

Honeybee: The social insect

Shimpy Sarkar*, Arshdeep Singh

Department of Entomology, School of Agriculture, Lovely Professional University,
Phagwara (Punjab) India, Department of Agronomy, M S Swaminathan School of
Agriculture, Shoolini University, Solan (Himachal Pradesh) India

ARTICLE ID: 020

Abstract

This chapter is regarding the remarkably interesting social behavior of honeybees. There are other group of insects as well which shows social life or caste system and accordingly their duties are also divided. The life of honeybees is awfully specific and different as far as they are compared with the other insects. They do not only mate, lay eggs, feed on crops and die. They live a very systematic life and perform their duties very religiously. So, let us discuss in detail.

Introduction:

Honeybees are very well-known insects as of today. Different studies regarding their habit, behavior, ecology, communication, foraging etc. have been done to understand them. Many scientists and researchers have spent their entire life in understanding these useful insects. Honeybees are considered as one of the best examples of social insects, but there are other social insects too. The different castes of honeybees are Queen, drones, and workers. Honeybees are also good pollinators apart from being one of the primary sources of honey production. So, here we present a description on the eusocial nature of honeybees which is awfully specific among the different orders of insects. As far as, the order Hymenoptera is concerned, only two families such as Halictidae and Apidae are said to consist of social insect species. Almost all other bees live a non-social or so-called solitary life.

Difference between social life and solitary life

In case of solitary type of life cycle the process is as simple as that. There are always one female insect and one male insect involved for the successful cycle to start. The female has the responsibility or natural way to lay their eggs in any hidden surface away from the natural enemies or near to the food which the larvae will feed upon after hatching out from the eggs. Thereby, the larvae will be independent for its growth and development along with its search for food without any further help from its parent insects (Gullan and Cranston, 2010).

Whereas, in case of social life of honeybees; there are different castes namely the queen, few drones and a huge number of worker bees. The main function or role of Queen bee is to lay eggs, drones are only necessary for mating and only sometimes they maintain the hive temperature. The most important duties are performed by the worker bees. They take care of the young ones, they perform the work of nursing, cleaning, foraging, and protecting their hives. In case of solitary insects, the females construct or build their place for nesting or oviposition but in case of honeybees this not at all the scenario. The different *Apis* species that are known for pollination as well as honey production are: *Apis cerana indica*, *Apis mellifera*, *Apis dorsata*, *Apis florea* and non-*Apis* species known for pollination is *Meliponairidipennis*.

Queen bee:

The selection of Queen bee is done by the worker bees by feeding them on royal jelly which is secreted by the hypopharyngeal glands of worker bees (Perfect Bee, 2017). Queens are always larger in size so for their development they are separated into a bigger chamber and for development they take up to 16 days, in all aspect of morphological physiological and behavioral characters. The queen is the only fertile female who can store the sperms when she mates with the drones (Fertile males). The queen bee sting is not that much functional as in case of worker bees and does not possess the glands which is responsible for producing bee-wax. The female is capable of laying as much as 2000 eggs/day (Perfect Bee, 2017).

Drones:

These are the members (fertile male) of the colony which has the only function of mating with the queen. They do not have any role in collection of pollen or nectar. These drones are not allowed to remain inside the hives during the winter season when the workers focus on keeping the hives warm. Drones possess big eyes which help them to locate the female while they fly to mate with the Queen. Other than these they have no contribution towards protecting the hives from enemies of any kind. Moreover, they do not possess any functional or non-functional sting (Perfect Bee, 2017).

