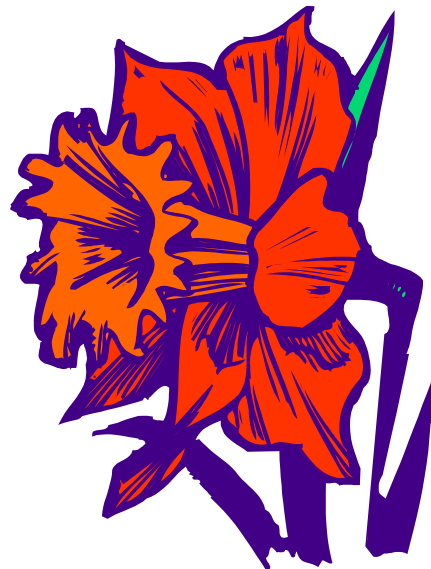
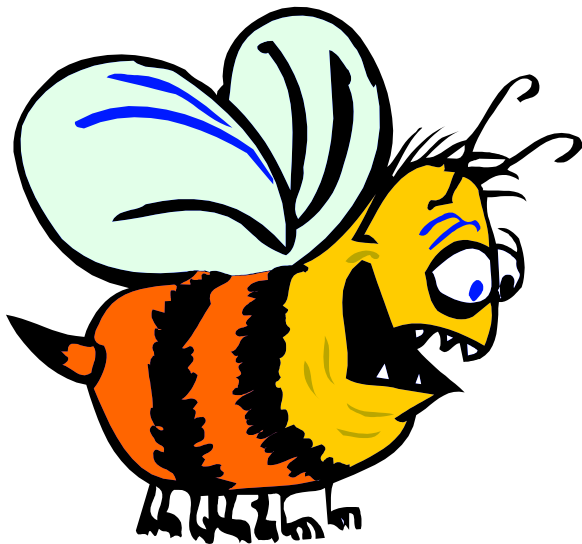




National Agricultural Library

Insects: The Good, The Bad and The Unusual



Grade Level: Late Elementary



Insects: The Good, The Bad and the Unusual

Created by Deborah Y. Richardson
with assistance from Cheryl Toefield-Keen

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Revised January 2004



Entomology: en-to-mol-o-gy a branch of zoology that deals with insects The Greek word entomon, meaning “notched,” refers to the segmented body plan of the insect.

How many different kinds of insects are there?

There are over a million species of insects. There are over 90,000 spp. of insects in North America. Insects outnumber all other animals at a rate of 4 to 1.

What was the biggest insect ever?

The fossil dragonfly, *Meganeura*, that lived about 250 million years ago was probably the largest insect ever. Its wingspan was over two feet.

What is the largest living insect?

LONGEST - a tropical stick insect - 13 inches from end to end.

HEAVIEST - the goliath beetle in Africa (weighs 1/4 pound and is 5 inches long). They belong to the same family (scarab beetles) as the eastern hercules beetle, which is about 2 inches long including the horn.

What is the smallest insect?

The smallest insects are fairyflies, which are insects that parasitize or lay their eggs inside other insects' eggs (including pest insects!). Fairyflies are only 1/5 of a millimeter long.

How fast can insects fly?

The male deer bot fly is reputed to develop flying speeds of several hundred miles per hour, but this is probably an exaggeration. A tabanid fly, related to horse flies, has been clocked at 90 miles per hour. Hawk moths have been timed at 33.5 miles per hour. A dragonfly of the species *Anax parthenope* has been clocked at almost 18 miles per hour. Honeybees fly at about 7 miles per hour, and have to beat their wings 190 times per second to do it.

How fast can insects flap their wings?

Insects with the fastest wing beat frequency are the no-see-ums, or very tiny midges, which beat their hairy wings 1,046 times per second. Male mosquitoes beat their wings 450 to 600 times per second. Cabbageworm butterflies beat their wings nine times per second.

Is a spider an insect?

Spiders are arachnids. They eat insects.

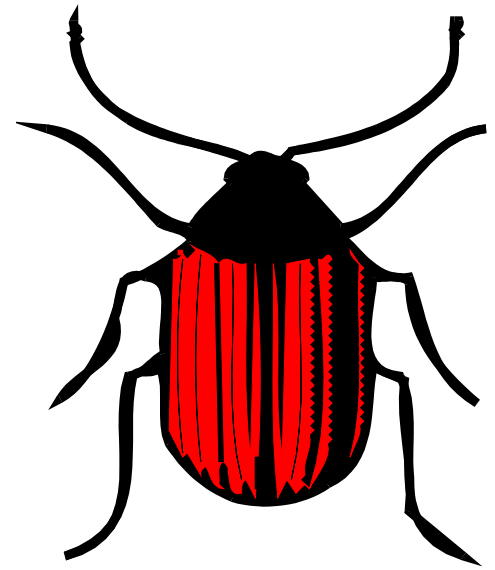
There are many kinds of insects. All insects have:

3 body parts

6 legs

3 or 4 life stages

Some insects have one or two pairs of wings.

