Letters

Microscopy and Resolution

Don’t misunderstand. I think Jeffrey L. Fox (no known relation) is the paragon of science writers. However, in the article on p. 502 of the November issue of Microbe, there are some small points that may have fallen by the wayside. In the second paragraph, “conventional light microscopy typically cannot resolve objects that are smaller than about 200 nm in diameter” is true only of commercially available “conventional microscopes.” Resolution is a function not only of the wavelength of the illuminating light but also of the numerical aperture of the optical system (objective plus condenser). These are two issues at the mercy of the manufacturers. Ultraviolet optics, once available, coupled with CCD video, might double the resolving power. The numerical aperture has pretty much remained stuck at about 1.4 for the last 50 years. Use of more sophisticated microscopes has suffered from the shortage of people willing to suffer with cranky and possibly fragile optical systems and with intransigent manufacturers. The added power of deconvolution software coupled with higher numerical aperture and/or UV imaging might offer more information without fluorescence. Suffice it to say that the transit of mRNA in cells was discovered in the 1930s using microscopes that are no longer commercially available, a matter that contributed to the eventual deciphering of the genetic code (Francis Crick, personal communication).

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Tracing and Tracking Bugs in the Feed and Food Chain: the Missing Link

To protect the health of consumers, producers of food and animal feed are responsible for the safety of their products, but there is no standard format to trace or track a biocontaminant. People are also becoming increasingly worried about the possibility of deliberate contamination of food, so-called bioterrorism. In the complex environment of the food chain, tracking microbial pathogens is hampered by the lack of fast, simple methods. Prediction of how these pathogens would spread in a given situation is vital to the control of these threats to public health.

A large European project (www.Biotracer.org), with 49 partners and a budget of U.S. $20 million, has just been launched to address gaps in food safety management and to foster closer relationships between scientists from different disciplines. Researchers from microbiology, physiology, molecular biology, the feed industry, the food industry, etc., will work closely with mathematical modelers in a concerted effort to form a better understanding of microbial behavior in food, resulting in increased levels of food safety.

The missing link is biotraceability, which is the interface between pathogen testing and tracing systems. This is crucial to improved tracing of the origin of accidental or deliberate microbial contamination of feed and food. As part of that, it is essential to model the development of contamination from the point of entry to the point of detection, and beyond. Innovative modeling tools will be developed by the use of virtual contamination scenarios. Modeling is important not only to trace the origin, but also to inform the producers of the appropriate corrective action necessary to protect the consumer. A complete chain approach is needed, beginning with sampling and ending with recommendations for control measures, well-justified and targeted product recalls, timely activation of rapid alert systems, and proper emergency responses. The approach should develop recommendations to control any risk through integration of novel genomics and metabolomics data, resulting in a better understanding of the physiology of the microorganisms, combining these with advances in predictive food-based microbiological models.

It is the ambition of the project to build up a Virtual Traceability Institute, in collaboration with international players, including the United States and Canada, in addition to major players from South Africa, Indonesia, Russia, and Brazil.

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