CSI: Crime Scene Insects™

Teacher's Guide
Part 1

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CSI: Crime Scene Insects Teacher's Guide
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I. INTRODUCTION

About the Exhibit

CSI: Crime Scene Insects explores the science behind one of the most fascinating areas of criminal investigation—forensic entomology. This field employs the use of insects such as flies, maggots and beetles to reveal critical details of a crime scene.

Exhibit Highlights include:

1. Time line of forensic entomology from 13th-Century China to present day
2. Insect models and computer interactives
3. Stroboscopic sculpture "The Fly Wheel" that animates the fly life cycle
4. Hundreds of insect specimens displayed individually or as "Insect Art"
5. Live displays of insect life cycles and skeleton decomposers
6. Field and lab equipment used by forensic investigators
7. Realistic simulated crime scenes with life-size figures
8. "Can you solve the crime?" case studies

Your students will leave the exhibit with a much greater appreciation for both the science behind criminal investigations and the important role insects play in solving those mysteries. So, round up your usual suspects and come join us soon to follow the evidence and investigate the science at *CSI: Crime Scene Insects*!

CSI Teacher's Guide Goals

The *CSI: Crime Scene Insects* Teacher's Guide provides:

1. Useful background for the teacher on the exhibit and forensic entomology
2. Classroom activities that can be used before or after a visit to the exhibit
3. Science activities and lab exercises that meet National Science Education Standards and incorporate multidisciplinary approaches to learning
4. Suggestions for extension classroom activities to promote further exploration into science topics related to insects, life cycles, and forensics
5. A concise resource for additional information, web sites and publications related to forensic entomology.

Helpful Hints Before The Visit

Preparation is a key element to making your museum field trip a valuable and enjoyable learning experience. Here are some quick tips to get you started:

1. Remember to schedule your classroom's visit with the museum in advance to arrive on times and days most appropriate for larger groups.
2. If possible, visit the exhibit before you take your students. You might invite some of the chaperones to come along as well. You can use this pre-visit as an opportunity to develop leading questions, check lists, or task sheets related to the exhibit that are specially adapted to your classroom interests and needs.
3. Before your visit, introduce the concept of forensic entomology to your students and briefly discuss some of the information provided in this Introduction and in the next section on Exhibit Details and Content. You can also look at the **CSI: Classroom Activities** in Unit One to see if any of these might be useful to do before the students visit the exhibit.
4. Select interested chaperones and provide them with background information on the exhibit. Museums typically recommend one adult per five students. Inform chaperones of their group leader responsibilities and encourage them to assist students with inquiry-based interactions while taking in the exhibit.

5. Prior to the visit, you might assign groups of students to specific topics or themes presented in *CSI: Crime Scene Insects*. Each group can become the "experts" in that area and report back to the class their detailed observations and comments after the visit to the exhibit.
6. Providing students with a check list of specimens to find, vocabulary to define, or basic questions to answer when they arrive at the museum can be a helpful way to keep students on track and engaged during their visit. Review the Key Content Points, Common Misconceptions and the Appendix of this Guide for suggestions.
7. At the museum, encourage students to discuss what they are experiencing and observing. Although each group may focus on one topic or area, allow ample time for your students to fully explore the entire exhibit.
8. Inform the students and chaperones about their tasks, departure and arrival times, lunch breaks, museum rules, and bathroom locations.

Special Notes and Suggestions

- **Helping students to positively react to exhibits of live termites and maggots, or beetles devouring flesh from skeletons.**

Remind your students that knowledge generally replaces fear or avoidance with curiosity and appreciation. Not everyone immediately warms up to insects or insect larvae, but after taking the time to investigate such an animal, a visitor is more likely to overcome any initial adverse reaction and can often gain an interest in the creature's biology. Pointing out the positive role of maggots and carrion beetles as major decomposers in our world might help visitors balance an initial lack of appreciation for these insects. Seeing a maggot as just an immature form of a fly and as a stage in the fly's incredible metamorphosis may help to remove some initial negative feelings.

