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VARIETIES OF ADAPTATION IN THE INSECT WORLD

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Abstract:
Adaptations are an example of an idioadaptive direction of evolution, through which organisms strive to win the struggle for survival. This article discusses the process of adaptation in the insect world, its varieties, the role of adaptation in insect life.

Keywords: adaptive, morphological, ethological, physiological, biochemical, entomological, pheramone

Adaptation means that living organisms live and produce offspring in a certain environment. Adaptation is inextricably linked to the viability, competitiveness and ability of organisms to produce normal offspring.[1]

All organisms on Earth have different adaptations to survive in the external environment and leave behind offspring. Animals also have various adaptations to survival in the external environment, and this condition is expressed not only in their structure or color, but also in their habits, instincts and behavior-a state of intimidation when they feel threatened, parental and nesting instincts, nesting instincts, arrivals and departures of birds, as well as in caring for food. Accordingly, adaptations are divided into groups: morphological, physiological, biochemical, ethological.[2]

For example, in morphological adaptations, the color and shape of the insect's body are diverse and have an additional color of the environment, sometimes similar to the shape of objects. This similarity allows them to escape from their enemies or catch their prey without even realizing it. For example, a butterfly caterpillar can remain motionless for more than an hour, clinging to the horn with its hind legs and lifting the front part of the body in case of danger. The appearance of the beetle, common in South America, resembles animal excrement. Morphological adaptations, in turn, are divided into such varieties as protective coloration, mimicry, and camouflage. The protective coloration of insects consists of useful adaptations that have arisen as a result of long-term natural selection in nature. Thanks to this adaptation, insects that do not have means of protection will be able to hide from their enemies, which means they will be less conspicuous to predators. It cannot be said that protective coloring and camouflage always scare insects away from the enemy. However, adapted organisms die less than non-adaptive ones.[2]

Adaptation in the organic world can occur both within the organism and within the species. Adaptation of organisms is first of all clearly manifested in morphological features. Insect protective coloration, warning coloration, distracting coloration, mimicry are examples.[1]

During the XX century, a huge amount of material has been accumulated on the entomofauna of the world; isolation of hormones of the central nervous system of insects (Polish scientist S. Kopec, 1917), excretory hormones—ecdysones (A.Butenand, 1954), juvenile hormone controlling the development of insects (K. Williams, 1956). By the 2nd half of the XX century, the discovery of pheromones secreted by insects and controlling their behavior (German scientist A. Butenand et al.) stimulated interest in the study of insect behavior. The discovery of the language of bees in the middle of the XX century (German zoologist K. Ethology has become one of the leading branches of entomology.[3]

The first major studies in the field of insect ecology were conducted by American scientists V. Shelford (1913) and R. Associated with the name of the champion (1931). German scientist G. Blank (1922) investigates the interaction of insects with their habitat and shows that their development is related to temperature. Norwegian biologist K. Fegri (1975) summarizes the complex relationship between insects and entomophilic plants.

In conditions of overcrowding of people, their behavior, morphology, appearance, physiology, habits and ecology change gradually (over several generations), this change is called a phase change. During the transition from a single phase to a group, locusts do not behave in isolation, but eventually form dense groups of adults and flocks. The change in this phase occurs after suitable environmental conditions (a sufficient number of plants for nutrition and planting, appropriate soil moisture for laying) allow the offspring to successfully reproduce, low natural mortality and an increase in numbers. Changes accompanying phase shifts include:

Behaviour. In a single phase (small number and density) grasshoppers behave individually. At the group stage, they form dense and highly mobile (Walking) bunkers and flying swarms of adults (winged grasshoppers) that behave like creatures.

Biology. This biased behavior is reinforced by the synchronization of biological phenomena: mating, egg laying, hatching, egg laying. Thus, the eggs hatch from dense egg deposits at the same time, and the newly appeared bunkers immediately form primary lines; after escaping, young individuals form a swarm.

Morphology. Some morphological changes accompanying phase shifts improve the ability of grasshoppers to fly long distances (a good ratio between the wing surface and body weight). Sometimes grasshoppers may have other changes in shape (for example, pronotum) and color (general body pattern). In the solitary phase, grasshoppers exhibit sexual dimorphism, females are larger than males; differences in size between the sexes are less noticeable and can sometimes be lost in the group phase.

Physiology. Usually females of some species lay fewer eggs, but these eggs are larger and hardier. Habits. Grasshoppers are able to change their ecological and food habits, so they settle and reproduce in vast habitats. The direct consequence extends to areas of distribution that are much larger compared to the invasion (individual populations). The most famous example of the ability to migrate and inhabit a wide range of habitats is the desert locust [schistocerca gregaria (Forskål 1775)], which existed during the recession (about 16 million square kilometers) in about 30 countries. During the plague (about 29 million square kilometers) it has spread to parts of 60 countries.

Insects are strongly influenced by temperature, humidity and light. The insect's body temperature is constantly changing depending on the ambient temperature. Most insects are activated at temperatures from 100 to 400C, but their vital activity increases significantly when the temperature reaches 20-300C. When the temperature rises, then decreases, the activity of insects, and with it the processes of vital activity, fade away. For any species, there are limited lower and upper temperature values, below or above which insects do not develop.

Adaptations in organisms are not absolute, but relative, for example, moths, despite death, fly towards the fire. The instincts in them attract fire because they collect nectar from flowers that are clearly visible at night, mostly white.

Summing up, we can say that adaptations are an opportunity to survive not only in the insect world, but also in the life of whole organisms.

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