Exoskeleton: cuticle, epidermis, basement membrane

Epicuticle
Exocuticle
Endocuticle
Epidermis
BM

Figure 2.1
The general structure of insect cuticle; the enlargement above shows details of the epicuticle. (After Hepburn 1985; Hadley 1986; Binnington 1993.)

Apodemes, setae, and glands

Seta (setae (pl))
Exocrine, or dermal, gland
Muscle attached to apodeme

Figure 2.6: The four basic types of cuticular protuberance: (a) a multicellular spine; (b) a seta, or trichoid sensillum; (c) acanthae; and (d) microtrichia.

Chitin

- Polysaccharide
- Units of N-acetyl glucosamine
- How are chains arranged?
- What causes hardness of cuticle?

Orthopteran external anatomy

http://www.crescent.k12.ok.us/staff/jaskew/ISR/botzo/chitin.gif
You'll encounter some of these terms when identifying specimens:

**Generalized Insect Head with Chewing Type Mouthparts**

http://www.ndsu.nodak.edu/entomology/topics/heads.htm

**Figure 2.10**

Frontal view of the head and dissected mouthparts of an adult of the European earwig, Forficula auricularia (Dermaptera: Forficulidae). Note that the head is prognathous and thus a gular plate, or gula, occurs in the ventral neck region.

**Head and mouthpart diversity**

Butterfly
Housefly
Mosquito
Ground beetle

**Sphinx moths – extreme proboscis**

Amphimoea walkeri
(Darwin Huxleyth)

http://www.juddpatterson.com/spotlight/images/h1.jpg
http://www.hondurasbutterfly.com/images/walkeri.jpg

**Odonata mouthparts**

Labium
Mandible
Maxilla

http://biodidac.bio.uottawa.ca
ORTHOPTERA

Straight-winged insects

Ordinal Characteristics:

1. chewing mouthparts
2. gradual metamorphosis
3. 2 pairs of wings, 1st thickened, 2nd membranous

ORTHOPTERA

○ Shorthorned and longhorned grasshoppers

ORTHOPTERA

○ Field, mole and cave crickets

http://arkadiapest.com/cave_crickets

http://bugguide.net/images