

Polycyclic Aromatic Hydrocarbons on Urban Scottish Mosses

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Polycyclic aromatic hydrocarbons (PAHs) and their alkylated homologues are a key measure of air quality in urban environments because they can be carcinogenic and mutagenic. Mosses are ubiquitous in urban environments as they grow on soil and other surfaces, including rocks, trees, and many common building materials. The ubiquity of mosses (planned or unplanned) across many urban locations, elevations and habitats means that mosses act as sinks for PAHs in various forms (aerosols, particulates and even water phases)[1]. To understand how mosses accumulate harmful PAH and may help protect urban atmospheres, naturally growing mosses collected from Scottish cities and their PAH content determined. Here we report data for twenty samples of moss collected from Aberdeen and compare PAH concentrations of mosses to their host substrates. It found that phenanthrene, fluoranthene and pyrene (average of 13 200, 8 200 and 7 600 ng/g, respectively) are the most abundant PAH on urban Scottish mosses. However, the concentration of PAH varies based on the growth habit of the moss; for example, epiphytic mosses have greater proportions of lower molecular weight PAH consistent with the preferential accumulation of gas-phase PAH on mosses in elevated positions. On substrates, the concentration of fluoranthene is higher than pyrene, but the overall concentrations are much lower than in overgrowing moss: 50 and 3.5 ng/g fluoranthene and pyrene on granite and 40 and 5.3 ng/g fluoranthene and pyrene on the soil. Generally, ground growing-mosses had the highest concentration of the most carcinogenic PAHs; the highest benzo[a]pyrene concentration was 10 000 ng/g). Other PAHs not common to urban atmospheres, such as anthanthrene and pentaphene, were observed on mosses but not at lithic interfaces between moss and substrate, suggesting mosses may rapidly accumulate and retain PAH at their surfaces[2].

[1] Sabovljević, M. S., Weidinger, M., et al. 2020. Metal accumulation in the acrocarp moss *Atrichum undulatum* under controlled conditions. *Environmental Pollution*, **256**, 113397.

[2] Yunker, M. B., Macdonald, R. W., et al. 2002. PAHs in the Fraser River basin: a critical appraisal of PAH ratios as indicators of PAH source and composition. *Organic Geochemistry*, **33**, 489-515.

