

From bees, geese and wasps to man

Nobel Prize goes to three noted animal behaviorists

In a surprising departure, the 1973 Nobel Prize in Physiology or Medicine has been awarded to three scientists who pioneered in the study of animal behavior. The coveted award has usually gone to scientists responsible for notable achievements in such areas as molecular biology and basic physiological processes. This year, however, the Nobel Committee of the Karolinska Institute in Stockholm has selected Karl von Frisch, Konrad Zacharias Lorenz and Nikolas Tinbergen, leaders in the field of ethology or the comparative study of animals. The institute noted that "their first discoveries were made on insects, fishes and birds, but the basic principles have proved to be applicable also on mammals, including man." For this the scientists will share \$112,834.

Karl von Frisch was born in Vienna, Austria, in 1886. He is best known for his years of painstaking experiments with bees and his eventual determination of the means by which bees communicate to each other the distance and direction to food. His observations led to the discovery that bees communicate by means of a rhythmic motion or dance. A particular dance, in addition to the odor of nectar pollen which adheres to the insect, indicates the direction and distance to the food. Von Frisch described two types of dance—the circling dance and the wagging dance. In the former, the bee executes alternate clockwise and counterclockwise circles. In the latter, the bee moves forward in a straight line while wagging its abdomen from side to side. The circle dance indicates that the food is within 75 meters of the hive. The wagging dance is used when the food is farther away. The direction to the food is indicated by the direction of the dance in relation to the top of the honeycomb. Von Frisch further found that as the food supply dwindled, the bees slowed down their dance, stopping completely when the food was gone. He also found that each subspecies of bee has a dance that cannot be interpreted by other subspecies. Von Frisch concluded that these dances are inherited rather than learned. Retired, von Frisch now lives in Munich, West Germany.



Konrad Lorenz was born in Vienna, Austria, in 1903. Working at the Max Planck Institute for Behavioral Physiology in Seewiesen, West Germany, Lorenz demonstrated that animals are born with innate patterns of behavior that are the result of natural selection. Most of his work was done with geese and the phenomenon known as "imprinting." Geese, Lorenz found, are imprinted or programmed to follow the first moving object they see after hatching. Under normal circumstances the moving object would be the goslings' mother but Lorenz was able to imprint geese to follow various inanimate objects (balloons and boxes) as well as himself. Lorenz's work with the early life experiences of birds has been a stimulus to other researchers. Most notably, research with young primates has shown that conditions such as isolation or overcrowding can lead to psychotic behavior in adult animals (and humans). This research, the Nobel committee said, has led to important results for psychiatry. Extending his theories of innate behavior patterns to humans, Lorenz published *On Aggression* in 1963. In this controversial book he argued that aggression is programmed into human beings the way instinctual behaviors are genetically programmed into other animals. Lorenz is associated with the Institute for Behavioral Research in Gruenau, Austria.

Nikolas Tinbergen was born in the Hague, Netherlands, in 1907. "One of Nikolas Tinbergen's most important contributions is that he has found ways to test his own and others' hypotheses by means of careful and quite ingenious experiments," the Nobel citation said. Learning from both von Frisch and Lorenz, Tinbergen did a series of studies on the landmark orientation of homing wasps. Strange work for a man who wrote that, "As a child I thoroughly disliked insects and always suspected that, apart from crawling over one's skin, they all might bite or sting." Tinbergen's later work was with sea gulls. His observations led to confirmation of Lorenz's theory of the inheritance of instinctive behavior. Tinbergen's experiments, however, pointed out that learned behavior is often as necessary to survival as instinctive behavior. A bird called the oyster catcher, for instance, will instinctively peck at anything it sees. Only by watching the mother do these birds learn to confine their pecking to oysters and other shellfish for their food. After years of observation of animals, Tinbergen has recently extended his theories to the human race. Animals, he says, are reluctant to kill their own kind, particularly when confronted with facial expressions of appeasement. Humans, using long-range weapons, do not have this natural restraint against killing. Tinbergen is at Oxford University.

