

Name KEY

EAS Master Beekeeper Written Exam 2023

Short Answer: (3 points each)

1. Name one thing that Harry Laidlaw is famous for?

Honey bee genetics
Artificial Insemination

2. How do honey bees cool their colony and what is the optimal temperature range of the brood nest?.

Evaporative cooling, fanning wings and evaporating collected moisture, bearding or moving outside the hive entrance. Optimal temperature range is 91-97° F

3. What is the developmental differences among drones, workers and queens?
(meaning how long does it take each to go through each of the developmental stages from egg to adult?)

Drones are the longest at 24 days.
Workers are 21 days and queens are 16 days.

4. Go step by step on how you would split a colony.

Many different answers for this question. Most important information is that you would find the queen and move her to a new colony with adequate food and drawn comb and then you would either allow the old colony to requeen or provide it with a queen.

5. Name three main determining factors for picking an apiary location.

Water availability, adequate forage, accessibility

6. What is robbing? Why is this something to avoid and how would you minimize robbing in your apiary?

Gathering resources from a non-recruited floral source. It is to be avoided because it can stress colonies and also transmit pests and pathogens. To minimize robbing you

can keep the colony covered during frame inspection, work the colony in a tent and/or keep your inspection time to a minimum.

7. What is the difference between a race, a hybrid and a subspecies of honey bee?

A subspecies refers to an evolved genetic taxa, meaning that it evolved specific behaviors and morphologies over time in response to unique ecological factors. A race can be considered a more informal term that can be used for subspecies. Examples of subspecies/races would be *Apis mellifera ligustica* or the Italian honey bee. A hybrid is when two different races or subspecies breed or are bred. Examples of honey bee hybrids would be Buckfast Bees which are a genetic mixture of many subspecies or races.

8. What is royal jelly and how is used in the hive?

Royal jelly is a mixture of secretions from two glands found in the head of worker honey bees. This mixture of secretions from the hypopharyngeal gland and mandibular gland make up royal jelly. This mixture is mass provisioned as food to developing queen larvae.

9. Based on optimum foraging theory, name two factors that could a make a colony switch to a different flower patch?

Quality of the patch, size of the patch and risk

10. How do people identify the botanical origin of honey? Why is it so difficult to determine the botanical origin of honey?

Pollen analysis. Honey is often composed and processed from many types of nectar and therefore have many pollen species present. So understanding the types and percentages of different pollens present is very helpful. There are also new molecular assays, but most research supports pollen analysis as an important diagnostic for botanical origin.

11. Honey is considered highly hygroscopic. What does that mean and what problems can arise when processing?

This means that honey is water loving and can readily absorb water. This can be a problem when processing honey because honey that is sitting in a humid environment can absorb moisture from the air which can cause it to ferment.

12. What is the active ingredient and mode of action of Checkmite®? Why is this product largely considered ineffective at controlling Varroa now?

The active ingredient in Checkmite® is coumaphos. It is a nerve toxin, specifically it inhibits acetylcholinesterase within the nerve terminal. It is largely considered ineffective for Varroa control due the development of resistance in mites.

True and False: (1 point each) Please write true or False next to the statement.

1. Drone bees lack corbicula, but queen bees and workers have them. **F**
2. Honey bees are the only type of bee that has a corbicula. **F**
3. European foulbrood is similar to American foulbrood in its ability to produce spores. **F**
4. A forest of flowering trees typically produces a greater nectar flow than a backyard flower garden. **T**
5. Yellow jackets have barbs on their stingers. **F**
6. Reverend Langstroth developed the grafting method many beekeepers use today. **F**
7. Worker honey bees that produce wax have 8 wax producing glands on their abdomen. **T**
8. Wax glands are most developed and productive in 12-18 day old workers. **T**
9. Two uses of propolis are to keep moisture and air drafts from entering the interior of the brood nest. **T**
10. *Aethina tumida* do not serve as vectors for pathogens in a honey bee colony. **F**

11. Many native bee species are solitary, therefore they mass provision their young. **T**
12. The long-term caging of a queen does affect the queens laying behavior once released. **T**
13. Brother Adams was responsible for breeding Buckfast Bees. **T**

Fill in the blanks: (1 point each)

1. Chalkbrood is caused by a _____ **fungus** _____ whose scientific name is Ascospaera apis.
2. Most of the traps designed for *Aethina tumida* target the _____ **adult** _____ stage of development.
3. (Continuing from question 2) However, the _____ **larval** _____ stage of development is the most destructive.
4. In order for fermentation to occur in honey three factors must be present. One is the presence of yeasts. Second is moisture content exceeding 17 percent and third are temperatures suitable for yeast to grow.
5. The quality and the size of the patch will determine recruitment of foragers to a patch.
6. The _____ **anther** _____ of a flower produces and releases the male gamete of a plant, otherwise known as pollen.
7. When constructing an electric fence to protect an apiary from bears you must remember to add a bait to the fence prior to any exposure to bears.
8. A new queen in the year 1985 would be marked with the color blue.

