The following information relates to;

Achievement Objectives

Life Processes, Ecology & Evolution LW 8-1: Understand the relationship between organisms and their environment.

and

Achievement Standard

3.3: Demonstrate understanding of the responses of plants and animals to their external environment.

Honey Bee Co-operative Behaviour

Honey bees show co-operative behaviours. A honey bee hive is also known as a 'super organism'. This means honey bees are mutually dependent and cannot survive or reproduce as individuals outside the hive. Within the hive there are three castes. The only female that reproduces is the queen. All the queen's daughters (workers) are sterile. The queen produces Queen Mandibular Pheromone (QMP) which suppresses the reproductive systems of her daughters. Drones (males) are the queen's sons and only live for about a week. Their sole purpose is to reproduce with a queen from a different hive. So why do female worker honey bees altruistically allow their individual reproductive fitness to be nonexistent?

Evolutionary biologist William Hamilton proposed that the castes found in social insects colonies arose by kin selection linked to genetic relatedness. Drone honey bees develop from unfertilised eggs (parthenogenesis) and are haploid. However, worker honey bees develop from fertilised eggs and are diploid. Sisters are 75% related to each other whereas mothers are only 50% related to their daughters. Thus, sisters will benefit (and pass on more of their own DNA) by helping their mothers to raise more sisters than to leave the nest and raise their own daughters.

Hamilton, W.D. (1964) The genetical theory of social behaviour, I,II. *Journal of Theoretical Biology*. 7:1-52.

Darwin, C. (1859) On the Origin of Species by Means of Natural Selection or The Preservation of Favored Races in the Struggle for Life. Reprinted 1998.

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