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References

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2. H. J. Morowitz, *Beginnings of Cellular Life* (Yale Univ. Press, Hew Haven, CT, 1992), p. 60.

The News article by Kerr notes that "At 20 to 100 nanometers in length, the objects [found on the meteorite with the use of an electron microscope] are 100 times smaller than the smallest microfossils of ancient bacteria ever found on Earth . . ." However, the bacterium *Coxiella* (a small, gram-negative pathogen) may be as small as 200 by 400 nanometers (0.2 by 0.4 micrometers), which would be closer to a five-fold difference in size. Thus, it is conceivable that bacteria could have evolved on Mars that were even smaller, that is, within the range of the objects found.

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Response: Single-domain magnetite can be produced external to the cell by dissimilatory Fe^{+3} reducing bacteria (*1*). Such magnetite is apparently not used by these bacteria for navigational purposes. We cannot tell whether the magnetite that was found in the meteorite (*2*) best fits a dissimilatory or assimilatory model, assuming that it was biogenetically produced. Even if this magnetite was internally produced by bacteria on Mars, a "navigational role" for it cannot be ruled out. Little is known about the past magnetic field of Mars; the field could have been much stronger during the period when volcanism was active on the planet.

We know of no widely accepted theoretical minimum size for bacteria, although we agree that one may exist on the basis of the number of molecules within a cell. Forms interpreted as fossilized nanobacteria ranging from 30 nanometers to 200 nanometers have recently been reported in terrestrial copper ores (*3*). This size range is similar to the ones described in the article (*2*). As microscope technologies improve (with, for example, sealed emission gun scanning electron microscopes), smaller and smaller bacteria may be discovered. Finally, conditions on Mars may have favored the evolution of very small microorganisms as compared with typical terrestrial ones.

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References and Notes

1. D. R. Loveley, *Microbiol. Rev.* **55**, 259 (1991).
2. D. S. McKay *et al.*, *Science* **273**, 924 (1996).
3. R. H. Sillitoe, R. L. Folk, N. Saric, *ibid.* **272**, 1153 (1996).
4. Readers can visit the WWW site of the Earth Science and Solar System Exploration Division of Johnson Space Center at http://www-sn.jsc.nasa.gov/

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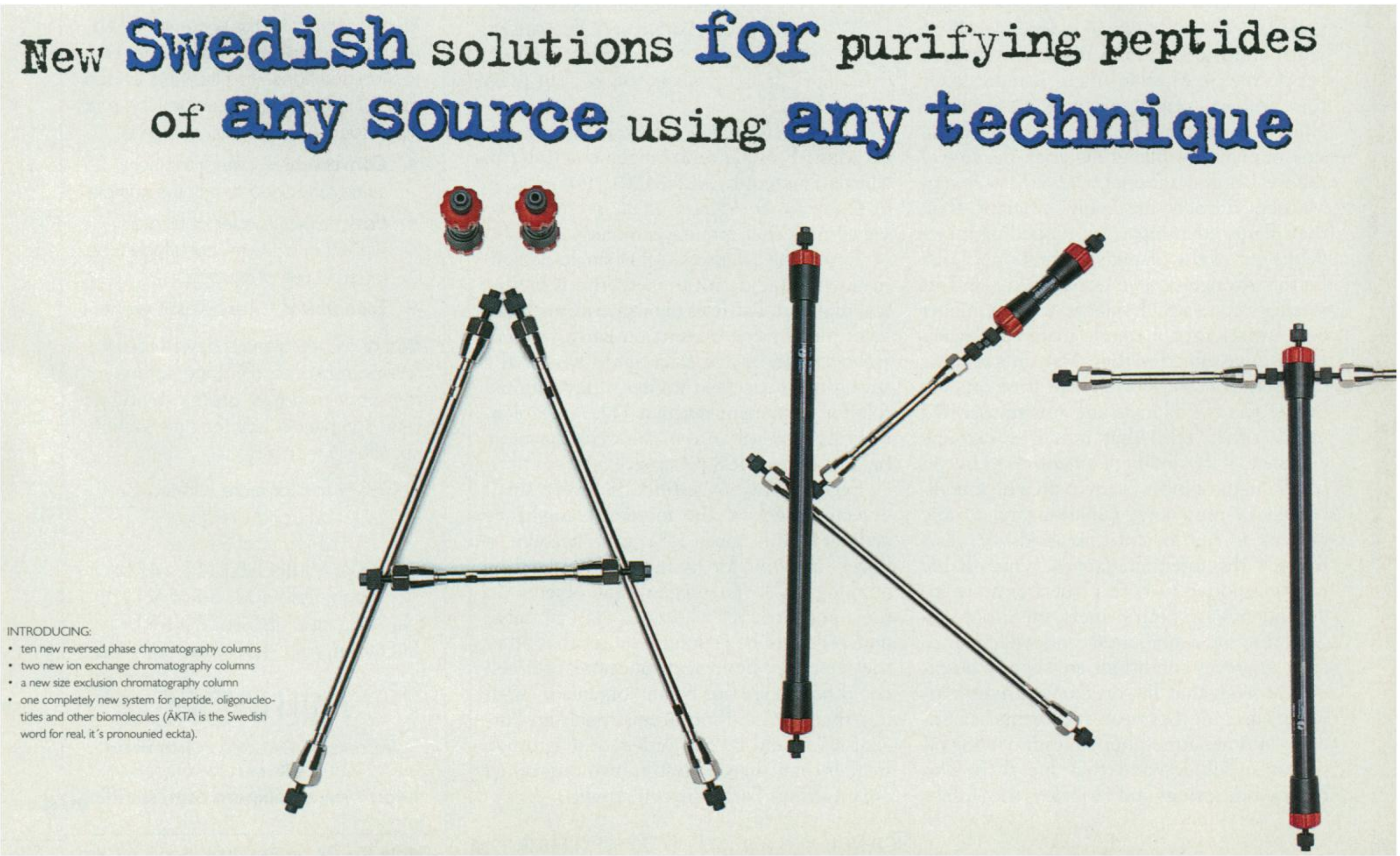
Important Credit

