My Notes

Q.(10) Illustrate circadian rhythm taking the activity of Bee an example?

An.

Circadian rhythms is best illustrated by the activity of bees. In the experiments of bees, Renner reported that bees learn the directions for travelling by using the sun as a compass. He kept the bees in a specific designed room and trained them to leave the hive at a specific time on each day. Such training was given in Paris and bees were taken to New-york during the night. In New-york, these bees were kept in an identical room at that which was in Paris with constant conditions. He observed that bees forage on first day similar to paris timing. When bees were moved to Davis (California) from long Island by Renner, they incorrectly oriented themselves by an angle of 45° because they used sun as a compass. As it is well known that Sun's motion changes by 15° per hour, the sun remained south at 12:00 noon at long Island but at Davis where time was 9:00 a.m. and the sun remained at south-east with 45° differences. Bees have the ability to learn and reset their timing by setting the compass. They initially learn the direction of travel and their compass resolution is about 30° similar to the angle permitted

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by the angular limits of the ommatidium present in the compound eyes of the bees. Bees slowly adjust to the local time of the new place by foraging. It has been seen that biological clocks are the endogenous nature and external stimuli only reset the clock.

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Q(11) What is the usefulness of motivational model in ethology.

A. Good models can help us organize our thinking and can suggest experiments that can test how good they are. If we find that one model consistently explain an animal's behaviour under a wide range of conditions, it may tell a great deal about the principles upon which the animal's nervous system is working. The models however tell us little or nothing about the means of operation about the said behaviour. The nervous system uses a large number of interconnected neurons for its operation and the interpretation of how the principles are put into practice remain a problem for the neurophysiologist.

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(12) Write a note on the advantages of territoriality in wild animals ?

Ans Many hypothesis exist as regards the benifits derived by organisms defending territories and the main points as highlighted by Wallace (1975) are described below -

A) Territories associated with reproduction -
They help in -
- Getting a nesting site.
- Decreases probable disturbance from rivals.
- facilitating pair formation.
- opportunity to the female to select vigrous male.

B) Territories associated with habitat -
This permits increased inbreeding within a population, which serve as a means of readily and intricately adapting to a given local set of conditions.

C) Territories associated with food -
- Facilitates animals to become more familar with the availability of food and water in a habitat
- Providing more time and energy to the animals for searching food and mate
- Getting adequate food for the pair and their offspring.

D) Territories associated with predation and parasitic pressure -
- Provide a good idea of cover location in a habitat.

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- Helps dispersal of animal, escapes from their predatory force.
- It reduces the chances of disease transmission.

In summing up the benifits derived from territories. The advantages gained by a particular species from territories may not hold good for the other species, thus the benifits derived are almost species specific.

Q. (13) Define territory of an animal species. Explain the territorial behaviour of an animals with appropriate example.

Ans. An area occupied more or less exclusively by an animal or group and defended by overt aggression or advertisement is a territory.

Many animals create "sign-posts" to advertise their territory. Sometimes these sign-posts are on the boundary thereby demarking the territory or may scattered throughout their territory. The animal uses various methods for advertising a territory.

Scent Marking → Scent marking, also known as territorial markings or spraying when this involves urination, is a behaviour used by animals to identify their territory. Most commonly, this accomplished by depositing strong smelling substances contained in the urine, faces or from specialized scent glands located on various parts of the body. Often,

the scent contains pheromones or carrier proteins such as the major urinary protein which stabilize the odors to maintain them for longer period of time. Territorial scent marking may involve behaviours specific to this activity. When a wolf marks its territory, it lifts a hind leg and urinates on a scent post (usually an elevated position like a tree, rock or bush). This raised leg urination is different from normal urination, which is done while squatting.

(14) Write notes on Waggle Dance of Bees?

Ans The language of bees have been studied by Karl Von Frisch (1944) for which he was awarded the Nobel Prize in 1973. They show "waggle dance" and "Round dance" to communicate about the location of food and water sources to other individual bees.

When food source is located farther than 250 feet, the round dance is replaced by tail wagging dance (Schwanzeltanz). The liveliness of the dance indicates the richness of the source and the scent points to the specific flower but in addition the information regarding the direction and the distance is also conveyed precisely. In this type of

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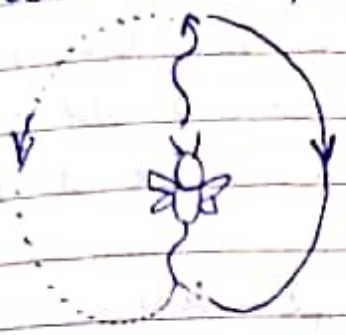
dance the bee runs in a straigth path for a short distance on the face of the hive, wagging its abdomen from side to side and once on the top of the run, it returns back to the starting point in a semicircle and then start on the straigth run once again but would ~~no~~ now make the semicircle on the opposite side. This sequence is repeated



many times. The tempo of the ~~distance~~ dance indicates the distance of the food source from the hive. As the distance increases, the number of complete dance pattern is given time decreases. As for ex.- A bee may complete 15 runs in 30 seconds for a distance of 1000 feet but may do only 11 in the 30 seconds if the food is 2000 feet away. However when the bees which follow this distance move out to look for the food they not only know the distance but also the direction as well. This information about the direction is conveyed taking into account the ~~posit~~ position of sun as reference. The bee while searching for food remembers the position of the sun and when she comes back and performs the dance she orient herself in such a manner that on the straight run of her dance, she keeps the sun on the same side and same angle. This is possible only when the dance is performed on the horizontal surface and most of the time it is performed on the vertical face of the hive