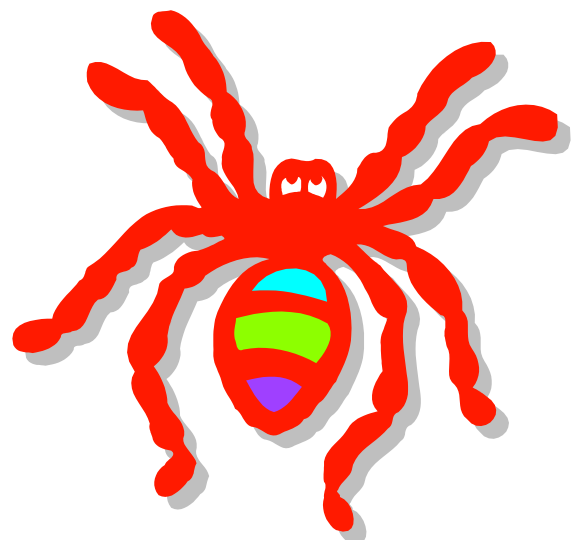


Spiders are different from insects. Spiders have:

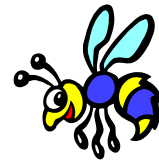
2 body parts

8 legs

3 life stages



Insect body parts



The most visible parts of the body of an adult insect are: the head, the antennae, the mouthparts, the thorax, the wings, the legs, and the abdomen.



The head is the anterior (front) of the three body regions of an adult insect. It has the eyes (usually a pair of compound eyes), the antennae and the mouthparts.

Head

Mouthparts: The mouthparts of adult insects can be of different types. Many species have the chewing type, for example in grasshoppers and beetles. Others have sucking mouthparts for example shaped like stylets (needle) in bugs and aphids or shaped like a coiled tongue in butterflies and moths. The different types of mouthparts determine how the insect feeds.

Antennae: The head of most adult insects bears a pair of antennae. Insects use the antennae to detect odors or they use them as tactile (touch) organs. Antennae are very variable in form and size.



The thorax is the middle of the three body regions of an adult insect. It is composed of 3 segments. It bears 3 pairs of legs (one on each segment) and usually 2 pairs of wings. Some insects have only 1 pair of wings.

Thorax

Legs: Adult insects have 6 legs. Each of the segments of the thorax bears 1 pair of legs. The legs are segmented. Often the last segment of the leg bears a small claw. In some insects, the legs are specially adapted for jumping.

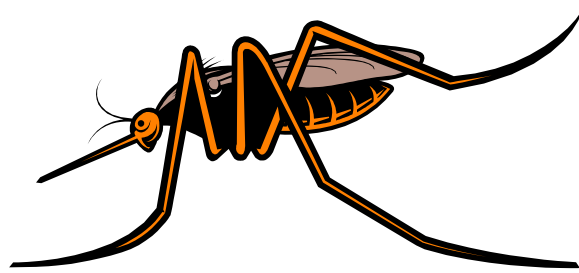
Wings: Most adult insects have 2 pairs of wings, but some (for example flies) have only 1 pair of wings. Usually the wings are membranous but in some insects they can be leathery or hard. Sometimes the wings bear hairs or small scales.



The abdomen is the posterior of the three body regions of an adult insect. It is composed of 11 segments. The abdomen bears the external genitalia of the insect. In female insects these consist of an ovipositor.

Abdomen

WANTED



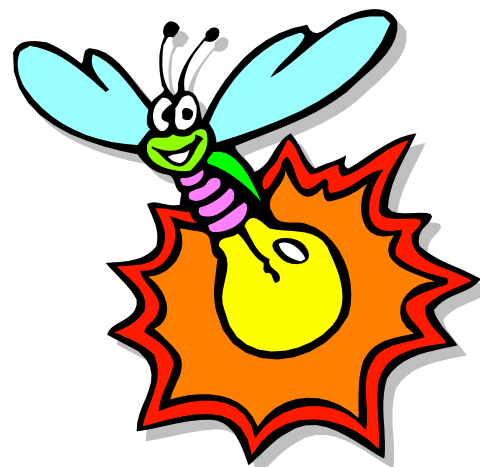
Mosquito

The most dangerous insects are mosquitoes, which pass on West Nile Virus, a parasite causing malaria, as well as the diseases dengue, yellow fever and certain types of encephalitis. Malaria kills a million people a year.

Fun Bugs



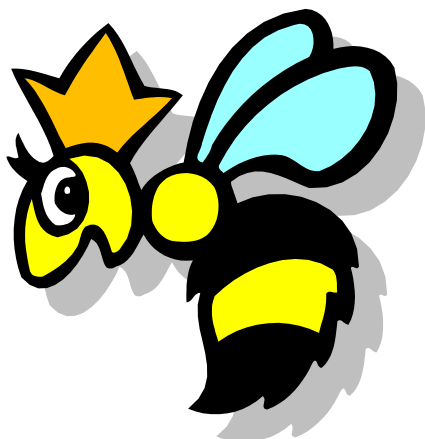
Horse Fly



Lightning Bug



Praying Mantis



Queen Bee



Carpenter Ant

Good Insects

Honey Bees



This bee is an effective pollinator for blueberry plants.

