incorporated into inexpensive food packaging materials such as plastic, paper, or glass and portable detection devices. Future applications of the technology are envisioned for other bacteria, viruses, illicit drugs, waste chemicals, and pesticides.

First Results of X-Ray Microscopy of the Structure of Parasitic Metazoa (LBNL-ALS). In the first stages of a project to study the structure of parasitic metazoa using the high-resolution x-ray microscope (XM-1) on beamline 6.1.2 of the Advanced Light Source, Lawrence Berkeley National Laboratory researchers compared structural information obtained by electron microscopy and confocal optical microscopy of the larvae of the parasitic nematode *Trichinella spiralis* with that of x-ray microscopy. *T. spiralis* is a parasite that infests the intestines of various mammals; it causes trichinosis in those who eat undercooked, infected pork, when larvae of the nematode travel through blood vessels and become encysted in muscle. X-ray microscopy images were also made of heartworm (*Dirofilaria immitis*), which is a filarial worm transmitted by mosquitoes and parasitic in the heart and associated blood vessels of dogs and other canids. The two samples represented multicellular organisms which are much larger in size and of more complex internal morphology than the organisms which have hitherto been examined by soft x-rays. The small size of many parasitic organisms requires the use of electron microscopy for adequate elucidation of their structures. While both transmission and scanning electron microscopy can provide complementary results that allow a considerable degree of structural correlation, each technique has its inherent limitations. Soft x-ray microscopy examination of the principal stage of the life cycle of *T. spiralis* indicated the presence of certain organ primordia in the mature (muscle larvae) much more readily and clearly than with conventional light microscopy. The soft x-ray images of these specimens also provided a three-dimensional representation of intercellular relationships and arrangement which cannot be obtained either by scanning or transmission electron microscopy. The new features revealed in the *T. spiralis* newborn larvae included a mid-body ganglion-like structure with axon-like extensions of individual cells, a structure which appeared to be a primordium of the ovary--an unprecedented degree of organ development and organization for this larval stage, and the arrangement of the posterior part of the digestive tract. In the microfilaria of the dog heartworm it was possible to observe cells of the amphidial nerves and an apparent network of interconnecting nerve cells throughout the length of the microfilaria. These preliminary results indicate that soft x-ray microscopy is an excellent tool for morphological studies, at the cellular level, of a variety of biological organisms.

Intracellular Structures of Normal and Aberrant Plasmodium Falciparum Malaria Parasites (LBNL-ALS/Monash U., Australia). In collaboration with members of the Center for X-Ray Optics, parasitologists at LBNL's Life Sciences Division have also been using the high-resolution x-ray microscope (XM-1) at the Advanced Light Source to study structural development of the malaria parasite *P. falciparum* in normal and genetically abnormal erythocyes (red blood cells) and in infected erythocycles treated with cysteine protease inhibitors, which are potential chemotherapeutic agents. *P. falciparum* is a particularly virulent organism responsible for about 45 percent of the cases of human malarial infection each year. Currently, malaria is third behind tuberculosis and measles as major killer diseases caused by a single organism with almost 1 million deaths per year, mainly women and children. There is no