Valencia is home to the first desert-like microbial community found in a city

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Researchers at the Universitat de València (Universiity of Valencia, UV) have discovered that besides accumulating microorganisms from the air and dust particles, photovoltaic solar panels can also harbour rich and very well-adapted microbial communities of different bacteria and fungi.

Field work, carried out on nine solar panels located across three UV campuses, has revealed that the microbial communities inhabiting these panels have more in common with those typically found in hot or polar deserts, rather than in a Mediterranean city.

Barely any data exists on the microbial ecologies of solar panels. A recent study in Brazil already pointed to the existence of microbial communities on solar panels; low in diversity, they are thought to affect the efficiency of the panels to generate energy. This study at the UV is the first to find a highly-diverse microbial community thriving on urban photovoltaic panels, pointing to the adaptive capacity of certain bacteria and fungi to extreme environments.

Highly diverse, and highly adaptive

Manuel Porcar of the UV explains: "The most abundant bacteria ('Deinococcus', 'Hymenobacter', etcetcera) found on the solar panels are not usually found in urban environments; rather they are more typical of hot and cold deserts (for example, the Sonoran Desert in Mexico or

Antarctica). On Valencian rooftops, then, we find a unique and highly-diverse microbial community: the first intraurban microbial desert".

This unique microbial community shows different day/night proteomic profiles; that is, the structure, functions and interactions of their proteins are different at night than during the day. It is dominated by a reddish pigmentation and is adapted to withstand cycles of high temperatures, desiccation and solar radiation. Furthermore, these microorganisms display strong resistance to high salt concentrations, moderate to strong resistance to low pH, and relatively low resistance to UV light and extreme heat.

More than 800 different species of bacteria and fungi were found on the University's photovoltaic solar panels, followed a year later by a further 500.

According to Porcar, this desert-like microbial community which is "a clear example of the power of natural selection to adapt organisms to different living conditions". This finding may have important applications in biotechnology.

More information: A highly diverse, desert-like microbial biocenosis on solar panels in a Mediterranean city. doi: dx.doi.org/10.1101/029660

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