A bee has five eyes, two large compound eyes on either side of its head, and three ocelli (primitive eyes) on top of its head to detect light intensity.

Honeybees fly at about 7 miles per hour, and have to beat their wings 190 times per second to do it. A bumble bee flaps its wings 160 beats per second.

The first week as an adult worker, honeybees clean the hive. By the second week, they feed the young. The third week, they make and repair wax cells in the hive. By the fourth week, they have begun guarding the hive, and finally, they will visit flowers for pollen (bees have built-in saddle bags) and nectar from the fifth week till they die. Workers might live for 6 to 8 weeks, while queens live up to 5 years. The total distance of the many trips honey bees travel to produce a pound of honey is about equal to twice the distance around the world.

The buzzing of flies and bees is not produced by any sound-producing apparatus within the insects' bodies. It is simply the sound of their wings moving up and down at a rapid rate.

Honey bees air condition their hive when it gets hot - some of the workers position themselves at the entrance to the hive and fan their wings. When it gets really hot they bring droplets of watered down honey with them which cools the air even more.

Ladybugs

Adult lady beetles and their larvae are an excellent, non-chemical way to control aphids, Colorado potato beetles (egg stage) and other insect pests in your garden. Lady beetles, ladybugs, or ladybird beetles are among the most visible and best known beneficial predatory insects. Over 450 species are found in North America. Some are native and some have been introduced from other countries.



Most lady beetles in North America are beneficial as both adults and larvae, feeding primarily on aphids. They also feed on mites, small insects, and insect eggs. Many crops benefit from lady beetles. They are helpful for growers of vegetables, grain crops, legumes, strawberries, and tree crops; however any crop that is attacked by aphids will benefit from these beetles.

Female lady beetles may lay from 20 to more than 1,000 eggs over a one to three month period, commencing in spring or early summer

Bad Insects

Cockroaches



A cockroach's heart is nothing but a simple tube with valves. The tube can pump blood backwards and forwards in the insect. The heart can even stop moving, apparently without harming the roach.

Cockroaches spread diseases like typhoid and dysentery. They can transmit bacteria and viruses. Some people, especially those with asthma, are sensitive to the allergens produced by these cockroaches. People are very upset when they find cockroaches in their homes and kitchens.

The fastest runners are cockroaches, which can move almost a foot per second. However this only translates to a little over 1 mph. Cockroaches have been on earth for over 300 million years.

Termites

Termites cause over \$250 million in damages by eating wood. The queen of a termite colony may lay 6,000 to 7,000 eggs per day, and may live 15 to 50 years.

Termites are the insects with the biggest nests. The largest termite mound, found in Australia was 20 feet across the base. The tallest termite mound, found in Africa, was 42 feet high, however only 10 feet across. Some African and Australian termite colonies may have as many as 3 million individuals.

The largest termite in the world is the African species *Macrotermes bellicosus*, which reaches a length of 5 inches.

Soldier termites cannot feed themselves and must be fed by the workers



Common House Fly



The house fly is a common flying insect that is found throughout the world.

The house fly is often a carrier of diseases, such as typhoid fever, cholera, dysentery, and anthrax. The fly transmits diseases by carrying disease organisms onto food. It picks up disease organisms on its leg hairs or eats them and then regurgitates them onto food (in the process of liquefying solid food).

A common housefly is faster--in one sense--than a jet airplane. The fly moves 300 times its body length in one second, while the jet, at the speed of sound, travels 100 times its body length in one second. The average house fly lives only two weeks. The compound eye of a housefly has more than 4,000 lenses. A house fly "hums" in the key of F and beats its wings over 20,000 beats a minute.

Unusual insects



Rough Harvester Ant



Sowbug



Green Lacewing larva



Adult Squash bug



Earwig



Stinkbug

Insect Trivia and Useless Facts



Biosatellite II orbited the Earth with gnats, flour beetles and wasps.

Locusts, or swarming grasshoppers, may eat up to 80,000 tons of grain and other vegetation in a day.

Humans have 792 distinct muscles, grasshoppers have 900, and caterpillars may have as many as 4,000 separate muscles.

An average man can pull about 0.86 times his own weight, but a leaf beetle (*Donacia*) can pull 42.7 times its own weight. Horses pull 0.5 times it's own weight, ants pull 52 times their weight (comparable to a human pulling 4.5 tons).

The coffin fly maintains itself for many generations in human bodies buried in coffins.

The ant has the largest brain in the animal kingdom, in proportion to its size.

There are more different kinds of insects on existence today than the total of all kinds of other animals put together.

The bombardier beetle produces two harmless chemicals in its body that when mixed react together to form a boiling hot spray of chemicals. The beetle shoots the burning mixture at attackers with an explosive sound, and rarely misses its mark.