- **Dealing with sensitive issues such as death and murder.**

While the writers in this exhibit specially selected cases that do not show excessive blood or violence, it is important to be sensitive to the age and maturity level of your students and to approach the displays and topics with appropriate discretion. When dealing with the issue of decomposition, it would be helpful to point out that death and decay are a natural part of the life cycle of all organisms. When violent deaths are depicted in the exhibit, point out that the purpose of forensic entomology is to aid law enforcement personnel in apprehending and convicting dangerous criminals. The ultimate goal is to prevent further tragedies. Nothing presented in this exhibit is done for sensationalistic reasons. Every element was carefully selected to provide accurate visual representations and to reinforce scientific themes.

II. EXHIBIT DESIGN AND CONTENT

Scientific Curator

The exhibit's curator is M. Lee Goff, Ph.D., one of the best possible advisors for an exhibit on the science and methods of forensic entomology. Dr. Goff is a professor and department chair at Chaminade University, a founding member and past president of the American Board of Forensic Entomology, and an FBI Academy instructor. He is a much-in-demand speaker on forensic entomology, and has also authored the recently published Harvard University Press book, A Fly for the Prosecution: *How Insect Evidence Helps Solve Crimes* and serves as a technical consultant for the hit television show “CSI: Crime Scene Investigations.”

Exhibit Design and Production

CSI: Crime Scene Insects was designed by Belzberg Architects based in Santa Monica, California. Their primary goal was to give visitors a feel for the work and science of forensic investigators. The exhibit components (or walls) are large and imposing. They are made of stacked plywood, which is meant to resemble the layers of dirt that an investigator may have to dig through to unearth evidence. There is also a puzzle-like quality to the design, which is meant to replicate the process an investigator goes through to solve a crime—this is often described as piecing together a puzzle. Finally, you will see that many of the

displays are designed to be viewed from more then just one side. Again, this is meant to mimic the work of an investigator who must examine all sides of a crime scene to find evidence.

We're Green! This exhibit was built with Earth-friendly products whenever possible. The plywood is from farm-raised sources, not forested. The tops of the benches are made from pressed sunflower seed husks and shells. All paints and lacquers are non-polluting, and the majority of the building materials are recycled or environmentally friendly. The entire exhibit was constructed with a commitment to seek alternative building methods that employ the three "R's"—Reduce, Reuse and Recycle.

The producer of *CSI: Crime Scene Insects* is ExhibitQ, an emerging museum exhibit company based in Long Beach, California, dedicated to providing science and cultural exhibits for museums, science centers, zoos, aquariums and libraries. Starting with the idea that science should and can be presented artistically, ExhibitQ gathered an eclectic and talented team to develop this exhibit. The exhibit team consists of more than 20 professionals including artisans and scientists, writers and engineers all interacting to produce a new type of science exhibit that is informative, accurate and aesthetically appealing.

Key Content Points of the Exhibit

CSI: Crime Scene Insects is presented in multiple sections, each presenting one or two major concepts related to forensic entomology. The key content points of the exhibit are highlighted below.

a. Forensic entomology links the study of insects to the science of crime investigations.
In forensic entomology, usually a crime has been committed, most often a murder, and insects on and around the victim's body become the evidence. To a trained investigator, insects can provide surprisingly precise clues concerning the time of wounds and of the death, whether or not drugs or toxins were involved, and whether the body was moved.

b. The natural succession of insects and the timing of their life cycles offer useful clues at a crime scene.
All insects go through one of several types of characteristic metamorphosis during their development from egg or immature form to adult. The precise sequence of insect species on a corpse and the timing of their developmental stages have been carefully documented by forensic entomologists. So under specified environmental conditions, it is possible to predict within hours the exact order of insects that will appear at a carcass or corpse as well as when the insects will lay eggs, when their larvae will hatch and how quickly they will develop into new adults. Knowing these time frames, investigators can literally "tell time" at a crime scene based, in part, on which insect species is present on a decaying body or in the surrounding soil and how far along the insects are in their developmental stages.

