

Basic Knowledge of Evolutionary Theory (2)

Altruistic Behavior

● Darwin's Dilemma

- Will we run out of tasty beef? → Because it will be all eaten away.
- Common problem to all evolution of altruistic behavior
 - e.g., worker ants and bees
 - cf. altruistic behavior: behavior that lowers self fitness and raises fitness of individuals other than self.
- Darwin's finding → heredity through kin with similar traits

● Solutions of Last 100 years

- Later half 20th century: group selection, species selection
 - “Animals behave to preserve their species”
- Anti-group selection ~ began sporadically in 1940's (animal ecology and such)
- Pro-group selection ~ from 1920's USA (Chicago School ecologists), German speaking countries (Konrad Lorenz and animal behaviorists) and Japan (Primatologists of the Kyoto University)

→ There was no logical basis. Somehow the existence of harmony with nature was believed.

- In 1950's, J.B.S. Haldane calculated that his eight cousins were hereditarily equal to himself.
- In 1964 William Hamilton published the concept of inclusive fitness.
- In 1976 Richard Dawkins published “*The Selfish Gene.*”

→ Proposition made : Evolution is a replication process of genes (genetic code)

● What is Inclusive Fitness?

- One's kin shares the same genes as oneself. Thus a rise in fitness of a kin is equal to some rise in the fitness of self.
 - $rb > c$ (r = relatedness between actor and recipient of altruistic behavior;
 c =cost of altruistic behavior; b =benefit of this altruistic behavior)

●Bibliography

Dawkins, R. *The Selfish Gene*: Kinokuniya Publishers (A classic that explicitly explains how the gene is the unit of natural selection)

Williams, G.C. *The Pony Fish's Glow*: Soshisha (The writer is an American biologist who proposed the evolution centering genes; an easy to read introductory text.)

※ Please go to <http://park.itc.u-tokyo.ac.jp/sakuralab/index.htm> for further references.