The "manna" of the Old Testament bible was a sugary substance formed by aphids feeding upon the tamarix tree.

The red admiral butterfly can distinguish sugar solutions 200 times more dilute than the human tongue can taste.

The periodical cicada lives underground as a nymph for 16.5 years.

More trees are lost to insects each year than are destroyed by forest fires.

The vampire moth of Australia feeds on, you guessed it - blood.

Certain honeypot ants become living storage containers. Their bloated abdomen contains a liquid food that is fed to other members of the colony.

The fire ant, which is about the size of a rice grain, has a sting that is worse than the sting of a hornet.

The female of most insect species is generally larger than the male of the species.

House flies use hairy, micro-hooking, glue-oozing toe pads to walk upside down on the ceiling.

Insects in Ancient Egypt

Egyptian mythology and art included the following insects:



Can you find the beetle in this hieroglyphic?

Dung beetles or **scarabs**-jewelry, dung rolling reminded Egyptians of the sun (which they called Ra) rolling across the sky each day.

Click beetles - the pronotum is shaped like the shield of ancient Egyptian soldiers.

Biting flies were symbols of determination, perseverance, valor, gold medals in the shape of the flies were given to soldiers.

Grasshoppers, dragonflies and Honey Bees were used in jewelry, as a symbol of life on the Nile River.

Praying mantids were a symbol of funerals, and the afterlife.

Grasshoppers, which were insect pests in Egypt, were used to represent soldiers. Because armies of soldiers typically attacked in large numbers, ancient Egyptians could easily associate outbreaks of grasshopper populations with attacking armies.

Flies also appeared as large golden fly pendants or in mummy beads. These pendants were military awards, representing the behaviors of biting flies that attacked humans. In addition to these large fly pendants, relative ly small fly pendants are found on mummy beads.



State Insects

Does your state have an insect?

Alabama
Monarch Butterfly

Arkansas
Honey Bee

California
Dog-faced Butterfly*

Colorado
Colorado Hairstreak
Butterfly

Connecticut
Praying Mantis

Delaware
Convergent Lady
Beetle

Florida
Zebra Longwing

Georgia
Honey Bee
Tiger Swallowtailed Butterfly

Illinois
Monarch Butterfly

Iowa
Lady Beetle

Kansas
Honey Bee

Kentucky
Viceroy Butterfly

Louisiana
Honey Bee

Maine
Honey Bee

Maryland
Baltimore Checkerspot
Butterfly

Massachusetts
Ladybug

Mississippi
Honey Bee
Spicebush Swallowtailed
Butterfly

Missouri
Honey Bee

Nebraska
Honey Bee

New Hampshire
Ladybug

New Jersey
Honey Bee

New Mexico
Tarantula Hawk Wasp

New York
Ladybug

North Carolina
Honey Bee

Ohio
Ladybug Beetle
Tiger Swallowtailed Butterfly

Oregon
Swallowtail Butterfly

Pennsylvania
Lightning Bug

Tennessee
Firefly
Ladybug

Utah
Honey Bee

Vermont
Tiger Swallowtail Butterfly

Washington
Green Darner dragonfly

Wisconsin
Honey Bee

Wyoming
Western Swallowtail
Butterfly

*California was the first state of the United States to select a state insect. The Dog-head Butterfly, *Zerene eurycle*, was officially adopted as the state insect of California in 1929. This was the result of a statewide poll of all the active entomologists in the state, responding to the Lorquin Entomological Society of Los Angeles.

State Insect Activity Page



Color in the states that have state insects.

Put a * in the colored states that have butter in the name of the insect.

How many * do you have? _____

Put a ▲ in the colored states that have honey in the name of the insect.

How many ▲ do you have? _____

Put a ■ in the colored states that have lady in the name of the insect.

How many ■ do you have? _____

* + ▲ + ■ = _____

How many colored states do not have * or ▲ or ■ ? _____

Source: TMO 2/1/02

How do say insect in another language?



Language

Word

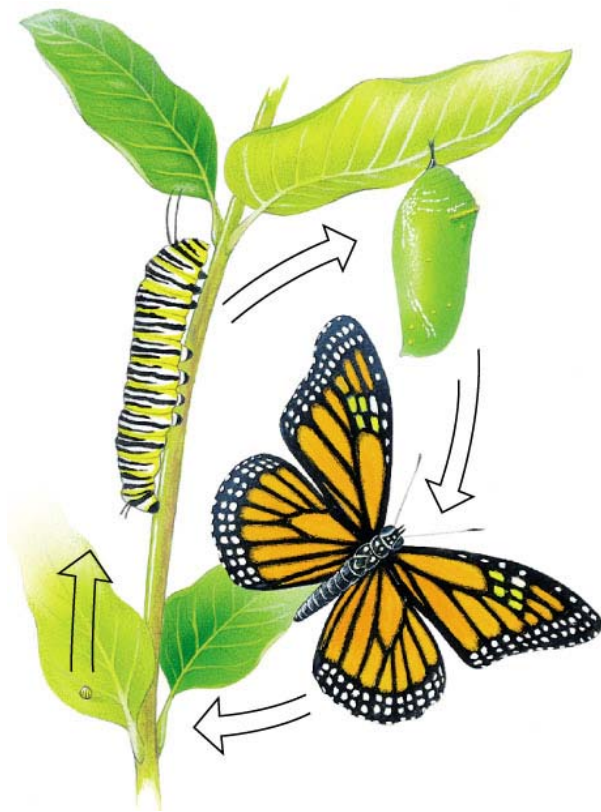
English	insect
Chinese	kun chong
Dutch	insekt
German	insekt neuter
Hungarian	rovar
Italian	insetto
Japanese	konchuu, mushi
Portuguese	inseto, insecto
Russian	hacekomoe
Spanish	insecto
Swahili	mdudu
Swedish	insekt