c. Flies and beetles, in particular, are important in forensic entomology.
While there are hundreds of insect species that can visit a decomposing body, generally flies and beetles are the fist to arrive on the scene. It's these two insect groups that emerge as major "key witnesses" and sources of information to a forensic investigator. Many of the forensically important flies and beetles are exhibited as live or preserved specimens in *CSI: Crime Scene Insects* including green bottle flies, blow flies, common house flies, rove beetles, hide beetles, checkered beetles, scarabs and carrion beetles. Some of the other types of insects or arthopods that have less significant roles in forensic entomology are also represented in the exhibit.

d. Maggots also play a key role as evidence at a crime scene.
Admittedly, maggots are not the most popular animal form, but they do provide some of the most accessible and useful information to a forensic investigator. These wiggling masses are actually fly larvae that have hatched from eggs deposited on decaying flesh by female flies; so, contrary to some myths, maggots do not spontaneously spring out of dead tissue. Maggots of each fly species relevant to forensics have been well studied by entomologists. These different fly larvae each show a predictable timetable for their growth and formation of pupae, the "cocoon" state that eventually emerges as a new adult fly. Taking samples of maggots from a corpse, determining their species and measuring their size and other structural

features helps investigators determine how long the maggots (and a body) have been present at a particular site.

e. Insect decomposers are more than just evidence.
In the natural and necessary process of decay in our world, animal and plant tissues are broken down and recycled. Many insects and/or their larvae consume dead or decaying materials as part of their natural life cycle and depend on decaying flesh for food sources. Their contribution as part of the Earth's natural "clean up crew" to eliminating the huge continuous biomass of dead plants and animals is critical to maintaining healthy environments and preventing the spread of disease.

Some Common Misconceptions

a. Forensic entomology only deals with murders and violent crimes.
Forensic entomologists are also called in to investigate cases related to neglect of patients or children when open bedsores or wounds are present and may be infested with insect larvae. The field can also involve investigations of insect damage to food (stored product entomology) or to buildings (structural entomology).

b. Simply knowing a species of fly or beetle on a corpse is enough information to make an estimate of time of death.
Calculating an estimate of a victim's time of death using insect data requires sampling multiple insect types, larvae and pupae from the body as well as capturing insects from the surrounding soil and environment. In addition, environmental conditions must be considered since they greatly influence the rate of insect's development. Temperature and weather conditions, in particular, are key factors.

c. Crimes are solved solely on the basis of evidence from insects.
While information from the analysis of insects on or near a corpse can be valuable in a criminal case, multiple lines of evidence are typically compiled including witness testimonies, DNA comparisons, fingerprints and other available physical evidence. Insects are only part of the picture.

d. All maggots are harmful to the animals they feed on.
Some species of maggots only feed on dying or decaying tissues in wounds and do not interfere with any surrounding healthy areas. In fact, these species of maggots have been used as an unconventional treatment for patients with antibiotic resistant skin infections to clean out necrotic (dead) cells in the wounds in order to promote healing.

e. The idea of using insects as evidence has only recently emerged since the creation of a current popular television show based on crime scene investigations.
One of the first recorded cases of forensic entomology is from China in 1235 where a murder was solved by identifying the killer's weapon from the presence of flies feeding on bits of tissue and blood still clinging to it. There had been only a few sporadic reports of using insects to estimate time of death in Western culture up until the mid-1980s when more entomologists and forensic investigators began to accept the reliability of entomological evidence from a corpse. The American Board of Forensic Entomology was formed in 1996.

III. APPENDIX

How Animals Are Classified

Classification Group	Humans	Skin Beetle	House Fly	Black Blow Fly
KINGDOM	Animalia	Animalia	Animalia	Animalia
PHYLUM	Chordata	Arthropoda	Arthropoda	Arthropoda
CLASS	Mammalia	Insecta	Insecta	Insecta
ORDER	Primates	Coleoptera	Diptera	Diptera
FAMILY	Hominidae	Dermestidae	Muscidae	Calliphoridae
GENUS	*Homo*	*Dermestes*	*Musca*	*Phormia*
SPECIES	*sapiens*	*maculatus*	*domestica*	*regina*

