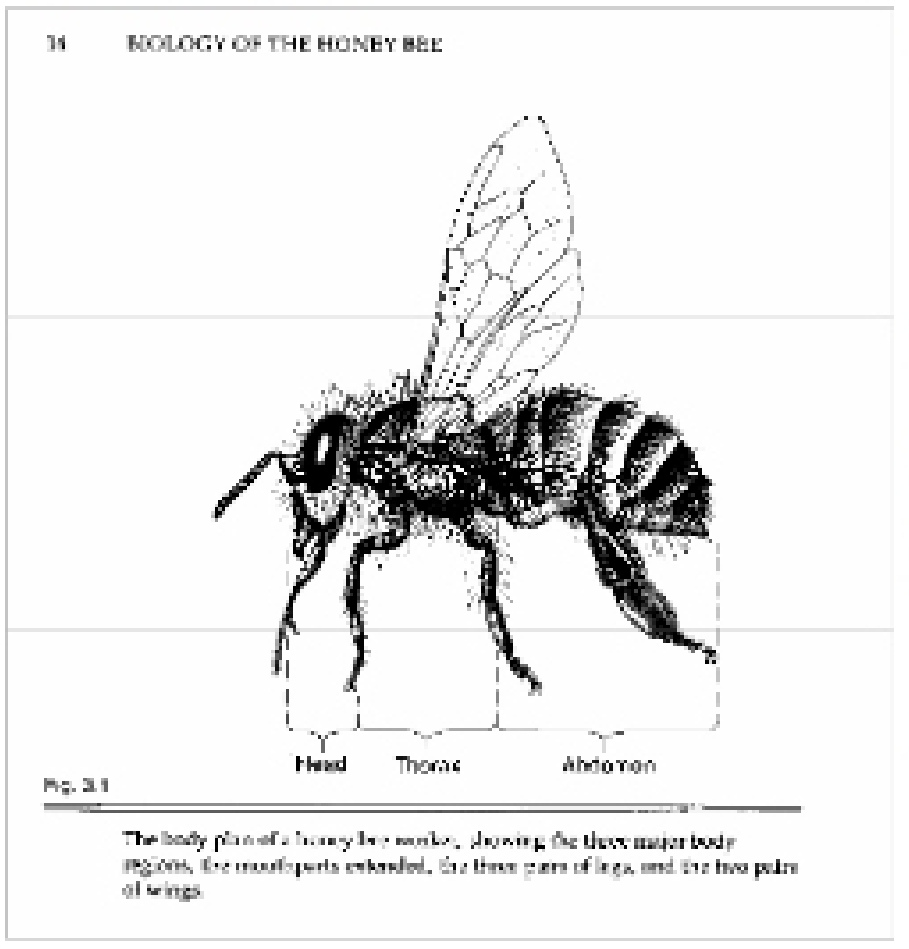
RECOMMENDED READING

- Chapter 3 Biology of the Honey Bee

EXOSKELETON

- Body is comprised of a series of hardened plates connected by membranes and covered in most regions by a dense pile of hairs.
- The skeleton is external, called an EXOSKELETON.
- Composed of chitin (chemically similar to cellulose).
- Chitin provides strength and flexibility to an insect body.
- Chitin is strong, but not strong enough to support large bodied organisms, so this limits insect size
- The exoskeleton also limits growth and in some insects it is shed occasionally to accommodate a growing body. This only occurs in honey bee larvae.
- Covered with a thin wax layer.
- Exoskeleton provides:
  1. Protection from predators
  2. Prevents water loss.
  3. Provides a substrate for internal muscle attachment.
  4. Allows rapid but precise movements (moving in a suit of armor).

EXOSKELETON



The body plan of a honey bee worker, showing the three major body regions, the mouthparts extended, the three pairs of legs, and the two pairs of wings.

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1. HEAD

- ingests food and partially digests food through the mouthparts and associated glands.
- serves as the major sensory region of the body through the eyes, antennae, and sensory hairs

2. THORAX

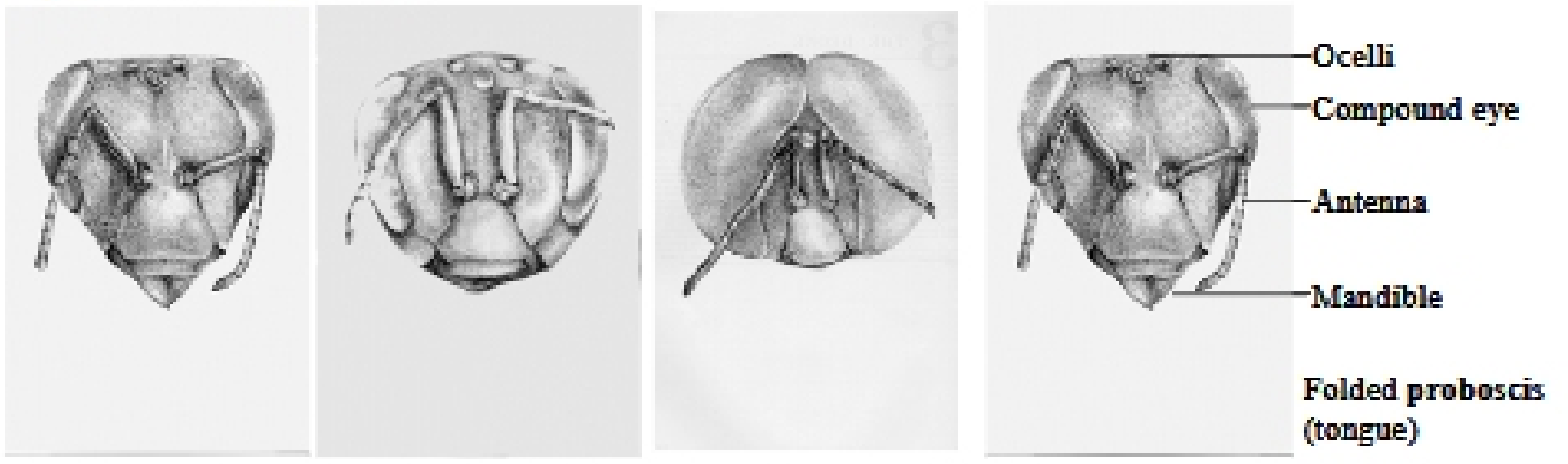
1. Composed of 3 segments each bearing a leg.
2. The last 2 segments has one pair of wings.
3. This is the locomotory region of the bee containing mostly muscle.
4. Legs have specialized structures of antenna cleaning, pollen and propolis collection.

