Worker Bee Jobs

Never unemployment or a layoff (Well, except for those drones)

Workers do the work in the bee society. Employment is based on the age of the bee and the needs of the colony. During their life they pass through many job promotions:

- **Nurse Bee**
  - 1 - 12 days
  - Clean own cell and others
  - Feeding brood (larvae)

- **House Bee**
  - 10 - 20 days old
  - Comb building
  - House keeping
  - Undertaker
  - Ripening honey
  - Climate control
  - Secreting/molding wax into cells
  - Accept and store pollen and nectar from foragers

- **House Security**
  - Guard hive and its entrance (some say only about 5% of bees perform this job)
  - Orientation flights to learn surroundings

- **Field Agent**
  - After about three weeks the girls are ready to spend the rest of their lives as foragers gathering pollen, nectar, tree resin (that they turn into propolis) and water for the hive. During this time they work themselves to death – literally
  - Worker bees in the summer only live about six weeks. In the winter they live a leisurely life for several months
Age Related Duties of Worker Bee
What makes a Queen a Queen?

Feeding a female larva Royal Jelly for the entire larval stage.
The Drone

- Develops from unfertilized egg - Male
- Larger than workers
- Large eyes & Wings
- Sexually mature at 2 weeks
- One function in life – mate with virgin queens
- Mates once in drone congregation areas at about 300 feet above ground, then dies (maybe not such a good life)
- No stinger (remember, he only has one function)
- Survivors are forced out of hive in the Fall and die (definitely not the good life. Maybe if he had another function???)

Feb 13, 09
The Life Cycle of Honeybees

Table 1: Developmental stages of the three castes of bees.

<table>
<thead>
<tr>
<th>DEVELOPMENTAL STAGE</th>
<th>DURATION OF STAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>QUEEN</td>
</tr>
<tr>
<td>Egg</td>
<td>3</td>
</tr>
<tr>
<td>Larval stage</td>
<td>5 ½</td>
</tr>
<tr>
<td>Pupal stage</td>
<td>7 ½</td>
</tr>
<tr>
<td>Total developmental time</td>
<td>16</td>
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</tbody>
</table>
What eggs look like
The Birthing Room – Eggs & Larva(e)
The Birthing Room – Larvae & Pupae

Feb 13, 09
The Birthing Room – Pupae

(cell cut-away showing side view)
Worker Cells

Drone – larger & raised cap, usually found at the outer edges of frames.
Drone Cells
Queen Cells

Worker cells are horizontal while queen cells are vertical. As the queen larva grows, the cell enlarges and becomes peanut-shaped when capped for the pupal stage of development.
Adults
External Anatomy
Bee Anatomy

Insects have a hard outer covering called an exoskeleton, rather than an internal skeleton like vertebrates (humans). The exoskeleton, which is made of a material called chitin, helps to protect the internal organs of the insect and helps prevent desiccation (drying out). In order to grow, the insect must shed the exoskeleton.

The three main sections of the Honeybee’s body:

- Head
- Thorax
- Abdomen
Internal Organs of a Worker Honeybee

- Esophagus
- Pharynx (sucking pump)
- Mandible or jaw
- Proboscis or tongue
- Honey stomach (empty)
- Honey stomach (full)
- Proventriculus (stomach mouth)
- Hindgut
- Ventricle (midgut)
- Rectum
- Anus
3a) Head

- There are three eyes, called ocelli, located at the top of the head between the bee’s two larger compound eyes. The ocelli detect light but can’t focus or arrange an image like the larger compound eyes.

- Honeybees use their antennae to learn about their environment: Tiny sensory hairs on each antenna allow them to smell, taste, feel air movements and to communicate with one another.

- The compound eyes each have almost 7,000 hexagonal facets. Each facet is like a mini-eye, containing its own lens and sensory cells.

- A bee’s curved, spoon-shaped jaws, called the mandible, are built for many uses: They can be used to ingest food, manipulate wax to build the hive cells, feed the young or queen, and even fight.

- The long proboscis at the front of the bee’s head is used to ingest liquids such as nectar, honey or water. The proboscis is tipped with a spoon-shaped glossa.
3b) Thorax

The saliva is mixed with beeswax to make it sticky.

