

SEGMENT FOUR, LECTURE THREE: BEHAVIOR

[Behavior, continued.] Measuring the genetic determinants of behavior.

Sometimes, single genes can have profound impacts on behavior, such as *fru* (fruitful) in *Drosophila*. Prairie vole pair-bonding behavior depends on a neurotransmitter (vasopressin) released during mating (Fig. 51.17). The receptor for vasopressin is highly expressed in the brains of male prairie voles. Blocking these receptors prevents normal pair-bonding behavior in recently mated males.

Lacewings use periodic wing vibrations as species-specific mating calls. Hybrids between species of lacewings show characteristics of both parents in terms of vibration period and volley times (see Fig. 51.14). These results suggest that multiple genes are responsible for determining mating call behavior.

Altruism/Cooperation - behavior that reduces one individual's fitness but increases another's fitness; E.g. Alarm calling in birds and rodents; sterile workers in social insects and naked mole rats (Fig. 51.27) Altruistic behavior is observed only in social species.

Inclusive Fitness, as proposed by biologist William Hamilton, is defined as the total contribution to the next generation. Compared to the standard definition of fitness, inclusive fitness also includes characters or behaviors that allow close relatives to produce more offspring.

Kin selection - increasing inclusive fitness by greater altruism towards close relatives (Fig. 51.29).

Coefficient of relatedness - The proportion of identical, (and homologous) genes between two individuals (Fig. 51.28).

Hamilton's Rule: selection favors altruism when $rB > C$ where

r = the coefficient of relatedness;

B = the benefit (number of extra offspring) produced by altruism, an

C = the cost (number of fewer offspring) produced by the altruist.

Recall that ecology is the scientific study of the interactions between organisms and their environments. Ecologists study at six different levels (Fig. 52.2):

- organismal ecologists study animal behaviors, such as those above.
- population ecology;
- community ecology (a community refers to all the organisms in a region);
- ecosystem ecology – comprises both organisms and abiotic factors in a region;
Note that biomes are major types of ecosystems: deserts, rivers etc.
- landscapes – areas where different types of ecosystems are adjacent;
- the biosphere is the global ecosystem.