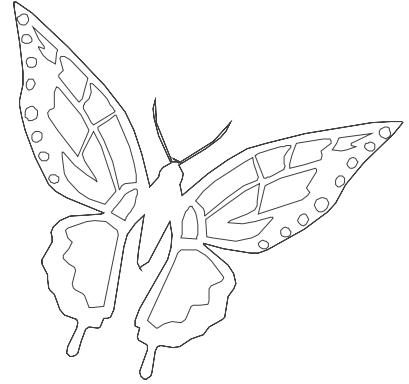
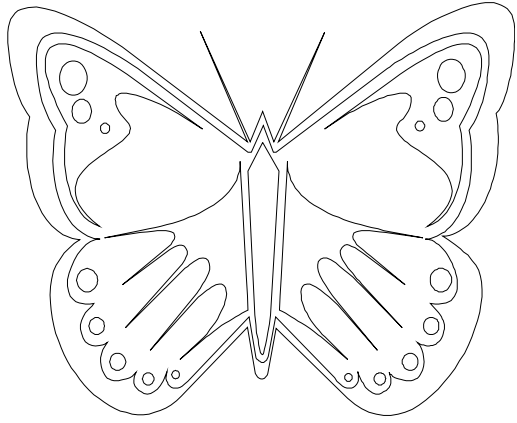
Monarch Butterflies

undergo complete metamorphosis and a four-stage life cycle.

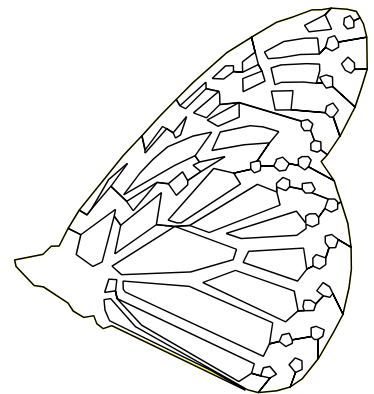
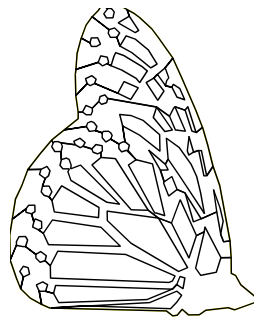
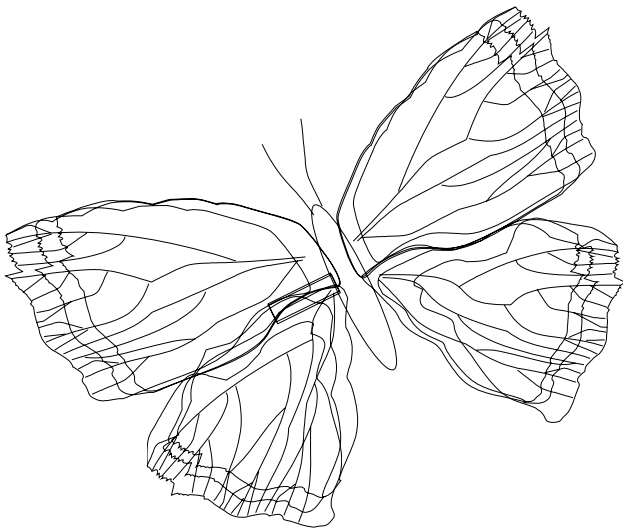
Metamorphosis is change in the form and often habits of an animal during normal

development after the embryonic stage.





Color Your Own Butterfly



FINDING INSECTS

WORD PUZZLE

J	C	K	F	I	R	O	A	C	H	E	S	G
P	S	E	L	T	E	E	B	A	X	W	L	R
D	U	W	N	X	S	W	F	O	Z	A	W	A
R	Y	A	E	C	E	D	I	R	D	S	S	S
A	L	T	A	R	E	T	S	Y	K	P	P	S
G	F	E	R	O	B	S	B	E	I	S	Q	H
O	R	R	W	A	H	U	L	A	D	Y	S	O
N	E	B	I	C	G	B	K	S	T	N	A	P
F	T	U	G	U	A	M	O	T	H	S	F	P
L	T	G	S	P	I	D	E	R	S	Z	B	E
Y	U	S	I	L	V	E	R	F	I	S	H	R
B	B	X	S	C	R	E	W	W	O	R	M	S

