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Generic Characters Viewed from Animal Behaviors¹⁾

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In animal classification genetic data are first of all valued, but morphological features are universally used, because these are the most convenient for this purpose. On the other hand, some ecological and physiological evidence reveals often specific relationships of animals. It is generally known that some insects adhere to a special food; e.g. some butterflies choose leaves of the special plants and some wasps hunt the definite prey for their larva. The parasitic animals generally pursue after their specific hosts. Not only food-habits but also mating behaviors are peculiar to some species of insects. About them Schneirla (1953) gives summaries under the two titles; Contributions of Heredity to Insect Behavior (p. 665) and Reproductive Behavior as Species Characteristics (p. 676) in the book, Insect Physiology edited by Roeder. These specific habits can be often observed in the vertebrates. In this paper the writer wants to enumerate several remarkable behaviors which will be ascertained as generic characters for animals.

Thanks to K. v. Frisch and his school, it has been proved that the honey bee uses the two sorts of dances, one round dance and the other wagging dance to announce food sources and new nesting sites to other members in the hive. These dances are special for all honey bees belonging to the genus *Apis*, though slightly different in species and races. The European species, *Apis mellifera* and Asiatic species, *Apis indica* can mostly communicate each other by the dances, when they are brought into the same hive. The *Apis* species such as *Apis mellifera*, *A. indica*, *A. florea* and *A. dorsata* perform all these dances, but the related genera *Melipona* and *Trigona* do not dance but communicate in simpler behaviors. The dances seem to be a peculiar behavior to the genus *Apis*.

In the lower vertebrates, such as fishes and amphibians, comparative studies of chromosomes and interspecific or intergeneric crosses are often used to testify their relative affinities between animals as the genetic method. But ecological or physiological studies for this purpose seem to be rather rare. In 1941 v. Frisch published an interesting work on an alarm substance (Schreckstoff) of a freshwater fish. When an injured minnow, *Phoxinus phoxinus*, was placed among its school, they would exhibit the alarm reaction. The school would concentrate immediately and seek a cover or flee. The alarm reaction is

1) Dedicated to the 65th birthday of Prof. Dr. B. Rensch.
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provoked by a repellent substance derived from the injured skin, which gives an impulse to the olfactory sense of the minnow. The skin extracts obtained from other fresh water fishes were compared with that from the minnow. The extracts from 18 species belonged to families other than the Cyprinidae showed no effect on the minnow, but those obtained from other Cyprinidae were active in general, though different in degrees by species. Frisch gave a list of reciprocal reactions on 24 species of fishes. Among these fishes used in the experiment *Leuciscus meidingeri* and *Telestes agassizi* indicated nearly the same strong reaction as *Phoxinus phoxinus*. The grades of reaction of these fishes seem to correlate in some way with the genetic relationships to the minnow. The physiological reaction may be a clue to check the morphological classification of fishes.

Concerning birds, many interesting specific habits are reported by field observations. It is well known that the birds belonging to the genus *Cuculus* lay their eggs in nests of several passerine birds in order to have their eggs been reared by these passerine birds. The following remarkable cases were given to the writer through the kindness of Dr. N. Kuroda. There are reported 24 species of shrike (*Lanius*) in the world. So far as is known, the species of the genus *Lanius* distributed in Japan, North America and Europe have the behavior of offering, that is to pierce and preserve their preys, such as insects, amphibians, small reptiles or small birds, in twigs or spines of bushes. The jay, *Garrulus*, conceals acorns and the nutcrack, *Nucifraga*, inhabiting in high mountainous districts or in boreal regions hides its food in some places during the snow season. The woodpeckers, *Melanerpes formicivorus* and *M. erythrocephalus* both distributed in North America, have both a behavior to push acorns into a pit which was perforated in advance.

From the ancient time it is in Japan generally known that the domestic cat is attracted to the plant *Actinidia polygama* which is commonly found in this country. The plant is used commonly as the best remedy for domestic cats. In reality, the cat is very active to the plant and indicates a special behavior. All parts of the plant are effective to the cat, such as the stem, leaves, flowers and fruits. People say that fruits with insect galls are the most influential on cats. Among cats, the strong male are most active, the female next to them, while the young before sexual maturity are quite indifferent to the plant. When cats come across the plant, their behaviors are in general as follows: they sniff at first, then lick and bite. After that they rub their body to the plant, turn on their backs and rub their shoulders on it. In this state they become fascinated and slaver from the mouth opened. Sometimes they enter the state of flehmen. In 1943 Hazama carried on the experiment with the plant on several large wild cats, such as *Felis leo*, *F. tigris* and *F. pardus*. He obtained in the experiment the results not different from that observed in domestic cats, *F. domestica*. These large wild cats are often entitled to the genus *Panthera* which belong to the genus *Felis* in wider sense. The plant *Actinidia polygama* has special effects on the genus *Felis* but other species belonging to the genus are not effective on *Felis*. In respect to the behavior of cats, the

writer remembers the similar behavior of house dogs, *Canis familiaris* for the fatty acids (decayed corpses of animals). The fatty acids are probably also influential to species belonging to the genus *Canis*.

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