According to European Chemicals Agency microplastics are very small, solid particles composed of mixtures of polymers, functional additives and residual impurities. Pollution of freshwaters with microplastics include: primary microplastics from resins used in the industry and secondary microplastics generated during fragmentation of larger pieces. Despite the increasing scientific papers on plastics in the environment, the research on microplastic aging remains limited. Ingestion of micro- and nanoplastics has been observed in many species of invertebrates, especially in filter feeders crustaceans and mussels. The changes caused by the aging process may affect their biological activity and the sorption processes. Microplastics have been suspected to act as a vector for hydrophobic organic compounds through the sorption of toxic contaminants and release additives. The number of papers have been published on the sorption of polycyclic hydrocarbons, selected pharmaceuticals and personal care products. However, no research has been found on the interaction of microplastics with antidepressant pharmaceuticals. Antidepressants are one of the most important group of drugs released to surface waters. They affect aquatic organisms at low levels in a range of several μg/l. Moreover, the consumption of the antidepressants increased rapidly worldwide due to the global epidemy of depression.

Protozoa play an important role in aquatic environment as primary consumers. Filter feeding ciliates feed on bacteria, suspended organic matter and phytoplankton and constitute a link in the food chain from bacteria to metazoans. They are potentially important vehicles for the delivery of toxicants, including microplastics into the food web.

The first goal of the project is the assessment of the acute and chronic toxicity of different kinds of microplastics (polystyrene, terephthalate and polyvinyl chloride; colorless and colored) towards ciliated protozoans *Spirostomum ambiguum* and *Tetrahymena thermophila*. Both pristine and aged plastics will be assessed. The microplastics will be aged in an weathering system - accelerated aging apparatus SUNTEST CPS+ from Atlas and during 6 and 12 months storage in climatic chamber. We hypothesize that inert particles are ingested by the protozoans and may affect their life functions: feeding behavior and growth rate. We expect that aging and weathering of the plastics influence on the toxicity by changing the composition, shape and physicochemical properties of the particles. In the ingestion/egestion test protozoa will be immobilized and observed under KEYENCE VHZ 700 microscope.

The second goal of the project is the assessment of the influence of microplastics on the toxicity and bioaccumulation of antidepressant pharmaceuticals (fluoxetine, sertraline, paroxetine and duloxetine) in the protozoans. Our previous studies indicate high sensitivity of *S. ambiguum* to sertraline and other antidepressants. We hypothesize that microplastics may serve as vectors enabling toxicant transport into cells and this process depends on the plastic type and environmental conditions, especially pH and ionic strength. In parallel to the bioaccumulation, sorption and desorption of antidepressants on microplastics will be analyzed in different pH. We hypothesize that drugs sorbed in water may be desorbed in acidic food vacuoles. The trace analysis of antidepressants in water and in the protozoans will be performed with UPLC-MS/MS.

The superiority of this project lies in application of two ciliated protists: a very large *S. ambiguum* and a small *T. thermophila* differing in metabolic and growth rate. Moreover, particles not perfect, but real shapes, obtained from real products, pristine and aged will be used in the research. Finally the interactions between inert particles and antidepressant pharmaceuticals will be assessed, which will help determine the fate of these class of pollutants in water.