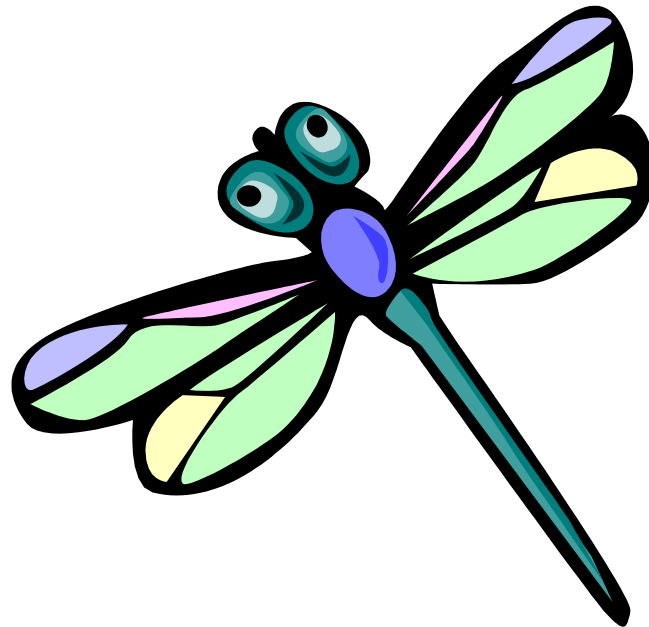
Can you find these insects.

1. Butterfly
2. Grasshoppers
3. Ants
4. Spiders
5. Bees
6. Wasps
7. Beetles
8. Moths
9. Dragonfly
10. Ladybug
11. Roaches
12. Waterbugs
13. Silverfish
14. Earwigs
15. Screwworms

Nicknames for Dragonflies:

1. DEVILS DARNING NEEDLES - from a belief that dragonflies sew up children's ears
2. SNAKE DOCTORS - from a belief that dragonflies warn snakes of approaching danger
3. HORSE STINGERS
4. MOSQUITO HAWKS

Dragonflies have as many as 30,000 lenses in each eye.



In Japan, dragonflies are a symbol of victory on the battlefield.

Late at night while you are asleep...



Insects as Food

entomophagy (eating insects)

Cockroaches

It may be hard to believe but cockroaches are edible but some military manuals indicate nutrition is low. Obviously, they are a prime candidate for gut purging due to their poor food source.

To purge, keep them contained in a fisherman's cricket tube or a cricket raising box for several days. For water and a good food source to purge their system use wet lettuce or piece of apple. Remember cockroaches are fast and they can fly. When ready to eat, put them in the freezer to kill, then remove heads, legs and wings and cook. You will find some have an odor. Also, this is one insect that must be cooked due to parasitic worms they carry. For most to stomach the thought of eating a cockroach, the specimens should be baked dry and ground into flour for mixing with a soup.

Ants

Ants and ant larvae are edible (except fire ant) and tasty. The formic acid mostly disappears when they are boiled. Black ants can be eaten raw whereas fire ants are not considered to be edible.

Certain tribes of Native Americans produced what is said to be a flavorful honey-ant wine. Ants generally have a vinegar flavor because they're loaded with formic acid, a chemical similar to the acetic acid in vinegar. In other countries such as Thailand, they sometimes substitute ant juice when recipes call for lemon. Larger ants can be squeezed onto your fresh wild salad.

Beetles

Both the adults and larvae of cicadas, Japanese beetles, June bug a floor beetles insect are edible.

Caterpillars

Caterpillars are edible but the smooth ones are best. Survival manual recommend not eating the brightly colored ones. On the other hand, the brightly colored tomato worm is edible.

Crickets and Grasshoppers

Crickets and grasshoppers can add protein, calories, fat and variety to a meager diet.

Crickets to include mole crickets and Mormon crickets and grasshoppers are the most common insects eaten worldwide. All are edible to include at all stages of their life cycle.

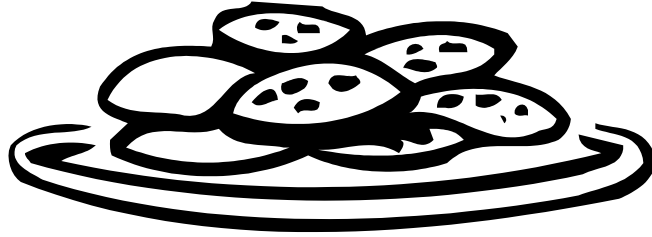
Honey Bees

Honey bees are accepted around the world as a favored food. They are edible at all stages (larval, pupal and adult) of growth. Boiling tends to break down their poison which is basically protein and at boiling temperatures, the stinger softens. Also pounding them before boiling is effective.

