

Bacterium capable of aquifer decontamination characterised and cultivated for first time in Europe

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UAB researchers have identified in the Besòs river estuary (Barcelona, Spain) a bacterium of the genus *Dehalogenimonas*, which has the capacity to transform toxic organochlorine compounds into others that are harmless. These experts have succeeded in characterising and cultivating these bacteria for the first time in Europe, which opens the door to their production and application to contaminated aquifers.

This bacterial genus was first described in 2009, and only two strains had previously been isolated, in chloroalkane-contaminated aquifers in Louisiana, USA. This is the first description of the characterisation and culturing of *Dehalogenimonas* in Europe, though sequences of its genome have been identified in various locations, such as the Arctic Ocean, the Baltic Sea, Canada, China, Germany, Hungary, Spain, Taiwan and the USA.

These [bacteria](#) can only use organochlorine compounds as an energy source during their respiration process, transforming them into products that are less chlorinated, more biodegradable and, in some cases, harmless.

From River Besòs sediments, after three years' research, the researchers have obtained a stable bacterial culture and have shown its capacity to transform some of the chlorinated aliphatic hydrocarbons that are frequently found in aquifers, such as 1,2-dichloroethane and

1,2-dichloropropane, into harmless products like ethene and propene, respectively.

The researchers also used an analytic technique to determine the fractionation of the stable isotopes of one of these [contaminants](#), thus demonstrating in situ that the bacteria contribute to the disappearance of the contaminants, distinguishing this process from naturally occurring physicochemical ones involving dilution of the contaminants by rainwater, adsorption to the organic matter or volatilisation.

Obtaining the bacterial consortium opens the way to production and subsequent application in contaminated aquifers, using the strategy of bioaugmentation, which involves adding bacteria with specific catabolic capacities in order to eliminate the contaminants. Although this technology has never been used in Catalonia, it is regarded as mature, with hundreds of successes in the USA and Canada.

"Being able to cultivate these bacteria in Europe means significantly lowering the costs of applying them, as most of the companies that deal in them are based in North America. Furthermore, if you take into account that they grow best in the anoxic conditions of aquifers, and that bioaugmentation is a low-cost, efficient technique, compatible with other remediation techniques, these bacteria could even be eventually applied at source, in the industrial plants themselves", explains Ernest Marco, the research coordinator.

A serious environmental problem

Contamination of aquifers by organochlorine compounds is one of the most serious environmental problems in this country and the rest of Europe. These contaminants are widely used in industry and reach subterranean waters by accident or as a result of improper waste disposal. Once in the [aquifers](#), they can build up for years because of

their low biodegradability, posing a threat due to their high toxicity. According to data from the Waste Agency of Catalonia, 8% of contaminated soils recorded in 2014 contained organochlorine compounds, of which 77 surpassed the maximum benchmark concentrations.

More information: L. Martín-González et al. Stable Carbon Isotope Fractionation During 1,2-Dichloropropane-to-Propene Transformation by an Enrichment Culture Containing Strains and a Gene , *Environmental Science & Technology* (2015). [DOI: 10.1021/acs.est.5b00929](https://doi.org/10.1021/acs.est.5b00929)

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