

Comment on “A Bacterium That Can Grow by Using Arsenic Instead of Phosphorus”

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Wolfe-Simon *et al.* (*Science Express Research Article*, published online 2 December 2010; 10.1126/science.1197258) reported that a naturally occurring bacterium, strain GFAJ-1, can substitute arsenic for phosphorus in its biomolecules. However, straightforward experiments to support this claim, including density gradient centrifugation of DNA assumed to contain arsenic, were either not performed or not presented. As a result, the authors' conclusions remain uncertain.

The title of the research article by Wolfe-Simon *et al.* (1) asserts that a bacterium, strain GFAJ-1, can grow by using arsenic instead of phosphorus. However, their study presents only preliminary results, not the confirmatory experiments one would expect to find in support of this claim.

The tolerance to and possible conditional dependence on arsenic of the bacterial isolate is very interesting. However, the main claim that “strain GFAJ-1 can vary the elemental composition of its basic biomolecules by substituting As for P” does not appear to be sufficiently supported by the data. Straightforward experiments that could verify incorporation of arsenic into biological macromolecules were either not performed or not reported. These could, for example, be density gradient centrifugation of DNA assumed to contain arsenic or autoradiography of electrophoretically separated proteins and restriction fragments of DNA from cells grown in the presence of radioactive arsenic. A comparison of the hydrolysis rates of DNA from bacteria grown in arsenate medium versus DNA from bacteria grown in phosphate medium could also have been easily done. Without these data, the authors' claim that the bacterium they described can grow by using arsenic instead of phosphorus remains unconvincing.

References

1. F. Wolfe-Simon *et al.*, *Science*, 2 December 2010 (10.1126/science.1197258).

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10.1126/science.1201381