Chocolate Chirpie Chip Cookies

Ingredients:

2 1/4 cup flour
1 tsp. baking soda
1 tsp. salt
1 cup butter, softened
3/4 cup sugar
3/4 cup brown sugar
1 tsp. vanilla
2 eggs
1 12-ounce chocolate chips
1 cup chopped nuts
1/2 cup dry-roasted crickets



Directions:

Preheat oven to 375. In small bowl, combine flour, baking soda and salt; set aside. In large bowl, combine butter, sugar, brown sugar and vanilla; beat until creamy. Beat in eggs. Gradually add flour mixture and insects, mix well. Stir in chocolate chips. Drop by rounded measuring teaspoonfuls onto ungreased cookie sheet. Bake for 8-10 minutes.



FINDING INSECTS

WORD PUZZLE

Answers are highlighted below.

J	C	K	F	I	R	O	A	C	H	E	S	G
P	S	E	L	T	E	E	B	A	X	W	L	R
D	U	W	N	X	S	W	F	O	Z	A	W	A
R	Y	A	E	C	E	D	I	R	D	S	S	S
A	L	T	A	R	E	T	S	Y	K	P	P	S
G	F	E	R	O	B	S	B	E	I	S	Q	H
O	R	R	W	A	H	U	L	A	D	Y	S	O
N	E	B	I	C	G	B	K	S	T	N	A	P
F	T	U	G	U	A	M	O	T	H	S	F	P
L	T	G	S	P	I	D	E	R	S	Z	B	E
Y	U	S	I	L	V	E	R	F	I	S	H	R
B	B	X	S	C	R	E	W	W	O	R	M	S

1. Butterfly
2. Grasshoppers
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4. Spiders
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7. Beetles
8. Moths
9. Dragonfly
10. Ladybug
11. Roaches
12. Waterbugs
13. Silverfish
14. Earwigs
15. Screwworms

Insect information on the Internet:

Educational Resources:

University of Kentucky <http://www.uky.edu/Agriculture/Entomology/>
Iowa State University www.ent.iastate.edu/Misc/insectsasfood.html

Insect body parts:

<http://www.bijlmakers.com/entomology/bodypart.htm>

Fire ants:

<http://fireant.tamu.edu/materials/graphics/photo/img4.html>

Butterfly Life cycle:

<http://www.enchantedlearning.com/subjects/butterfly/lifecycle/Egg.shtml>
<http://lincoln.midcoast.com/~wps/3mmonarch/lifecycle.htm>

Insect images: <http://www.all-safe-pest.com/gallery.htm>

Ladybugs: From: www.enchantedlearning.com/subjects/insects/Ladybug.shtml

Information on insects in other cultures: courses.ent.iastate.edu/

For a additional information from the National Agricultural Library's AGRICOLA database:

AU: Zenger,-J.T.; Walker,-T.J.

TI: Impact of the internet on entomology teaching and research.

SO: Annu-rev-entomol. Palo Alto, Calif. : Annual Reviews, inc., 1956-. 2000. v. 45 p. 747-767.

CN: DNAL 421-An72

LA: English

DE: entomology-. teaching-. research-. internet-. information-technology. distance-teaching. publications-. literature-reviews.

ID: world-wide-web. electronic-publications.

AU: Ellis,-M.D.; Higley,-L.G.; Jones,-A.; Hoback,-W.W.; Quisenberry,-S.S.

TI: Bug bash--a pyramid of teaching and learning about insects.

SO: Am-entomol. Lanham, Md. : Entomological Society of America, c1990-. Winter 1999. v. 45 (4) p. 200-203.

CN: DNAL QL461.A52

LA: English

DE: entomology-. secondary-education. educational-programs. public-relations.

ID: youth-outreach-programs.

AU: Ehler,-L.E.

TI: A modified "Riker Specimen Mount" for soft-bodied arthropods.

SO: Am-entomol. Lanham, Md. : Entomological Society of America, c1990-. Spring 1999. v. 45 (1) p. 10-11.

CN: DNAL QL461.A52

LA: English

DE: arthropods-. specimen-handling. teaching-materials. entomology-.

ID: classroom-instruction.

AU: Wangberg,-J.K.

TI: General entomology: valuing the fundamentals in the 21st century.

SO: Am-entomol. Lanham, Md. : Entomological Society of America, c1990-. Fall 1998. v. 44 (3) p. 139-141.

CN: DNAL QL461.A52

LA: English

DE: entomology-. agricultural-education. science-education. teaching-. educational-programs.

AU: Solter,-L.F.
 TI: Is entomological research child's play? Teaching children scientific methods.
 SO: Am-entomol. Lanham, Md. : Entomological Society of America, c1990-. Winter 1997. v. 43 (4) p. 198-200.
 CN: DNAL QL461.A52
 LA: English
 DE: entomology-. teaching-. elementary-education. usa-.

AU: Matthews,-R.W.; Flage,-L.R.; Matthews,-J.R.
 TI: Insects as teaching tools in primary and secondary education.
 SO: Annu-rev-entomol. Palo Alto, Calif. : Annual Reviews, inc., 1956-. 1997. v. 42 p. 269-289.
 CN: DNAL 421-An72
 LA: English
 DE: insects-. science-education. environmental-education. primary-education. secondary-education. teaching-materials. learning-activities. class-activities. entomology-. reviews-.
 ID: classroom-insects.

