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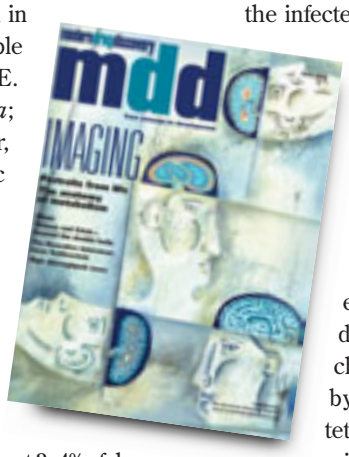
Weighty matters

I enjoyed "MS and Microbiology" by Catherine C. Fenselau and Kathryn Jackson (March 2003, p 37), which describes applications of MALDI-TOF analysis for the characterization of intact microorganisms. I wish to offer one correction, however. I think the statement that "RNA makes up only about 0.01% of the dry weight of bacteria" must be in error, and this may also apply to the RNA content estimate for spores. My own experience is more in line with the numbers cited in an old but usually reliable work (chapter by S. E. Luria in *The Bacteria*; Gunsalus, I. C., Stanier, R. Y., Eds.; Academic Press: New York, 1960; Vol. 1). Luria indicates that the RNA content of most bacteria averages about 10% of the dry weight and can be up to 20% for *E. coli* in log phase. DNA, on the other hand, is only about 3–4% of dry weight. These numbers do not change Fenselau's conclusion that "DNA would clearly represent the most unique biomarker for each microorganism," at least if the comparison is with RNA, since the bulk of that is reasonably well-conserved ribosomal RNA. However, the low DNA content relative to protein (the latter is cited by both Luria and Fenselau as 50% of dry weight) makes it easy to see why current practice is focused on the characterization of proteins, which we know are also a quite distinctive group of biomarkers.



Allen T. Phillips
Professor Emeritus of Biochemistry
Department of Biochemistry and Molecular Biology
Pennsylvania State University
University Park, PA

Author's reply:

I welcome this correction and affirmation. Most relevant to our work, the abundance of proteins holds.

Catherine C. Fenselau

Microfilarial musings

The article "Elephantiasis" by Julie L. McDowell (April 2003, p 56) made the following statement about the life cycle: "The microfilariae then make their way to the mosquito mouth and biting parts. As the mosquito continues biting people, the microfilariae are injected into their blood." In fact, in mosquitoes the microfilariae undergo a couple of molts and become infective third-stage larvae, which then make their way into the mouth and biting parts. When the infected mosquitoes bite people for their blood meal, these infective larvae—not microfilariae—are released near the site of the bite. Later, the infective larvae crawl through the bite wound and make their way into the lymphatics.

These worms carry several endobacteria in them, and we developed new strategies for chemotherapeutic intervention by using antibiotics such as tetracycline and doxycycline in animal models and infected people. Tetracyclines appear to clear these endobacteria, called *Wolbachia*, and with them cleared, the worms show abnormal embryogenesis. Because antibiotic treatment affects embryo growth and worm development, it blocks the release of microfilariae into the bloodstream of infected individuals. The reduction in circulating microfilariae also reduces transmission of infections through mosquitoes. Doxycycline and other tetracyclines are registered drugs and are well tolerated, and their toxicities have been studied. Therefore, less needs to be done for their approval as antifilarial drugs, and they can easily be approved by federal regulatory authorities. Moreover, combinations of tetracyclines with diethylcarbamazine (DEC) or ivermectin could be more efficacious for the treatment of infections in areas where filariasis is endemic.

Ramakrishna Rao
Associate Professor of Research
Washington University School of Medicine
St. Louis, MO