Bee life cycle

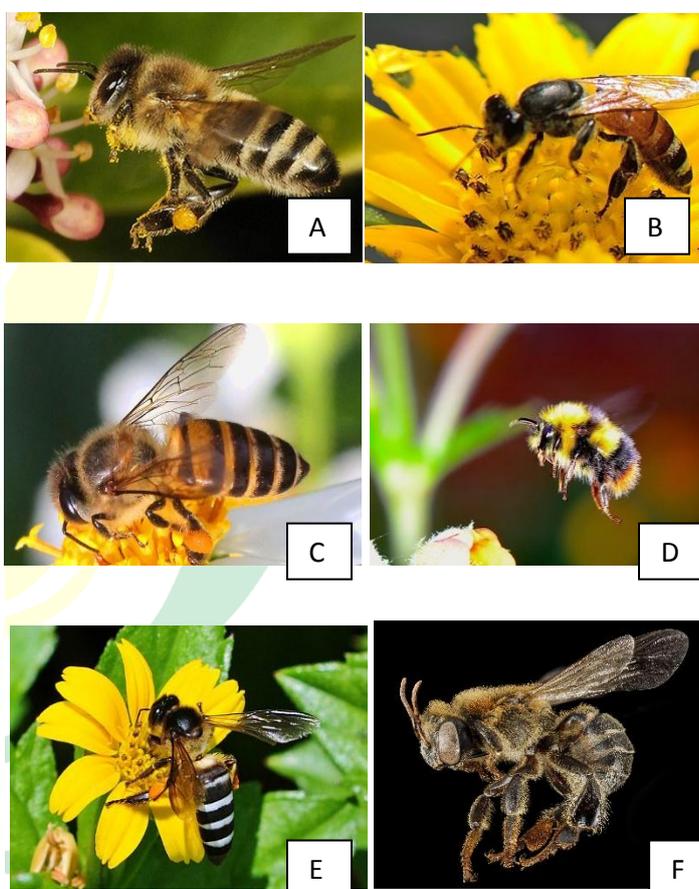
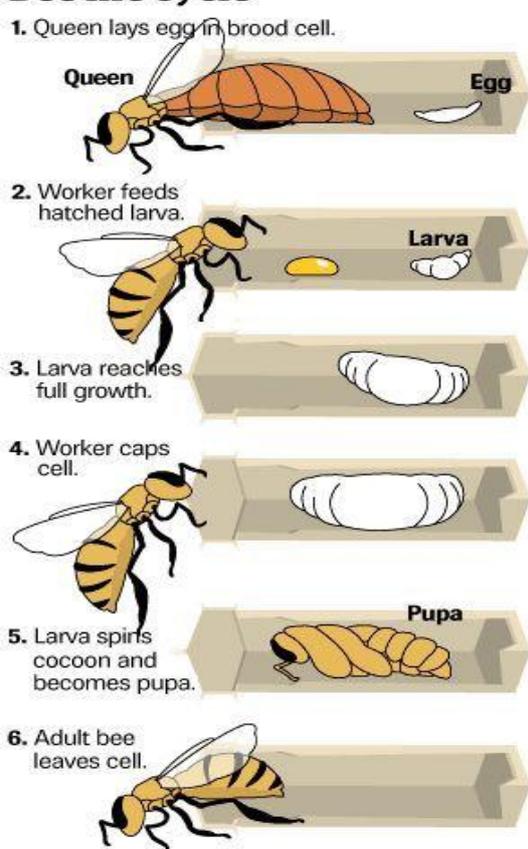


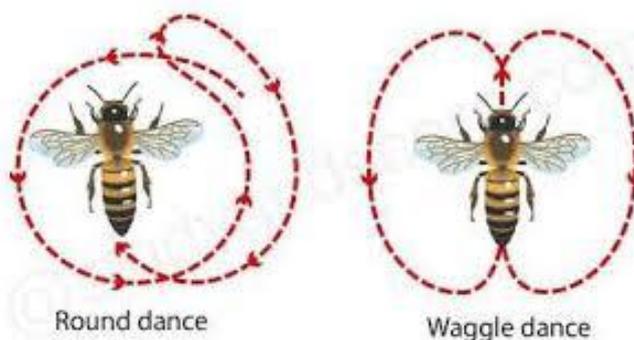
Fig 1: Showing life cycle of honeybee and different species of honeybee, A: *Apismellifera*, B: *Apisflorea*, C: *Apisceranaindica*, D: *Bumble bee*, E: *Apisdorsata*, F: *Meliponairidipennis*

Workers:

They are imperfectly developed females. These are smaller than the queen. These have strong wings to fly. These have a large and efficient proboscis (mouth parts packed together

like a thin tube) for sucking nectar. A well-developed sting is present. Hind legs have “pollen basket” for collecting pollen. The workers have a life span of about 35 days. The different duties which they perform age-wise are as follows: Day 1-14 Activity inside the hive such as cleaning the hive, feeding the larvae, etc. Day 14-20 Guard duties at entrance to the hive Day 21- 35 Foraging, i.e. collecting the food (nectar and pollen from the surroundings). As per their duties they are continuously exposed to different environmental conditions (Jones et al., 2018a; Jones et al., 2018b). The type of modification that the alimentary canal has differs as per the locality or the type of crop they feed up on or the type of hive services that they provide which may range from nursing to processing of food (Jones et al., 2018b).