3. ABDOMEN

1. Seven visible segments.
2. Contains most of the internal organs and the stinger.

HEAD

http://gears.tucson.ars.ag.gov/beebook/



Worker Queen Drone

EYES

Two types of eyes

1. compound eyes
2. ocelli.

COMPOUND EYES

Compound eye is composed of ~6900 hexagonal **FACETS** containing it's own lens to receive light, a pigmented cone to concentrate and focus light, and a sensory retinal hair for light perception.

FACETS OF THE COMPOUND EYE

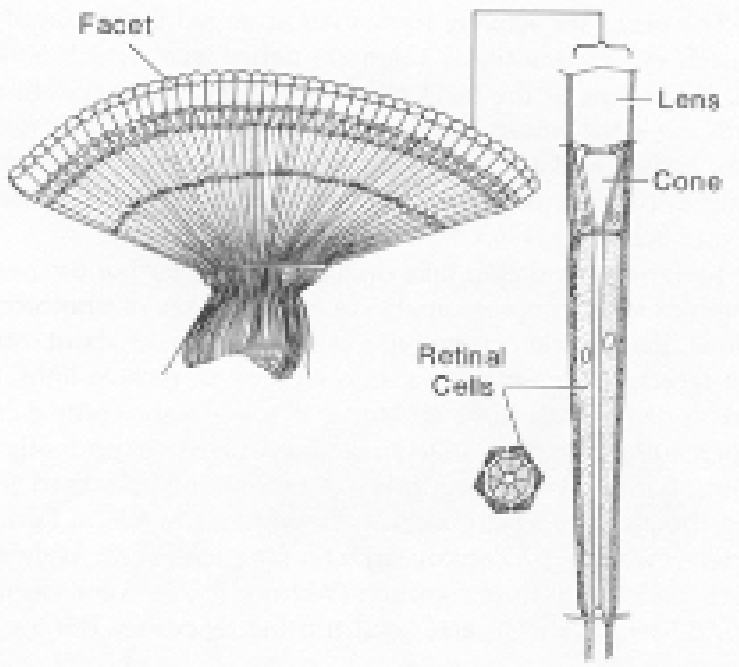
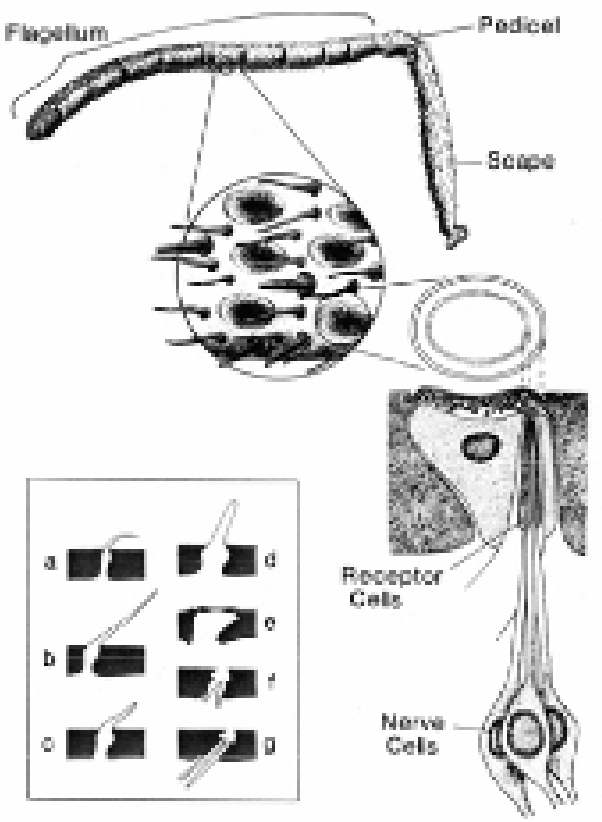


Fig. 3.3

Cross section through a worker's eye, showing some of the individual facets. One of the facets has been enlarged to show the structures which receive, concentrate, and perceive light. (Redrawn from Snodgrass, 1956. Copyright © 1956 by Cornell University. Used by permission of Cornell University Press.)

- Facets respond independently to incoming live waves and groups of facets are specialized for receiving 1) polarized light, 2) pattern recognition, 3) color vision, and 4) head turning responses (orientation).
- Compound eye can also perceive airflow using sensory hairs at the junction of facets.
- Removing sensory hairs disrupts bees' ability to estimate flight distance.
- Facets diverge angularly by 1° resulting in a mosaic pattern that is well adapted to detecting movement.

ANTENNA



- Smell, taste and feel.
- Detect direction odors are coming from.
- Pore plates in the antennae detect chemicals.
- Detection of volatile or contact chemicals.
- Contact chemoreception is like taste in humans.

MANDIBLES

- Spoon-shaped, strong and jaw-like.
- Powerful muscles connect them to the head.