Effect of Climate Change on Building Design and Indoor Health (ECOCIDE)

Background

As people spend most of their lives indoors, the composition of the community of the microscopic organisms (bacteria, fungi and viruses) that live within our built environment is an important component of our health, through potential impacts on indoor air quality and on the structural integrity of the building. The conditions within building structures will change in the future, for example, due to a change in climate and because of the need to construct more energy efficient buildings and increase use of sustainable materials. Changes in climate, building design and materials can alter the environment of the building, mainly though a likely effect on moisture content and temperature. This change in the building environment can the composition of the indoor microbiota.

Aims

Our overarching aim is to determine how building design interacts with climate change to alter the composition of the indoor microbiota community. We test whether a combination of experiments and numerical simulations can identify potential problems with the design of new builds and renovations of buildings, thereby helping to 'future proof' against the need for excessive renovations in the future. Ultimately, we aim to better understand the interactions between the indoor microbiota, the indoor and outdoor environment, building materials and structural design to improve future sustainable design of buildings.

Approach

We use an interdisciplinary approach of (1) evolutionary biology and genomics, (2) building physics and (3) materials science, where we use a combination of experimental microcosms, genomics and numerical simulations to simulate and then quantify potential impacts of

building design and climate change on the composition and function of the indoor microbiota.

A national survey on the structural condition of wood-framed houses dating back several decades will be the basis for the project, but these data will be supplemented by examining case studies on public buildings such as health care centres, schools and kindergartens, and traditional log houses. Private house-owners, building and renovation companies, public organizations and regions are invited to provide their buildings as sampling sites. We emphasise the microbiota within building structures as it is in these areas where moisture can accumulate (due to a combination of high humidity and reduced air flow) and where microbial communities can grow unnoticed until a serious 'mould' problem develops. The results of this study offer the basis for large-scale laboratory screening studies of different building materials and how they operate under changing climate conditions.

More information:

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