Dances of honeybee:



When the food source is less than 50 meters distance the foraging worker bees perform round tail dance, the bees make small circular movements through their abdomen. This type of dance does not provide any information about the direction of the food source. When the food source is at a distance more than 50 meters the bees perform wagtail dance. All these types of communication of bees or bee language were studied by Karl Von Frisch.

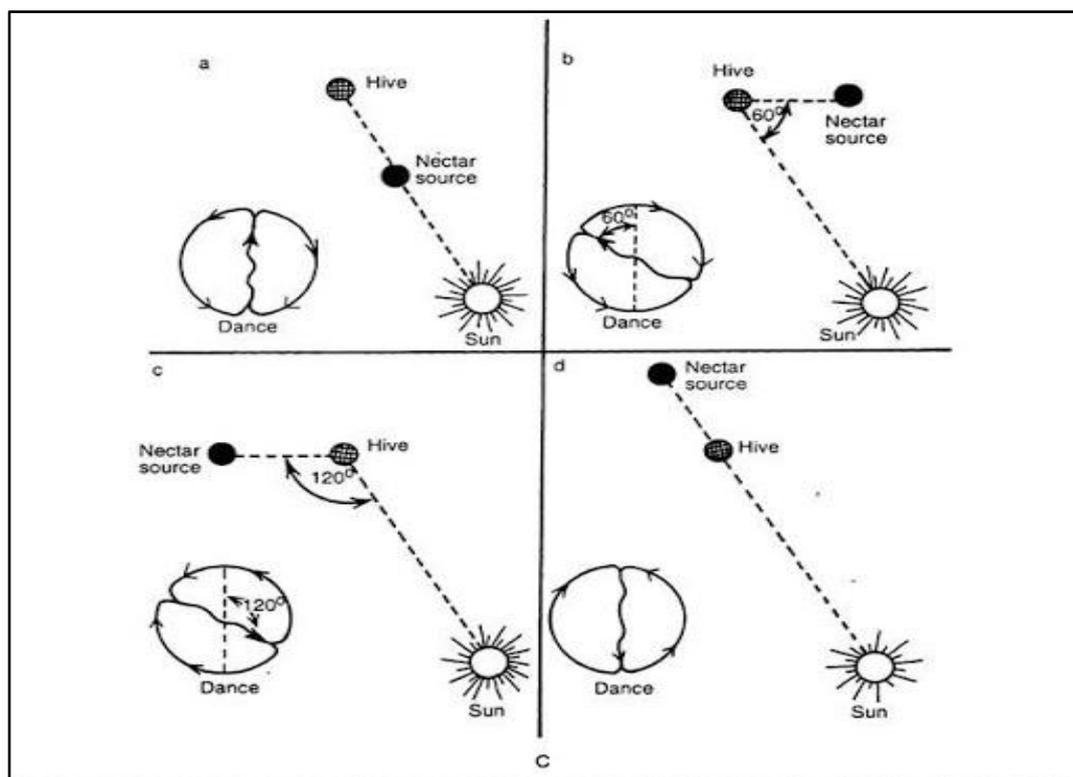


Fig 2: Different types of wag tail dance as per the direction of the food source

References:

Gullan PJ and Cranston PS. The insects an outline of entomology. 4th edition, Publisher Wiley-Blackwell 2010; 183:308-336.

Jones, J. C; Fruciano, C; Marchant, J; Hildebrand, F; Forslund, S; Bork, P; Engel, P; Hughes, W. O. H (2018b). "The gut microbiome is associated with behavioural task in honeybees". *Insectes Sociaux*. **65** (3): 419–429. doi:10.1007/s00040-018-0624-9.

Jones, Julia C; Fruciano, Carmelo; Hildebrand, Falk; Al Toufalilia, Hasan; Balfour, Nicholas J; Bork, Peer; Engel, Philipp; Ratnieks, Francis LW; Hughes, William OH (2018a). "Gut microbiota composition is associated with environmental landscape in honeybees". *Ecology and Evolution*. **8** (1): 441–451. doi:10.1002/ece3.3597.

The Dance Language and Orientation of Bees, Cambridge, Mass., Harvard University Press (1967), a translation of *Tanzsprache und Orientierung der Bienen*.

The Dancing Bees: An Account of the Life and Senses of the Honey Bee, Harvest Books New York (1953), a translation of *Ausdem Leben der Bienen*, 5th revised edition, Springer Verlag.