Researchers reveal which London Underground lines are mouldiest

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People travelling on the London Underground Jubilee Line inhale more fungal spores than those on the Central and Bakerloo Lines, according to new research from our scientists here at the University.

Through a recent study into a common airborne fungus from which we get penicillin, researchers from our Department of Biology & Biochemistry measured levels of fungi on platforms at 12 stations across three lines in the capital.

By comparing spore samples with others collected across different parts of city, they found that viable mould levels in Underground stations were consistently higher than two nearby outdoor locations, and up to four times the levels recorded at a local hospital; incidentally the location of this week's Royal birth.

Fungus levels on the Jubilee Line were fractionally higher than on the Central Line – at just over one fungal spore per minute of normal human breathing. On the Bakerloo line, which opened in 1906, passengers breathe in less fungal spores – at around 0.75 a minute.

The study, published recently in *Fungal Ecology*, focused on penicillium chrysogenum – the species first discovered by Alexander Fleming in 1928 at St Mary's Hospital, from where samples for this study were also taken. Fleming's discovery led to the breakthrough development of penicillin as an antibiotic, but despite widespread scientific interest, relatively little is known about the species ecology or how it has evolved.

This study notes that a number of factors including local substrates, temperature, time of day, humidity and depth all influence fungi levels in different areas. Interestingly, it also found that whilst the Jubilee Line had high levels of fungal spores, it in fact had the lowest proportion of penicillium spores, despite these being one of the most common fungal species in the outside air. This suggests that other fungi are responsible for the relative increase of fungal spores in the Jubilee Line.

Finally, through the study researchers have identified two new penicillin species. These are formally named Penicillium floreyi and Penicillium chainii, after Howard Florey and Ernst Chain who won the Nobel Prize for Medicine, along with Fleming, for their work on penicillin.

Lead researcher Dr Daniel Henk said: "Finding an abundance of fungi in the air of the London Underground is not that surprising because people encounter them nearly everywhere all the time. However, our observation that part of the fungal community differs between the above ground and below ground air and between Underground lines suggests that the physical structure of the Tube is more than a sieve through which airborne fungi flow.

"In some ways, the Underground might be like the U-bend of a sink for the air around the people of London, trapping fungi in the air from outside, but it is also an environment capable of supporting fungal growth in its own right. Uncovering the fungal species in the built environment should ultimately help us manage our building for sustainability, health and biodiversity."

More information: opus.bath.ac.uk/35859/

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