9. One common tree that bees collect propolis from is

_____ **poplar** _____.

10. A recent paper showed a correlation between plantings of

_____ **sunflower** _____ and reductions in Varroa mite infestations.

Multiple choice: (2 points each) Choose BEST answer!

1. * Honey bees are _____ insects.
 - a. **Eusocial**
 - b. Quasi-social
 - c. Semi-social
 - d. Communal

2. The queen bee in a colony is the only reproductive female in a colony with all the workers being sterile. This dynamic is maintained through:
 - a. Aggression displays by the queen
 - b. The worker bees' lack of ovaries
 - c. **Pheromones released by the queen**
 - d. Workers' lack of sperm

3. What must be done to a breeder colony in order to use the cell punch method of queen rearing?
 - a. The colony must be fed sugar syrup for at least a week before you plan to begin
 - b. The queen must be kept below a queen excluder with all capped brood put above the excluder
 - c. A cloak board must be put on the colony 3-5 days before you plan to begin
 - d. **Frames with wax foundation must be placed in the hive well before you plan to raise queens to allow the bees to draw it out and the queen to begin laying on them**

4. A good rule of thumb for the minimum temperature it should be outside to do a thorough inspection into a hive is:
 - a. 40 degrees F
 - b. **50 degrees F**
 - c. 60 degrees F
 - d. 70 degrees F

5. What is not a characteristic of top bar beekeeping
- Does not require foundation
 - Colonies expand horizontally
 - Wax comb can be reused after harvest
 - One of the oldest types of hives style in the world
6. When selecting a honey bee frame to graft from it is important that the frame contain
- 3 day old larvae with lots of royal jelly
 - 6 day old larvae with lots of royal jelly
 - A tight brood pattern
 - Answers a and c
7. The most important factor in determining when to use formic acid is
- Mite load
 - Adult bee population
 - Ambient temperature
 - Location of the queen
8. Beeswax does not contain
- hydrocarbons
 - wax esters
 - fatty acids
 - hemolymph
9. Leading issue with chemical mite control is
- formulation
 - resistance
 - dosing
 - sublethal effects
 - all of the above
10. The wing coupling device in honey bees are little hooks called

- a. jugums
- b. frenulums
- c. hamuli
- d. ceca

11. Worker laid eggs are identified and policed by other bees by_____.

- a. odor
- b. sight
- c. touch
- d. taste

Essays: Pick two (9.5 points each)

1. You see that your next door neighbor has hired a lawn care service that makes heavy use of pesticides to keep lawns weed free. You have also seen the same neighbor using a glyphosate based weed killer extensively in their garden which contains many flowering plants that could attract your bees and you are worried these chemicals may be detrimental to your bees' health. You know from previous conversations that they support you keeping bees and have commented that they love seeing bees buzzing around their flowers. How would you approach them about limiting their use of these chemicals or perhaps even eliminating them entirely without causing friction?

2. A new member of your local beekeeping club has discovered that one of the hives in their apiary is infected with AFB. As soon as they discovered the AFB-infected hive they stopped and did not inspect other colonies, which they explained they did so as to not spread spores to them. They tell you that they have arranged for the hive to be treated with gamma radiation (which they state should be 100% effective in sterilizing the equipment) 7 days from now. Should this beekeeper keep the hive in their apiary for now since it will be treated in a week's time? Will irradiation be as effective as they claim? After the equipment has been treated, should they feel comfortable returning the equipment to the apiary?

3. A friend approaches you and says that they recently learned that people can collect and consume pollen from honey bees, and that pollen is very high in protein. They wanted to know if you know where to get pollen as they are looking for a plant based

source of protein they can incorporate into their diet. What would you tell your friend?

4. In the middle of the summer a local in your community calls and claims that they saw an Asian giant hornet! They describe it as being by itself, about an inch and a half long, black and red in color, and seen killing and dragging cicadas into a burrow in the ground. Should you be concerned about *Vespa mandarinia* being in your area in the near future? Explain your answer. Not long after this, state biologists confirm a separate (but unrelated) case of northern Asian hornets in your area. How do you a) react to this within your own beekeeping operations and b) deal with this issue in your community, who may look to you (as a Master beekeeper) as an authority on this matter?