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# Biological and chemical analysis of micronized beach plastic from Baltic Sea

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## Abstract

The rising presence of plastic debris along with chemical pollution in aquatic environments caused increasing concern regarding potential impacts on human and environmental health. Apart from physical effects, plastic particles contain toxic additives, and these particles adsorb various chemicals present in the surrounding environment. Upon reaching in the living organisms' gut these chemicals may leach-out leading to adverse effects.

Beach plastic was collected from Gotska Sandön Island, situated in the Baltic Sea, south-east of the Swedish mainland. The samples were cleaned, and polymer type characterization was conducted using a fourier transform infrared (FTIR) spectroscopy. Each polymer was grinded separately and sieved into various sizes by using steel sieves. For size characterization a Multisizer Coulter counter III (MSIII) was used. Each particle size group was extracted separately with a mixture of organic solvents.

For the measurement of the mechanism-specific hazard potential, the plastic extracts were screened with different Chemical Activated LUCiferase gene eXpression (CALUX) bioassays for agonistic and antagonistic activities for various nuclear hormone receptors (estrogenic, androgenic, and thyroid), aryl hydrocarbon receptor (AhR) and for mutagenic response i.e., P53. Preliminary results indicate high estrogenic and AhR potencies in various extracts, which were selected for further biological and chemical characterization to identify causative compounds responsible for observed effects.

Complexity of samples will be reduced by using gas chromatographic- (GC-) fractionation with parallel mass spectrometric (MS) detection system and obtained fractions will be biologically analyzed. Furthermore, bioactive fractions will be chemically screened by using quadrupole-time of flight mass spectrometry linked to gas chromatography (GC-QTOFMS).

**Keywords:** beach plastic, microplastics, CALUX, GC, MS

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