The nervous system comprises a small “brain” and 7 ganglia right down the body. The 7th is near the end of the abdomen. This is why the detached body part of the bee sting continues to pump venom. The ganglia control the wings, hemolymph, legs, etc....
The air sacs (think lungs) are connected to the surface by tracheal tubes, emerging near the wings for breathing.

(like having nostrils between your shoulder blades)

There are also breathing pores (spiracles) along the sides of the abdomen. (refer to the page showing the Dorsal Vessel in the Abdomen section)
There is a total of four wings, two on each side. The forewing and hind wing on each side are joined during flight by a system of hooks (think Velcro). It is the rapid flapping of the wings that causes the distinctive “buzz”. At 15MPH you can’t out-run a Honeybee.
Like all insects, there are 6 legs. The legs of the bee are primarily used for walking. However, Honeybee legs have specialized areas such as the antennae cleaners on the forelegs, and the pollen baskets on the hind legs.
Honeybees have “six-pack” abs.

Actually, as seen from the outside, only six abdominal segments can be observed, but the adult honeybee has nine, while the larva has ten.
Digestion of foods occurs in the mid-gut. The hind-gut reclaims water and nutrients and passes small amounts of indigestible wastes to the rectum for storage until excretion.

Honeybees have reversible movement of foods from mouthparts to/from a honey stomach. The honey stomach is a crop or storage area to hold freshly collected nectar or water for transport to/from the nest.
The blood (haemolymph) is not carried by arteries and veins but flows loosely around the body, controlled by the dorsal and ventral diaphragms, sometimes called vessels, bellows or heart. Oxygen enters into the bee via spiracles (including two rows of 6 on the abdomen and by trachea connected by 3 spiracles on the upper thorax) then into the bellows in the abdomen which distribute it into the blood.

In the spring you will find how much waste can be stored when the girls make their cleansing flights over your nice new, clean bee suit or jacket.

(You might want to get the kind with a detachable veil)
Wax Gland(s): Four pairs of glands, sometimes called mirrors, are specialized parts of the body wall. During the wax forming period in the life of a worker, the glands greatly thicken and take on their glandular structure.

The wax is discharged as a liquid, hardens to small flakes or scales, and sits in wax pockets. The wax scale is then transferred to the mandibles where it is chewed into a compact, pliant mass. After the worker bee outgrows the wax forming period, the glands degenerate and become a flat layer of cells.
Workers have a Nasanoff gland at the end of their abdomen. This Nasanoff gland is used by the guard bees at the hive entrance to disseminate a scent that guides young bees back to the entrance during early flights.
Abdomen (cont.)

And finally – the part you’re most interested in...

On the end of the female bee's abdomen is the *ovipositor* (stinger). The ovipositor of the worker bee is barbed so that it remains imbedded into whatever the honeybee stings. In its struggle to free itself, a portion of the bee (stinger, venom sac, ganglia) is left behind, which damages her enough to kill her. The venom sac continues to contract by reflex action, continuously pumping venom into the wound for several seconds. The queen’s ovipositor is slightly barbed and is “reusable”: It’s used to kill rival queens.
Review

1. Three members of the colony
   a) Worker
   b) Queen
   c) Drone

2. Development timeline of a Honeybee and their lifetime functions
   a) Egg (Eggs)
   b) Larva (Larvae – “lar-vee” or “lar-vie”)
   c) Pupa (Pupae – “pew-pee” or “pew-pie”)
   d) Adult (Adults)
   e) Job responsibilities

3. Anatomy: Three major sections of the bee and several parts of each
   a) Head
   b) Thorax
   c) Abdomen
Final Exam Time

Match these words with the numbers on the picture. Write the words on the correct line to the side.

Abdomen, Eyes, Feelers, Head, Legs, Pollen Sacs, Stinger, Thorax, Tongue, Wax Glands, Wings

1. Feelers (Antenae)
2. Compound eyes
3. Tongue (Probosis)
4. Fore legs
5. Pollen Sacs
6. Wax Glands
7. Stinger
8. Wings
9. Head
10. Thorax
11. Abdomen