PHEROMONES

B.Sc. Part I
Dr. Vandana Kumari, R.C.S. College, Manjhaul

Introduction

Pheromones are chemical secreted by exocrine glands. They are released into the external environment. They influence the behaviors and cause specific reactions in the animals of the same species.

- They represent a means of communication, a means of imparting information by smell
- Pheromones are widespread among insects and vertebrates; they are also found in crustaceans but are unknown among birds. The chemicals may be secreted by special glands or incorporated in other substances, such as urine. They may be shed freely into the environment or deposited in carefully chosen locations.
- Pheromones are also used by some fungi, slime molds, and algae as attractants in reproduction; organisms of complementary reproductive cell types grow or move toward each other.

Types of pheromones

- Quick action Pheromones
  - Sex attractants
  - Trail pheromones
  - Alarm pheromones
- Slow action pheromones

Quick action pheromones

- These act in some way on the recipient's neural system.
- Results in quick action or immediate effect on its behavior.

These are of three types

- Sex attractants;
- Trail attractants; and
- Alarm pheromones.

Sex attractants

- These are odorous and volatile substances. These are exuded by the female and are detected by the extremely sensitive chemoreceptors present in the antennae of males of the same species. In response, the males become sexually stimulated and can be drawn towards female from a distance, as great as 4.5 km in some cases.
- Among the sex attractants isolated and identified are bombykol secreted by female silkworms, and gyplure secreted by female gypsy moth. A female silkworm contains on an average 0.01 mg of sex attractant sufficient to stimulate more than a billion males.
- Sex attractants have been tested as possible specific insecticides in biological control. Synthetic forms of such chemicals are used for attracting insect pests which are killed with potent insecticides. If attractants are spread in large quantities over an insect-infested field, the confused males might never find females and mate with them.

Trail pheromones

- Trail pheromones are secreted by the fire ants returning to their nest after finding food, so that other ants can also follow the trail to reach food. These are highly volatile and evaporate within two minutes only so that there is no risk of confusion created by the old trails.
- Similarly, worker bees on finding food, secrete geraniole, to guide other worker bees to the source of food, in addition to their wagging dance.

Alarm pheromones

- These pheromones are released by ants when disturbed. Alarm pheromones are less specific than sex attractants. They have a lower molecular weight. This causes several different species of ants responding to the same alarm substance.

Slow action pheromones

- These pheromones act more slowly and affect growth and differentiation of the recipients. They play an important role in regulating the composition and activities of colonial insects such as ants, bees and termites. Queen bees secrete 9-ketodeconic acid. When ingested by worker bees, it retards development of their ovaries and ability to build royal cells rearing new species. It also serves as a sex attractant for males during nuptial flight.
- In termites, special castes such as queens, kings and soldiers secrete inhibitory pheromones. These pheromones affect the corpus allatum of the nymphs and prevent their development into these specialized castes. If a queen dies, there is no longer any "anti-queen" pheromone released so that one or more nymphs develop into queens. Same happens in case of other specialized castes.
- The males of migratory locusts secrete pheromones which accelerate the growth of young locusts. In mice, if several females are put together in a cage their estrous cycle become erratic. However, if one male mouse is also placed with them, his odour synchronizes the estrous cycles of all the females (Whitten effect).