The Research News article "Getting familiar with the top quark" by James Glanz (23 Aug., p. 1046) does a good job of explaining the



complicated relationship between the precise masses of the top quark and the W boson and the predicted mass of the still-unseen Higgs boson. However, the legend in the figure illustrating this relationship may mislead readers about the source of the precision measurements of these particles' masses.

The original legend in the figure supplied by the Collider Detector at Fermilab (CDF) Collaboration read "World average measurements," but it appeared in *Science* as "CDF plus other measurements." This alteration does not give important credit to the DZero collaboration at Fermilab and the UA2 collaboration at the European Organization for Nuclear Research (CERN), in Geneva, Switzerland; both have made crucial contributions to the average. The main point of the plot is to show how precise measurements of the top quark and W boson masses give indirect information on the Higgs particle mass, one of the most important parameters in high-energy physics. The limit on the Higgs mass is driven primarily by the W mass measurement, and DZero currently has the world's most precise measurement of this quantity.

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The error in the legend in the figure occurred during editing. *Science* regrets the error.—***Eds.***

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Controlling Cotton Pests

Contrary to the characterization in Jocelyn Kaiser's article "Pests overwhelm *Bt* cotton crop" (News & Comment, 26 July, p. 423), the Bollgard *Bacillus thuringiensis* (*Bt*) gene by Monsanto is providing economic and environmental benefits to cotton growers and is performing as expected given this year's severe pest conditions.

Bollgard was evaluated in 6 years of field tests before commercialization. The vast majority of these tests were done in full public view by scientists at the U.S. Department of Agriculture, universities, and extension facilities. Control of the pests targeted for this product—tobacco budworm, pink bollworm, and bollworm—was excellent. In a few of the field tests, high infestation levels have required application of pesticides to supplement the control provided by the *Bt* gene.

Monsanto is well aware of the potential for pests to adapt to the *Bt* protein. Because we—along with many others—have much to lose if this happens, we have worked long and hard with resistance management experts to develop strategies to delay the onset of resistance. Strategies vary depending on the insect involved. With the bollworm, the key strategy is refugia, host plants where the insect can escape exposure to the *Bt* protein. Nonselected populations that develop on these refuges help dilute and suppress any resistance genes that may develop in the Bollgard fields. The bollworm has a multitude of hosts—both wild and crop plants. With Bollgard, resistance management is taken even further by requiring growers to plant refuges with cotton that does not contain the Bollgard gene. When both the natural and mandated refuges are combined, resistance development in the bollworm can be delayed significantly.

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The bollworm outbreak on *Bt* cotton is not a manifestation of physiological resistance predicted in 1991 (*1*); rather, the epidemic apparently arises from extant populations that have the inherent ability to discriminate