In tackling lead pollution, fungi may be our friends

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Fungi may be unexpected allies in our efforts to keep hazardous lead under control. That's based on the unexpected discovery that fungi can transform lead into its most stable mineral form. The findings reported online on January 12 in *Current Biology*, a Cell Press publication, suggest that this interaction between fungi and lead may be occurring in nature anywhere the two are found together. It also suggests that the introduction or encouragement of fungi may be a useful treatment strategy for lead-polluted sites.

"Lead is usually regarded as a pretty stable substance," said Geoffrey Gadd of the University of Dundee. "The idea that fungi and other microbes may attack it and change its form is quite unexpected."

Lead is an important structural and industrial material and, as an unfortunate consequence of its popular use in everything from firearms to paint, lead contamination is a serious problem worldwide. There have been efforts to contain lead in contaminated soils through the addition of sources of phosphorus, an element that enables the incorporation of lead into a stable pyromorphite mineral. But that change had been considered a purely chemical and physical phenomenon, not a biological one. That is, until now.

In the new study, the researchers carefully examined lead shot after it had been incubated with and without fungi. In the presence of fungi, the lead shot began to show evidence of pyromorphite formation after one month's time. That stable lead-containing mineral continued to increase

in abundance with time. Minerals found on the surface of lead shot incubated without fungi represented less stable forms as a result of normal corrosion.

"It seems the ability of many fungi to produce organic acids or other substances may be very important in attacking the lead and releasing forms of free lead including lead complexes, which can then react with phosphorus sources to form pyromorphite," Gadd explained.

While not all species of fungus are able to transform lead in this way, it appears that many of them can, he added. It's not entirely clear why some fungi do this, but it might assist their survival in contaminated soils.

The discovery is yet another example of the "amazing things that fungi, and microbes more generally, can do in the environment," says Gadd. "Even metals can be subject to microbial colonization and attack."

Provided by Cell Press