Major Classes of the **Phylum Arthropoda**

Characteristics of Arthropods: Segmented bodies with jointed exoskeletons of chitin; jointed appendages; respiration by body surface, gills, or trachae; marine, freshwater and terrestrial

Class	Examples	Species Number	Characteristics
Insecta	Flies, beetles, ants, termites, butterflies	~700,000	3 body parts; antennae, mouthparts for chewing, sucking or sponging; 3 pairs of legs; usually 2 pairs of wings; breathe via tracheae; most terrestrial
Arachnida	Spiders, scorpions, ticks	~57,000	1 or 2 body parts; modified mouth parts; 4 pairs of walking legs; mostly terrestrial
Crustacea	Shrimp, lobster, crabs, barnacles, copepods, ostracods	~25,000	2 or 3 body parts; antennae; hewing mouthparts; 3 or more pairs of legs, mostly marine
Diplopoda	Millipedes	~7,000	Multiple body segments with distinct head; antennae; chewing mouthparts; 2 pairs of legs per segment; breathe via tracheae; terrestrial; feed on plants (dead or living)
Chilopoda	Centipedes	~2,000	Multiple body segments with distinct head; large antennae; chewing mouth parts; 1 pair of legs per segment; terrestrial; feed on insects

NOTE: species numbers are likely underestimates, but are helpful to show relative differences between the classes

Major Orders of Insects with Incomplete Metamorphosis

ORDER	SPECIES	CHARACTERISTICS
Collembola	Springtails	Primitive wingless insects; largely in soil;
Thysanura	Silverfish	Primitive wingless insects; in caves and damp houses
Ephemeroptera	Mayflies	Larvae in fresh water, adults live only days
Odonata	Dragonflies, Damselflies	Generally large insects found worldwide; carnivorous or herbivores; larvae predators in fresh water
Plecoptera	Stoneflies	Adults usually live near river banks, larvae in fresh water
Blattodea	Cockroaches	Omnivorous (eat both plants and animals); often scavengers; found worldwide;
Isoptera	Termites ("white ants")	Social insects living in vast colonies, with one queen to lay all the eggs; most feed on wood;
Mantodea	Mantids	Predatory insects with large eyes and grasping front legs; mostly in tropics
Dermaptera	Earwigs	Omnivorous insects with fan-shaped hind wings and pincers on tail
Orthoptera	Grasshoppers	Grass-feeding insects with jumping back legs
Phasmatodea	Walking Sticks Leaf-insects	Leaf-feeding insects with camouflaged, flattened or slender bodies; look like leaves or sticks of plants
Psocoptera	Book lice	Small chewing insects, feed on tree bark, book bindings, also found in food
Phthiraptera	Parasitic lice	Parasites of birds and mammals, live on skin; feed on feathers, skin or blood; wingless
Hemiptera	True Bugs	Piercing or sucking mouthparts; feed on plants, insects or mammals
Thysanoptera	Thrips	Tiny insects with fringed wings; herbivorous with sucking mouthparts
Megaloptera	Alderflies Dobsonflies	Larvae are aquatic and carnivorous; adults have long antennae, 2 pairs of large wings
Neuroptera	Lacewings Ant-lions	Predatores as larvae, adults are carnivorous or herbivorous

Source: Adapted from *1001 Facts About Insects*, Laurence Mound & Steve Brooks, DK Publishers, 2003

Major Orders of Insects with Complete Metamorphosis

ORDER	SPECIES	CHARACTERISTICS
Coleoptera	Beetles	Very varied species; hard front pair of wings covering a second pair; found worldwide
Mecoptera	Scorpion flies	Small predators with biting mouthparts; in woodlands, caterpillar-like larvae
Siphonaptera	Fleas	Wingless with jumping hind legs; parasites of birds and mammals; feed on blood; piercing and sucking mouthparts
Diptera	True Flies	Two-winged flies; adults feed on plants/animals, rotting vegetation; found worldwide in all habitats; larvae (maggots) are legless and wormlike
Trichoptera	Caddisflies	Larvae in fresh water, have a protective case around their body; adults feed on flowers if at all
Lepidoptera	Butterflies Moths	Larvae (caterpillars) feed mainly on plants; colorful adults drink nectar, some adult species feed very little
Hymenoptera	Wasps, Ants, Bees	Mainly carnivorous insects, some herbivorous; some species live in highly ordered societies

