

# Soil study unearths microbe diversity discovery

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■ Brunel Academy

◆ Deer park

● Farm



▲ Merchants Acad.

★ City square

+ River bank



Map of soil distribution. Credit: Dr Matt Tarnowski

Human impacted soils tend to harbor different microbial communities to those areas less affected by human activities, a team of researchers working with Bristol school children have found.

Together, they studied the species of bacteria found in soils at two [local schools](#), Merchants Academy and Brunel Academy, the Avon riverbank, Queens Square, Fenswood Farm and Ashton Court Deer Park.

The team found that human impacted soils still showed a large diversity between sites in terms of the microbes present and the study highlighted that other factors like the geochemical make-up of the [soil](#) and [environmental factors](#) also play a key role. The work is [published](#) in the journal *Royal Society Open Science*.

Lead author, Dr. Matt Tarnowski explained, "One reason researchers are doing this is that many important biotechnologies like novel antibiotics are found in the soil. Building on this interest our multidisciplinary team from the University of Bristol investigated what the soils of Bristol contained in collaboration with local people to try and understand how discoveries in soils might be used in a fair and equitable way. The project started by working with local school children, who helped with the science."

Dr. Thomas Goroehowski, a Royal Society University Research Fellow and Associate Professor of Biological Engineering at the University of Bristol School of Biological Sciences, and co-author on the study added, "Surprisingly, there is a real lack of studies on soils from urban

environments. We not only got the chance to sample some of these, but had a lot of fun doing so too. The children loved supporting us as citizen scientists and people of all ages were fascinated by the live DNA sequencing experiments we performed at festivals and community events across the city to see what the soils contained."

Emily Phelps, co-author and Ph.D. candidate at the University of East Anglia said, "It was great to interact with local school children and teach them about soil, DNA and sequencing. I remember the excitement of the students when we brought out some worms, and discussed their role in soil ecosystems. There was also a real buzz when they were given the opportunity to decide where to sample soil at their schools and provide hands-on help with our research."

Co-author, Dr. Gilda Varliero, microbial ecology researcher now working in the Rhizosphere Processes Group in the Swiss Federal Research Institute, said, "These results suggest that the level of disturbance, urbanization and human density of the studied areas influence the microbial community structure, diversity and role in the ecosystem, potentially impacting soil health."

The [public engagement](#) sparked new conversations about the role of language and terminology used when studying soils.

Co-author, Dr. Jim Scown, now Lecturer in Environmental Humanities at the Cornwall campus of the University of Exeter, explained, "How we talk and think about soils and the life they hold is never neutral. The metaphor 'bioprospecting' is used widely in the biosciences as a shorthand for research that looks at extracting valuable information from nature. This positions soils as resources to be exploited and researchers in a position of dominance.

"Many antibiotics originate from microbes living in the soil, but soils

have plenty more vocations than to provide us with medicines. After discussions with people across the city, we came up with the alternative metaphor of 'biorespecting' to open broader discussions into our relationships with soils and who stands to benefit from DNA sequences contained within them."

Dr. Tarnowski, now based at the Marine Microbiology Laboratory at Swansea University, concluded, "This started as a curiosity-driven project about soil to help us connect our science to the wider communities across Bristol. Yet conversations emerged about how science and technology could be more responsible. This led us to develop a new approach to guide research in a way that does not treat nature as a resource to be exploited. This work showed me that terms used in research sometimes contain implicit assumptions.

"I encourage all scientists to broaden the perspective on their research by collaborating with diverse disciplines and the public in their studies. We hope that the study will stimulate conversations about who benefits from bioscience research and innovation."

**More information:** Matthew J. Tarnowski et al, Soil as a transdisciplinary research catalyst: from bioprospecting to biorespecting, *Royal Society Open Science* (2023). [DOI: 10.1098/rsos.230963](https://doi.org/10.1098/rsos.230963)

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