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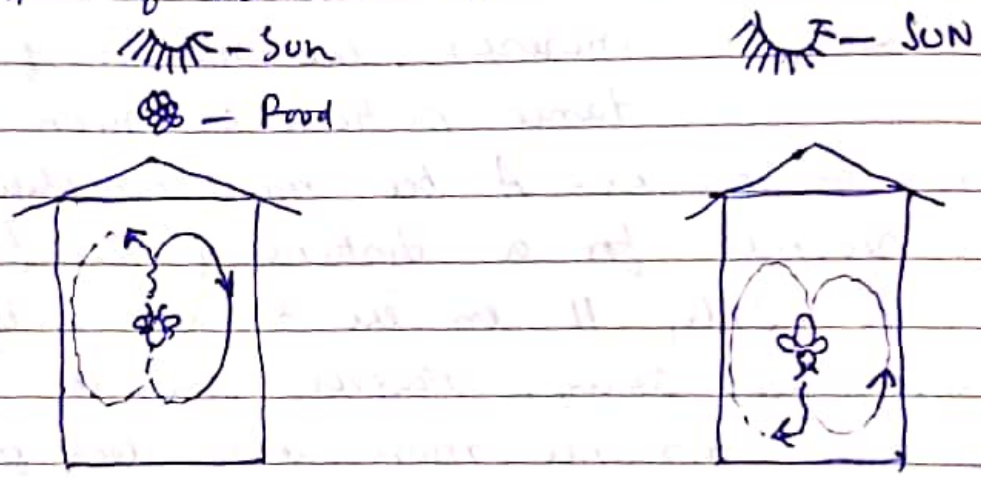
which is also dark. In such a case the angle of the straight run to the vertical, points to the food source. The vertical represents the direction of the sun. If the food is directly in line of sun, then the straight run of waggling dance would be straight up the face of the hive, and if the food is in opposite direction to the sun, then the straight run would be down the face of the hive. but if the food is, say 30° to the right of sun then the straight run would be 30° to right of the vertical.



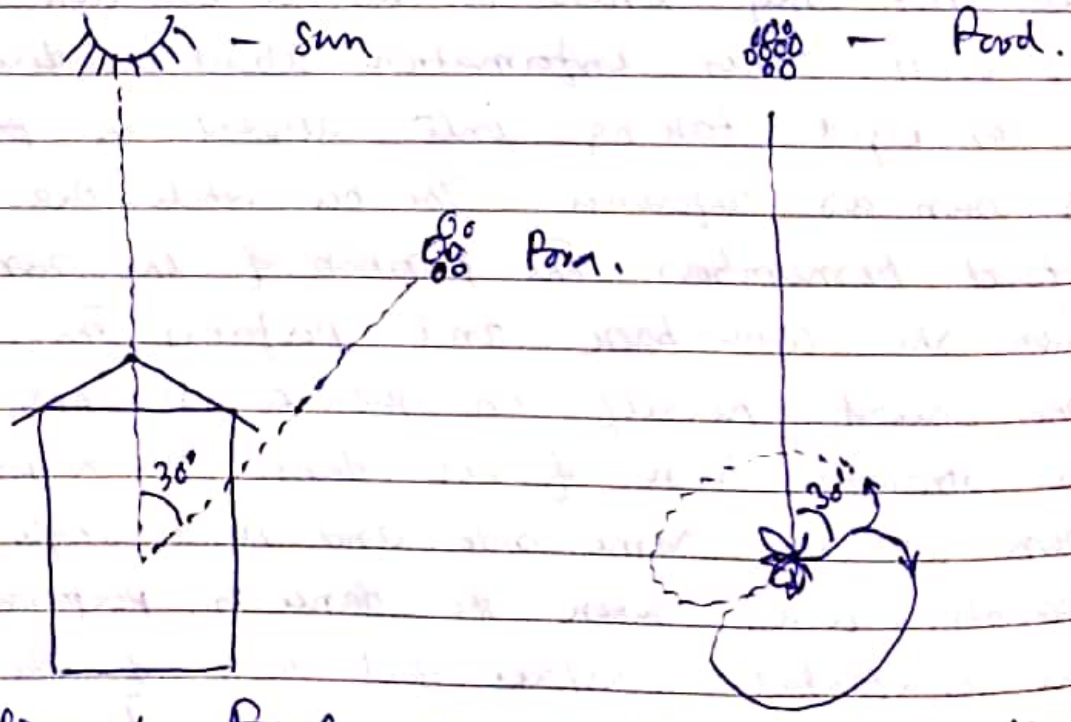


Fig – Location of food source with respect to the direction of Sun.