 2012



Ton Rulkens, 2012

Mayflies emerge out of lakes and swarm land to mate⁷. These swarms are so large, they usually dominate whatever surface the mayflies choose. Since they do not bite, these insects belonging to the order **ephemeroptera** are merely annoying.

House flies - *Musca domestica* - **diptera** are merely a nuisance to have around the house or any food, really.

Stink bugs - **hemiptera** - find their ways into houses or just around, but if you try to squash them, they smell...hence the name

Works Cited

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- 3 Dodrill, T. "Whole Foods Launches 'Human Bee-In' to Help Save the Honeybees." *Inquisitor*, 2014.
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- 5 "How to Manage Pests: Pests in Gardens and Landscapes: Scales." *University of California Agriculture and Natural Resources Statewide Integrated Pest Management Program*, 2014.
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- 7 Dupuy, W.A. *Our Insect Friends and Foes*. Dover Publications, 1925.
- 8 "Malaria." World Health Organization Incorporated, 2017.

