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INSECTS IN RESEARCH AND PRACTICE – INTRODUCTION

Insects are the largest and extremely diverse taxonomic group. It is enough to recall in mind the image of the Old World swallowtail, the common house mosquito, the European mole cricket, the honey bee, the great diving beetle, the human flea or many others belonging to about 30 orders of arthropods, which are part of the Class Insecta. They developed the ability to fly actively, which gave them the opportunity to occupy ecological niches inaccessible to other groups of invertebrates, as well as great potential for protection against predators and for specialization. As a result, they have adapted to life in very diverse environments. They can be found practically everywhere, on land, in water, in the air, in soil. Insects live singly or in groups. The latter include Hymenoptera – very well known to all bees and ants, which form social systems, displaying complicated patterns of behavior and intra-population interactions, or the much less known in this context flies of the biting midge family. Phenomenon of diapause gives insects a remarkable potential to survive even extremely difficult environmental conditions, prevailing during severe winters or very hot and dry summers.

Insects are excellent models for studying physiological and molecular processes, for instance the wax moth, *Galleria mellonella* (Lepidoptera), used to study immunological mechanisms, or commonly known the fruit fly, *Drosophila melanogaster*. On this species, studies are carried out on processes characteristic of insects, such as the participation of juvenile hormone and ecdysteroids in the regulation of development and metamorphosis or reproductive processes, as well as many much more common and universal mechanisms. These studies allowed to make spectacular scientific discoveries. The importance of many of these achieve-

ments is attested by the Nobel Prizes awarded for them. Probably only few readers know that as many as 6 of these awards, in the field of physiology or medicine, were received by scientists for the discoveries made on *D. melanogaster*. The earliest breakthrough in this prestigious achievement was the role of chromosomes in inheritance. It was received in 1933 by the American biologist Thomas Hunt Morgan. Another Nobel Prize, for the discovery of mutation induction using X-rays, was awarded in 1946 to the American zoologist Hermann Joseph Muller. In 1995, Edward Lewis, Christiane Nüsslein-Volhard and Eric Wieschaus were honored for discovering the mechanisms of genetic control of early embryonic development. Another award, in 2004, went to Richard Axel and Linda Brown Buck, for discovering olfactory receptors, describing the organization and explaining the molecular mechanisms of the olfactory system. In 2011, the Nobel Committee awarded the French immunologist Jules Hoffmann for discovering the mechanisms of innate immunity activation. The last one was granted in 2017, described in more detail in this monograph, which concerned the discovery of the molecular mechanism controlling circadian biological rhythms, including the role of the *period*/Period gene and protein, one of the key elements of the molecular oscillator. It was received by American chronobiologists, Jeffrey Hall, Michael Rosbash and Michael Young.

In addition to their enormous „contributions“ to science, insects can be excellent criminal assistants as indicators of the time of death based on a qualitative and quantitative analysis of the entomofauna found on the corpse. They are also extremely important from an economic point of view because, as a rich source of protein, they are part of the regular diet of

about 2 billion people on Earth. On the other hand, some species are a serious threat as pests of forests or crops, but in themselves they simply occupy rich niches in which they can exist. Insects are also vectors for many parasites and pathogens in humans, animals and plants. As a result, serious diseases such as malaria, yellow fever, hemorrhagic fever or Chagas disease spread through them.

The presented monograph displays only a small, but I hope, interesting area of research on insects for the Readers. I would like to

thank all the Authors whose articles were included in its composition and the Reviewers for the substantive evaluation of works. I would also like to thank Dr. hab. Annie Wasik, Secretary of the Editorial Board, for great cooperation, and the Editor-in-Chief of the Kosmos quarterly, Professor Krystyna Skwarło-Sońta, for the invitation to edit an issue entirely devoted to this fascinating group of animals.