Source: Adapted from *1001 Facts About Insects*, Laurence Mound & Steve Brooks, DK Publishers, 2003

Carrion Insects: Diptera and Coleoptera

Flies (Diptera) and beetles (Coleoptera) make up the two most common orders of insects found on carrion. Carrion insects are those that feed on or are associated with decomposing animal tissues. To properly identify the insect species found on carrion often requires a microscope since many distinguishing characteristics are too small to be seen by eye. In addition, immature larval forms of carrion insects are often present on the dead animal. Determining the species of insect from its larval stage is very difficult and often requires rearing the larvae in the lab until they develop into more easily identifiable adults.

Order Diptera

This order consists of true flies; the adults have one pair of wings and one pair of halteres, small knobbed structures used for balance and equilibrium. The larvae are called maggots; they lack legs and appear wormlike. Diptera have complete metamorphosis (egg, larva, pupa, adult) and all stages are found on carrion.

Major Families of **Diptera** Found on or Near Carrion

FAMILY	EXAMPLES AND CHARACTERISTICS
Calliphoridae	Blow flies, Greenbottle flies; often the most abundant larvae on carrion (early stage of decomposition)
Sarcophagidae	Flesh flies; large flies that lay live larvae instead of eggs; may be present shortly after death (early stage of decomposition)
Muscidae	House flies and stable flies; Dump flies which are sometimes found during late stages of decomposition
Piophilidae	Cheese Skippers (maggots tend to curl and flick, or "skip"). Associated with late stage of decomposition

Order Coleoptera

This order is the largest in the class Insecta and consists of beetles. Adults have two pairs of wings, but the front pair are hard, thickened elytra that protect the flight wings folded underneath. Coleoptera have complete metamorphosis, but it is unlikely that one would find eggs or pupae on carrion.

Major Families of **Coleoptera** Found on or Near Carrion

FAMILY	EXAMPLES AND CHARACTERISTICS
Staphylinidae	Rove Beetles; predators of fly larvae; can be present within hours after death as well as months later (early to late stage decomposition)
Silphidae	Carrion Beetles; adults and larvae feed on fly larvae; (early stage of decomposition)
Histeridae	Clown Beetles; predators of fly eggs, fly/beetle larvae; often found under the remains (early stage of decomposition)
Dermestidae	Skin Beetles; feed on dried skin and tissues (late stage of decomposition)
Scarabidae	Hide Beetles; some of the last arrivals at a corpse (late stage)
Cleridae	Ham Beetles, Checkered Beetles; predators of flies and beetles; feed also on dried tissue (late stage)

Glossary

Adventive species. Insects or arthopods that are not decomposers but use the body or corpse as an extension of their normal habitat.
Abdomen. The third body division of an insect.
Ametabolous metamorphosis. Development without change or metamorphosis. The immature form is similar to the adult insect. (Ex. springtails and silverfish).
Antennae. (sing., antenna). Pair of segmented appendages located on the head and usually sensory in function - the "feelers."
Arthropoda. "Jointed leg." A phylum of animals with segmented body, exoskeleton, and jointed legs.
Arthropods. Animals belonging to the phylum Arthropoda.

Berlese Funnel. A device used by entomologists to separate insects from a sample of moist soil, humus, compost, or leaf litter.

Carrion. The dead and rotting flesh of an animal.
Chitin. The light yet tough material that makes up an insect's exoskeleton and wings.
Coleoptera. Order of insects having stiff anterior pair of wings (elytra) that cover membraneous wings underneath. The mouth parts form two pairs of jaws (mandibles and maxill[ae]) that are adapted for chewing. Most Coleoptera are known as beetles and weevils.
Compound eye. An eye consisting of many individual elements facets that produces multiple images and allows vision in many directions.
Corpse. The dead body of a human being.

