Basic Assessment Study Guide

Natural History of the Honey Bee

The Candidate should be…	***Responses may include:***
3.1 able to give an elementary account of the development of queens, workers and drones in the honeybee colony	Queen: Egg laid in or moved by workers to queen cell (like a monkey nut hanging down) Larva is continuously fed on royal jelly Adult Activities: 1 – 5 days after emergence, builds up strength 5 – 14 days series of mating flights 5 days after mating, begins to lay Workers: Eggs laid in open cells, first erect and then gradually lying down Larvae are cared for by adult workers, where they are continuously fed (first two days, all are fed on royal jelly), then get a mixture of royal jelly, honey and pollen Pupae are in sealed cells and no longer need feeding. They develop into the adult form and emerge on their own Adult worker complete the following tasks: 1 – 2 days after emergence, clean cells and warm brood nest 3 – 5 days, feed older larvae with honey and pollen 6 – 10 days, feed younger larvae with royal jelly 11 – 18 days, ripen nectar, produce wax and construct combs 10 – 21 days, guarding and ventilation, take exercise and orientation flights to learn to fly and locate the hive 22+ days, forage for nectar, pollen, water or propolis Drones: Same development as the workers until they reach the adult stage Once they become adults, the drones' only role is to mate with a queen

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<tr><td></td><td></td></tr>
<tr><td rowspan="5">3.2 able to state the periods spent by the female castes and the drone in the four stages of their life (egg, larva, pupa and adult)</td><td></td><td>Queen</td><td>Worker</td><td>Drone</td></tr>
<tr><td>Egg Hatches</td><td>3 days</td><td>3 days</td><td>3 days</td></tr>
<tr><td>Larva Sealed</td><td>8 days</td><td>9 days</td><td>10 days</td></tr>
<tr><td>Adult Emerges</td><td>15 ½ days</td><td>21 days</td><td>24 days</td></tr>
<tr><td>Death</td><td>Up to 5 years, but usually replaced after 2 years by the beekeeper or at any time if considered necessary by the worker bees</td><td>Approximately 6 weeks, but 3 – 6 months over winter</td><td>Possibly until the autumn, not over winter</td></tr>
<tr><td>3.3 able to give an elementary description of the function of the queen, worker and drone in the life of the colony</td><td colspan="3">Queen:
One present in each colony
The only female who is fully sexually developed

Drones:
Approximately 300 in the colony
Sole function is to fertilise a queen

Workers:
Approximately 30,000 – 60,000 in the colony
Do everything else (see 3.1 for more details)</td></tr>
<tr><td>3.4 able to give a simple description of wax production and comb building by the honeybee</td><td colspan="3">Wax is formed from honey and nectar and is secreted from eight small wax glands underneath the abdomen of the bee
The soft wax is poured into eight pockets beneath the glands where it solidifies into tiny discs
It is then removed and passed to the mouth, where it is worked into hexagonal cells called combs
Combs are used to form the basic structure of the hive</td></tr>
<tr><td>3.5 aware of the importance of pollination to flowering plants and consequently to farmers and growers</td><td colspan="3">As the worker bees collect nectar, pollen (plant sperm cells) stick to their fine hairs
Each visit by the bee, aids pollination of flowers
A variety of agricultural crops are dependent on insect pollination to successfully set seed</td></tr>
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3.6 able to name the main local flora from which honey bees gather pollen and nectar	February – March (very early): Crocus Snowdrops Flowering currant Willow Poplar Spring: Fruit Blossoms Rape Garden Flowers Summer: Field Beans Borage Garden Flowers Chestnuts Clovers Autumn: Blackberries Willow Herbs Balsams Heather Ivy
3.7 able to give a simple definition of nectar and a simple description of how it is collected, brought back to the hive and is converted into honey	Nectar is ingested by the nee into its honey stomach and regurgitated back at the hive Hive bees add enzymes to the nectar to break down the complex sugars and then store it in the comb Nectar is fanned to evaporate and reduce the water content to approximately 17% (otherwise the honey will ferment) When ripe (i.e. ready for consumption), it is sealed under a capping of wax

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<tr><td rowspan="5">3.8 able to give a simple description of the collection and use of pollen, water and propolis in the honey bee colony</td><td></td><td>Collection Method</td><td>Uses</td></tr>
<tr><td>Nectar</td><td>Carried from the flower in honey stomach of foraging worker bees
Processed into honey by hive bees</td><td>Food
Carbohydrate
For energy</td></tr>
<tr><td>Pollen</td><td>Carried from the flower in pollen baskets
Pollen baskets are located on the hind legs of worker bees
Will also attach to hairs all over the bee until ‘combed’ and ‘pressed’ into baskets
Converted into ‘bee bread’ by hive bees for feeding to larvae</td><td>Food
Protein
For growth</td></tr>
<tr><td>Propolis</td><td>Carried from plant wounds and buds in pollen baskets
Main source – coniferous trees</td><td>Used to seal cracks in the hive
Reinforces old comb
Entombs dead animals in the hive (i.e. Mice)
Limits bacterial and fungal growth</td></tr>
<tr><td>Water</td><td>Carried in stomach</td><td>Mixed with honey before bees eat it or feed it to brood
Used to cool hive on hot days through the action of evaporation</td></tr>
<tr><td>3.9 able to give an elementary description of swarming in a honey bee colony</td><td colspan="3">Swarming is when a queen and many of the flying bees leave the hive to establish a new colony

It can be trigged by:
A reduction in levels of ‘queen substance’ because the queen is aging
Congestion, thus insufficient room for new brood</td></tr>
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	The initial swarm is the prime swarm and contains the old queen If more than one replacement queen hatches, the stronger queen may kill the others or drive them out In the above case, the swarm is called a cast
3.10 able to give an elementary description of the way in which the honey bee colony passes the winter	Winter workers have large, fat bodies and live for 6 months Bees cluster in the hive around the queen to retain warmth They vibrate their wing muscles to generate heat They rotate positions to ‘take turns’ on the colder outer edge of the cluster The queen is at the centre of the cluster No drones are present Approximately 10,000 – 20,000 workers over winter to regenerate the colony in Spring