Zebra mussel *Dreissena polymorpha* (Pallas, 1771) is an invasive bivalve coming from the Black and Caspian Sea region, living in brackish and fresh waters in almost entire Europe and in the eastern part of North America. It ranks among 10 most dangerous invasive species in the world, but in Poland it is regarded as a post-invasive species, which is currently an important component of the bottom fauna. Most studies on the zebra mussel are focused on understanding its high invasive potential. Almost all scientists focused on the development of effective methods to prevent the spread of this species. These actions are fully justified by gigantic financial losses, which are generated by this species destroying hydro-technical installations, overgrowing ship hulls and accelerating their corrosion. This species is also a threat to the environment because it displaces native species and transfers pathogens. On the other hand, more and more scientists start to perceive zebra mussels as a potentially almost perfect "natural tool" for protection of water quality. There are attempts to use *D. polymorpha* in the process of restoration of water bodies, treatment of wastewater and bioindication, by virtue of its ability to accumulate contaminants and pathogens. Certainly, it is one of the best known species of bivalves in terms of anatomy, physiology and behaviour. However, there are aspects of the biology of *D. polymorpha*, which still have not been given much insight, although, paradoxically, may be some of the most important aspects of the functioning of the mussel.

The main aim of this research is to understand how the zebra mussel reacts to various abiotic (flow rate, light intensity, temperature, salinity) and biotic (increased densities of conspecifics, the presence of kairomones of predator, alarm substances and species which inhabit the colony of *D. polymorpha*) environmental factors with its valve movements (opening and closing the shell). It is the fastest noticeable behavioural response, closely related to the most important activities of mussel life (nutrition, respiration, excretion, attachment to the substrate, reproduction or receipt of chemical signals from the external environment). We assume that *D. polymorpha* is capable of specific reactions to various factors, which may lead to different patterns of valve movements. We are going to record the reactions of mussels (with shells marked with colour markers) and analyse their behaviour by using specialised software that allows to read and analyse a number of valve movement parameters, such as the degree of the opening of shells, the number of openings and closings of defined characteristics (inter alia duration, rate, amplitude), and a number of complex sequences of various events.Our research will allow to check if specific valve movements are associated with reactions to stress conditions, which result in a better adaptation of the bivalve to its environment. Therefore, we suspect that they may also reflect the quality of the environment. A comprehensive knowledge of the factors affecting valve movements will allow to understand the biology of these mussels and their functioning in the environment. Nevertheless, most of the conducted research on the zebra mussel behaviour has overlooked this aspect.

Exploring the behaviour associated with the opening and closing of valves has been proved to be useful for humans, as evidenced by the early warning system against pollution, which uses a variety of reactions of mussels to chemical substances of anthropogenic origin. Similar experiments were conducted on other species of mussels (inter alia the blue mussel *Mytilus edulis* ) and the majority of them concerned the effect of chemical pollution, often very toxic to aquatic ecosystems. However, mussels also change their behaviour under the influence of natural factors, such as temperature or the presence of predators, which are neutral from the point of view of the detection of pollutants. However, there is no study dealing with this topic in the current scientific literature. It is therefore necessary to conduct basic research, which will show reactions of *D. polymorpha* to factors naturally occurring in their environment. Our research will provide detailed information about a new aspect of the behaviour (valve movements) of the zebra mussel, which is an important species from an economic and environmental point of view. They may also contribute to explanation of the success of *D. polymorpha* in the colonization of new environments. Furthermore, our results will be the first in this field and will complement the knowledge of the missing aspect of behaviour of *D. polymorpha*, useful for calibration of early warning systems based on its behaviour. Our research may also shed new light on the results of previously conducted experiments.