Diptera. Order of insects with one pair of wings, the second ones modified to halteres. Includes flies and mosquitoes.

Ecdysis. "Stripping." Molting process of insects; shedding of exoskeleton.
Ectoparasite. Any parasite that lives on the outside of animals (Ex. lice, mosquitoes).
Elytra. The two stiff anterior wings of a beetle which protect the posterior membranous functional wings.
Entomologist. "Entomo = notched (animals)." A scientist who studies insects.
Entomology. The scientific study of insects.
Entomotoxicology. The use of carrion-feeding insects to identify drugs and toxins present in corpse tissues.
Exoskeleton. The outside "skin" of an insect or arthopod, made from tough chitin.

Forensics. The use of science and technology to investigate and establish facts in criminal or civil courts of law.
Forensic Entomology. The application of insect biology as reliable evidence in criminal or civil cases.
Haltere. One of the club-shaped 'balancers'' found on each side of the metathorax among the true flies (Diptera). They are the much-modified hind wings.
Holometabolous. Complete metamorphosis involving egg, larva, pupa and adult. Includes flies, beetles, butterflies, wasps.
Hygrothermograph. An instrument that measures and records temperature and relative humidity changes.

Incomplete Metamorphosis. See Paurometabolous.
Instar. Stages of an insect or arthropod between molts.

Larva. (Larvae pl.) An immature insect form that is markedly different from the adult: caterpillars and fly maggots are good examples. Larvae is plural.

Maggot. A fly larva; a larva without legs and without well-developed head.
Mandible. The jaw of an insect. It may be sharply toothed and used for biting, as in grasshoppers and wasps, or it may be drawn out to form a slender needle as in mosquitoes. Mandibles are completely absent in most flies, butterflies and moths.

Maxilla. (plural maxillae) One of the two components of the insect mouth-parts lying just behind the jaws. They assist with the detection and manipulation of food and are often drawn out into tubular structures for sucking up liquids.
Metamorphosis. The changes that take place during an insect's life as it turns from a young animal to an adult (incomplete metamorphosis) or from egg, larva, pupa, adult (complete metamorphosis).
Molt. Shedding the outer covering of the body - the exoskeleton.
Muscoid flies. Flies (Diptera)that belong to the Family Muscidae (Ex. Houseflies). **Myiasis.** When maggots (fly larvae) feed on living tissue and not decaying tissue.

Necrophagous. "Death, feeding." Species that feed on carrion or corpses, includes some flies and beetles.
Nymph. Young stages insects that undergo an incomplete metamorphosis. The nymph is usually quite similar to the adult except that its wings are not fully developed.

Ocellus. (Plural Ocelli) One of the simple eyes of insects, usually occurring in a group of three on the top of the head, although one or more may be absent from many insects.
Omnivorous. "All, feeding." Species that feed on corpses and are also predators of other insects present on a corpse (Ex. wasps, ants, and some types of beetles).

Paurometabolous. Incomplete or "gradual metamorphosis". The eggs hatch into an immature form that resembles the adult , but is smaller and without wings (Ex. cockroaches, grasshoppers, praying mantis).
Postmortem Interval (PMI). The time since death of a victim.
Predator species. One that feeds on other insects or arthopods (Ex. Spiders, wasps, and some types of beetles that prey on fly larvae, eggs and pupae).

Pupa. (pl., pupae). The third stage in the life history of flies, butterflies and other insects undergoing a complete metamorphosis. The pupa is a non-feeding and usually immobile.
Pupate. To turn into and exist as a pupa.

Redi, Francisco. An Italian physician and naturalist who demonstrated in the 1600s that flies did not arise as a result of "spontaneous generation" from rotting meat. He showed that meat, shielded from egg-laying flies by cloth, never developed maggots.
Rigor mortis. "Stiffness, death." Muscular stiffening following death.

Spiracle. One of the breathing pores - openings of the tracheal system - through which diffusion of gases takes place. In maggots, the number of spiracles present helps entomologists determine the age of the larvae.
Succession. The natural change and replacement of insects on corpses that happens in a fairly predictable sequence and can be used in estimating time of death.

