Nanoparticles are particles of size under 100 nm. To realize how small these molecules are, we can compare them to invisible to our eye microorganisms, which, compared to nanoparticles are real giants. Natural nanoparticles have been always present in the human environment - they can arise, for example, as a result of volcano eruptions or fires. Because of very attractive physical and chemical properties of nanoparticles, in the fifties of the last century, a new branch of industry developed – nanotechnology, that is focused on nanoparticles production technology and the use of artificial nanomaterials in the industry. One of the very promising nanoparticle is graphene oxide (GO), which is considered the "molecule of the future". The progress of science and technology over the years has resulted in a real boom in the use of nanoparticles (including graphene oxide), in many fields, from the textile, electronics, waste treatment, ending with pharmacy and medical use, for example as carriers of anticancer drugs. Unfortunately, such a wide use of nanomaterials certainly leads to their penetration into the environment, which raises serious concerns of scientists. It is already known, that nanoparticles have a negative effect on organisms and contribute to the formation of serious damage to cell structures, most probably through the production of free radicals. Impaired cell functioning leads to disturbance of homeostasis and improper functioning of the whole organism. From the scientific point of view, it is very important to determine what is nanoparticles mode of action and their fate in the body. An important aspect is also the possible accumulation of these molecules in organs, which may increase the potential toxicity. Reproduction, understood as the issue of fertile offspring and the transmission of genetic information, is a strategic goal for maintaining the continuity of each species, and is part of the definition of the species. Homeostatic disorders, leading to the impairment of this important process, or its complete inhibition, can have dramatic consequences not only for the species that is exposed to a specific factor, but also for many other species associated with food chain relationships. Thus, the consequences introduced by any xenobiotic at the selected stage of the food chain may have consequences for the whole environment. Knowledge about the impact of nanoparticles on the environment is still quite limited, so it is necessary to carry out research on how they affect the basic structures of the body/cells, including DNA and RNA, which are carriers of genetic information, and proteins that are the basic building structures of the body. Another necessary aspect related to the toxicity of nanoparticles is to determine whether there are methods that can help to prevent or reduce the negative effects of nanomaterials. An interesting agent, that may have the ability to eliminate or decrease the harmful effects of nanoparticles seems to be ascorbic acid, popularly known as vitamin C. Ascorbic acid is a well-studied diet supplement, which thanks to its strong antioxidant properties, contributes to the improvement of the body's functioning on many levels. It is known for reducing the risk of disease, is involved in the activation of enzymes important for metabolic processes or even may contribute to faster wound healing. It is worth to investigate, whether its health-promoting effects on the body can endure adverse effects of nanoparticles or even protect the body against their toxic effects.

The main objective of the project is to assess the effects of long-term exposure to graphene oxide nanoparticles (GO) in food, and to assess their impact on reproductive potential (at the molecular level) in the *Acheta domesticus* model species, as well as estimating the potentially protective effect of vitamin C supplementation on improving the condition of the organism of the house cricket subject to GO intoxication.

In order to achieve the project's goals and verify the hypotheses set in it, a number of experiments will be carried out:

- Monitoring the quality and number of eggs laid: number of eggs laid by females per individual, and chemical composition of eggs (ratio of lipids, protein and carbohydrates)
- Assessment of basic health parameters of cells: cell viability level and oxidative stress level - production of reactive oxygen species (flow cytometry)
- Assessment of reproductive potential at the molecular level: examination of vitellogenin genes expression profiles and proteins, which are the basic nutrient for developing embryos in the egg and determine their proper development (Western Blot, ELISA, RT - PCR)
- Assessment of oxidative stress at the molecular level: investigation of the influence of free radicals on cell aging processes - free radical theory of cell aging (estimation of telomere length and telomerase activity).