AU: Ghosh,-A.-K. (Asish Kumar), 1938-; Sengupta,-T.
 TI: Handbook on insect collection, preservation and study.
 SO: Calcutta : Zoological Survey of India, 1982. 64 p. [1] p. : ill.
 CN: DNAL QL465.G56--1982
 LA: English
 DE: Insects-Collection-and-preservation. Entomology-Study-and-teaching-India.

AU: Klowden,-M.J.
 TI: Insects in the classroom: using the "creating" level of cognition in teaching.
 SO: Agric-educ-mag. Henry, Ill. : The Agricultural Education Magazine, Inc., 1980-. Dec 1995. v. 68 (6) p. 7, 11.
 CN: DNAL 275.8-Ag8
 LA: English
 DE: agricultural-education. entomology-. teaching-methods. higher-education. student-participation. idaho-.

AU: Shaw,-S.R.
 TI: The biodiversity crisis: a new challenge for entomological teaching.
 SO: Am-entomol. Lanham, Md. : Entomological Society of America, c1990-. Fall 1995. v. 41 (3) p. 134-135.
 CN: DNAL QL461.A52
 LA: English
 DE: species-diversity. entomology-. teaching-. college-curriculum.

AU: Cifuentes-Romo,-Dina.
 TI: Exercises in agricultural entomology.
 ST: Coleccion Blanca ; 4.
 SO: Murcia : Universidad de Murcia, Secretariado de Publicaciones, 1989. 217 p. : ill.
 CN: DNAL QL463.C53-1989
 LA: Spanish
 DE: Entomology-Study-and-teaching-Activity-programs.

AU: Keith,-D.-L.; Oseto,-C.-Y.; Kopp,-Dennis-D.
 CA: Nebraska Cooperative Extension Service.
 TI: 4-H entomology.
 ST: Nebraska Cooperative Extension 4-H ; no.26, no.342-245.
 SO: [Lincoln, Nebr. : Cooperative Extension Service, University of Nebraska, 1990] 56, [10] p. 4 sheets.
 CN: NBU S533-F66-N42-no.26,-342-345
 LA: English
 DE: Entomology-Study-and-teaching. Insects-Collection-and-preservation-Juvenile-literature. 4-H-clubs.

AU: Rutschky,-Charles-W.
 TI: Entomology, a catalog of instructional materials.
 SO: College Park, Md. : Entomological Society of America, c1983. ii, 480 p.
 CN: DNAL Z5860.R87
 LA: English

DE: Entomology-Study-and-teaching-Bibliography-Catalogs.

AU: Morrison,-J.

TI: Teaching a lab wasp field tricks.

SO: Agric-Res-U-S-Dep-Agric-Res-Serv. Washington, D.C. : The Administration. Sept 1988. v. 36 (8) p. 6-9. ill.

CN: DNAL 1.98-AG84

LA: English

DE: gossypium-hirsutum. heliothis-zea. heliothis-virescens. croceipes-. parasites-of-insect-pests. biological-control.

AU: York,-A.C.

TI: Teaching students objective skills to master science and science writings.

SO: N-A-C-T-A-J. Urbana, Ill. : National Association of Colleges and Teachers of Agriculture. June 1988. v. 32 (2) p. 19-21.

CN: DNAL 275.9-N213

LA: English

DE: science-education. writing-skills. insect-pests. teaching-methods.

AU: Dille,-Alvin, 1876-1920.

TI: How teachers may use publications on the control of diseases and insect enemies of the home garden.

ST: Department circular / United States Department of Agriculture ; 68.

SO: Washington, D.C. : U.S. Dept. of Agriculture, 1919. 4 p.

CN: DNAL 1-Ag84D-no.68

LA: English

DE: Garden-pests-Study-and-teaching. Agriculture-Study-and-teaching.

AU: Jones,-M.-P. (Merlin Perry), 1895-

CA: United States. Federal Extension Service.

TI: 4-H club entomology leaders' manual.

ST: Agriculture handbook / United States Department of Agriculture ; no. 106.

SO: [Washington, D.C.] : Federal Extension Service, United States Department of Agriculture, 1956. 16 p. : ill.

CN: DNAL 1-Ag84Ah-no.106

LA: English

DE: Entomology-Study-and-teaching-Handbooks,-manuals,-etc.

AU: Lane,-C.-H. (Charles Homer), 1877-; Banks,-Nathan, 1868-

TI: Collection and preservation of insects and other material for use in the study of agriculture. Rev. Aug. 1917.

ST: Farmers' bulletin / United States Department of Agriculture ; no. 606.

SO: Washington, D.C. : U.S. Dept. of Agriculture, 1917. 22 p. : ill.

CN: DNAL 1-Ag84F-no.606-1917

LA: English

DE: Insects-Collection-and-preservation. Agriculture-Study-and-teaching.

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