Thorax. The middle segment of the three major divisions of an insect body. The legs and wings (if present) are always attached to the thorax.
Trachea. (Plural tracheae). One of the internal minute tubes that permeate the insect body and carry gases to and from the various organs etc. They open to the air at the spiracles.

IV. RESOURCES and SUPPLIES

Books and Publications

A Fly for the Prosecution: How Insect Evidence Helps Solve Crimes, M. Lee Goff, Harvard University Press: 2000

*Photographic Atlas of Entomology and Guide to Insect Identification***,** James L. Castner, Feline Press: 2000

Forensic Entomology: Utility of Arthropods in Legal Investigations, Jason H. Byrd, James L. Castner H., CRC Press: 2000

Forensic Insect Identification Cards (laminated), Jason H. Byrd, James L. Castner, Feline Press: 2000

*Entomology and the Law: Flies as Forensic Indicators***,** Bernard Greenberg, John Charles Kunich, Cambridge University Press: 2002

The Practical Entomologist (An introductory guide to observing and understanding the world of insects), Rick Imes, Simon and Schuster/Fireside Publication, 1992.

Encyclopedia of Insects, (The newly published consummate guide to everything and anything insect related. Includes a chapter on forensic entomology by Dr. Goff.) Vincent Resh & Ring Cerde, Academic Press, 2003.

1001 Facts About Insects, (Excellent photographs and interesting facts about insect behavior and environments; reference section is especially helpful in this backpack size book.) Laurence Mound and Steve Brooks, DK Publishing (Backpack Book Series), 2003.

Bugs, (Children's book with beautiful close up photographs of insects.) Penelope York, DK Publishing (Eye Wonder Series), 2002.

Web sites

http://www.aafs.org
The web site for the American Academy of Forensic Sciences includes a Resource/Forensic section that provides additional links to forensic publications and organizations.

www.missouri.edu/~agwww/entomology/
Official page of the American Board of Forensic Entomology.

http://www.Tncrimlaw.com/forensic/
Provided by the Tennessee Criminal Law Defense Resources, this site provides definitions and web site links for many fields within the broad umbrella of forensic investigations.

http://www.fbi.gov/hq/lab/handbook/intro.htm
This is a link to the FBI's Handbook of Forensic Services. This handbook provides guidance and procedures for safe and efficient methods of collecting and preserving evidence and to describe the forensic examinations performed by the FBI Laboratory.

http://www.deathonline.net/decomposition/index.htm
Describes the natural biological process that occurs after death. Body changes, insect interaction, decomposition, and forensic evidence. **Please note**: this site contains graphic images and descriptions.

http://www.uky.edu/Agriculture/Entomology/ythfacts/entyouth.htm
This University of Kentucky Entomology Department site is designed for teachers and young students. Basic insect information, resources and related activities are found here.

www.ent.iastate.edu/List/
Entomology index of internet resources, Iowa State University; VanDyk, J.K. and Bjostad, L.B.

Web sites/Videos

http://www.deathonline.net/decomposition/decomposition/index.htm
An extension to the cite noted above; contains a movie clip showing an animal at various points of decomposition. (**Please note**: this site contains graphic images that may not be appropriate for some young children.)

Scientific Supply Companies

1. BioQuip Products, Inc. 2321 Gladwick St. Rancho Dominguez, CA 90220. 310 667-8800. Supplies for entomology; insect models and videos.
2. Science Kit and Boreal Laboratories. 800 828-7777 www.sciencekit.com
3. Dermestid Skeletal Preparation Kit and other Forensic Kits.
4. The Science Store. 800 522.8281 www.science-store.com
5. Skeleton and skull models.
6. Combined Scientific Supplies PO Box 1446 Ft. Davis, TX 79734. 915 426-3851. www.wirelessfrontier.net. Insect specimens, preserved and ready for mounting.
7. Carolina Biological Supply Co. 800 334-5551 www.carolina.com
8. Insect specimens-live; Forensic Activity: Skeleton Sleuth Kit
9. Ward's Biological Supply 800 962-2660 www.wardsci.com live insect specimens.