

IN MY ELEMENT



“Arsenic solves the riddle of hidden gold”



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Arsenic is primarily known as a deadly poison, for example in the classic American film “Arsenic and Old Lace” and in Friedrich Schiller’s drama “Kabale und Liebe” (Love and Politics). But in fact it has a healing effect in low concentrations, as do many active ingredients. It is still used today in medications. This element has been known since antiquity. It occurs naturally in the soil almost everywhere, in various concentrations. My colleagues and I have now identified it as the crucial element in the genesis of large deposits of gold.

In the Carlin gold deposit in Nevada, for example, this precious metal does not occur as nuggets or gold ore but instead is concealed, finely dispersed within pyrite crystals.

Pyrite is an iron sulfide that is also known as fool’s gold. Unfortunately, the gold that lies hidden in fool’s gold can only be identified by means of chemical analysis. As a result, new gold deposits of this kind are not easy to find. For a long time it remained unclear how pyrites containing gold were generated and, more importantly, how they can be identified.

But now we have solved this riddle. For our study, we reproduced in our laboratory the conditions under which pyrite is formed. We streamed hot solutions containing sul-

furic acid through carbonates rich in iron and thus produced pyrite crystals. To these hot solutions we added gold and arsenic in a range of different concentrations. We discovered that the higher the concentration of arsenic in the pyrite, the more gold can be deposited there. The arsenic acts more or less as a trailblazer for the gold. Its presence alters the pyrite in a way that enables gold to accumulate there more readily.

Three years of research work went into this study. The special challenge that faced us was reproducing the natural processes in the laboratory. The results of the study are highly relevant, because the demand for gold is still increasing, in the electronics industry for example. If we understand how gold deposits are formed, we can find them more easily. Now that we have shown that arsenic plays an important role in the accumulation of gold, it can serve us as an indicator of previously undiscovered gold deposits.