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Available PhD position

Application deadline March 31, 2021

Studying the long-term effects of the nuclear Chernobyl accident on a radiosensitive plant, Pinus sylvestris, using a multi-level-omics approach

Following the nuclear accidents in the Chernobyl (1986) and Fukushima Dai-Ichi (2011) nuclear power plants, vast areas of land were contaminated with radionuclides, leading to a long-term exposure of the environment to enhanced levels of ionising radiation. In the highest contaminated forests in Chernobyl, located to the west of the Chernobyl reactor, a massive death of Scots pine trees (Pinus sylvestris) was observed shortly after the nuclear accident.

In this PhD research project we will investigate the hypothesis that radiation leads to a disturbed hormone balance or transport which in turn will lead to morphological changes in Pinus sylvestris and that epigenetic changes may lie at the basis of the disturbance of the plant hormone balance or transport.

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Long-term consequences of exposure to nuclear accident relevant radionuclides in Lemna minor from (epi)genetic to community level effects

This research concerns long-term effect studies (over multiple generations) at different levels of biological complexity (from molecular to population and community level) in a duckweed species (Lemna minor) exposed to environmental relevant concentrations of different genotoxic radionuclides (^{137}Cs, ^{90}Sr) linked to possible nuclear accidental scenario's.

This PhD will take the results of previous studies further by testing the response of a set of potential biomarker genes as well as changes in (epi)genetic marks in exposure scenarios relevant for studying the long term effects of a nuclear accident on the environment. For the first time the response of Lemna minor plants collected alongside a gradient of contamination will be compared and studied at different levels of biological complexity including in a small food chain.

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Impact on changing soil conditions following inundation on radionuclide and heavy metal (re)mobilization and the interplay with the soil microbiome

The Grote Nete River is the main collector of the Nete Catchment.
Radionuclides and metals can exert a persistent pressure on the soil ecosystem.

This project aims to explicate the effects of flooding on the organic and mineralogical geochemistry and on the microbial community, and to understand the impact of related chemical and microbial processes on the (re)mobilization of radionuclides and metals through a thorough understanding of the interplay between the soil microbiome and the ongoing geochemistry. According to the Sigmaplan, reed will be introduced in the flooded areas, and therefore we will link the chemical and biological processes to the transfer to reed plants. Furthermore, this project will assess the ecological impact of long-term radionuclide and metal contamination and predict the ecosystems response to changing conditions.

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