Beet armyworm (*Spodoptera exigua*) is a polyphagous pest occurring in many countries of Asia, Japan, Europe, America and Australia. This species feeds on more than 50 species of plants and appears everywhere it finds host plants and climate conditions suitable for development. Scientists worldwide tried using various treatments to fight this pest, but it is still a serious problem for agriculture, as it causes significant damage to crops causing economic losses. This is one of the main reasons why scientists around the world are interested in this species. In the past, this insect occurred mainly in warm climates, in places with relatively small temperature fluctuations during a day. In Poland, in Upper Silesia and other regions, many species of butterflies which are crop pests live in contaminated areas and demonstrate cross-resistance to pesticides. This could mean that individuals living in contaminated areas can be more resistant to a variety of xenobiotics. Over eight years ago in the Department of Animal Physiology and Ecotoxicology, Faculty of Biology and Environmental Protection, University of Silesia in Katowice we began a breeding program of *Spodoptera exigua* towards the selection of individuals resistant to sublethal concentrations of cadmium. The breeding, conducted in stable laboratory conditions, allows to create an excellent research model, because it allows us to check the stress-response mechanisms of an organism to a particular factor or to combined factors. It is well known that cadmium generates oxidative DNA damage. Therefore, in individuals coming from the cadmium strain, a lot of damage should be observed. Our research, conducted by the NCN project, shows that insects from the selected strain have good reproduction and grow parameters (comparable to individuals from the control strain). However, these parameters have been changed when additional stressor was imposed. At the molecular level there are a number of differences between the strains, eg. expression level of selected genes or DNA repair rate. These results encouraged us to hypothesize that insects selected toward resistance to cadmium develop a metabolism that allows them to develop and reproduce normally in such conditions.

The primary purpose of this study is to determine what role did prolonged selection toward cadmium resistance in housekeeping genes expression and expression genes responsible for DNA repair play in the population of *S. exigua*. To achieve the project aims and attempt to verify our hypothesis, the following will be performed for both strains:

- housekeeping gene expression analyses (also under influence of additional stressor),
- oxidative DNA damage level measurements,
- DNA reparation rate check after treatment with H_2O_2,
- estimation of DNA methylation in selected genes with lower expression,
- sequencing of selected gene fragments.

This analysis will allow to find out, at the molecular level, the mechanisms that determine the survival and good reproduction of selected insects important for humans. In the context of heavy metal environmental pollution, they are important factors that can explain the formation of cross-resistance mechanisms.