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Bio-susceptibility of materials and thermal insulation systems used for historical buildings

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In historical buildings of Northern countries high levels of energy are necessary to reach comfortable temperatures especially during the cold season. For this reason historical buildings are now also included in country specific regulations and ordinances to enhance the "energy – efficiency". Since an exterior insulation – as it is commonly used for modern architecture - is incompatible with monument protection, several indoor insulation systems based on historical and ecological materials, are on the market that should improve the thermic performance of a historical building. However, using organic materials as cellulose, loam, weed or wood, bears the risk of fungal growth and thus may lead to health problems in indoor environments. For this reason 5 different ecological indoor insulations systems were tested for their bio-susceptibility against various fungi both under natural conditions – after 2 years of installation in an historical building – and under laboratory conditions with high levels of relative humidity. Fungal growth was evaluated by classical isolation and cultivation as well as by molecular methods. The materials turned out to have a quite different susceptibility towards fungal contamination. Whereas insulations made of bloated Perlite (plaster and board) did not show any fungal growth after 2 years of exposition, the historical insulation made of loam and weed had high cell counts of various fungi. In laboratory experiments wooden softboard represented the best environment for fungal growth. As a result from this study, plaster and board made of bloated Perlite are presented as being the most appropriate materials for thermal insulation at least from the microbiological and hygienic point of view. For future investigations and for the monitoring of fungi in insulation and other building materials we suggest a molecular biology approach with a common protocol for quantitative DNA-extraction and amplification.