MINITOPIC
Electrons Hop along Hemes of Proteins in Bacterial Nanowire

Electrons travel irregularly along the 10 hemes arranged along and within the MtrF nanowire protein from *Shewanella oneidensis*, according to geochemist Kevin Rosso of the Department of Energy Pacific Northwest National Laboratory in Richland, Wash., and his collaborators at University College London in the United Kingdom. Their calculated estimate of this heme-to-heme flux of electrons is “consistent with recently measured rates for the related multiheme protein complex MtrCAB,” they note. Their findings also “suggest that the [bacterial nanowire] protein evolved to harbor low-potential hemes without slowing down electron flow.” Details appeared 2 January 2014 in *Proceedings of the National Academy of Sciences* (doi:10.1073/pnas.1316156111).

in 40 other cases, at least one structure was solved for a homolog. For example, researchers were unable to purify *Mtb* cytidylate kinase, a potential drug target, because it did not crystallize. However, the team solved structures for two homolog proteins from *M. smegmatis* and *M. abscessus*, which have 68 and 74% global sequence identity, respectively.

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RESEARCH ADVANCES
Plant Virus That Infects Honeybees May Harm Colonies

Marcia Stone

Tobacco ringspot virus (TRSV), a plant pathogen, hopped kingdoms into honeybees, according to Yan Ping Chen and her collaborators around the United States (US) and in Beijing, China. “Honeybees exposed to contaminated pollen can also be infected, [alerting] us to the risk of new viral diseases secondary to host shifting,” she says. Details appeared in the 21 January 2014 *mBio* (http://bit.ly/asmtip0114g).

“The serendipitous detection of TRSV during a routine screening for viruses in European honeybees, formally known as *Apis mellifera*, made us wonder if the virus was simply colonizing the arthropod host or if it was actively infecting it,” Chen says. Because TRSV is a positive-stranded RNA virus, the group began analyzing bee tissues for proof of its replication. Negative-stranded copies of the TRSV genome can be detected in most bee tissues, consistent with active replication, according to Chen’s collaborator Ji Lian Li of the Chinese Academy of Agricultural Science in Beijing.

RNA viruses such as TRSV can exist as genetically related variants, or “quasispecies,” that together infect their prey, a capacity that heightens the risk of new viral diseases secondary to host shifting,” note Li, Chen, and their collaborators.

“TRSV is a positive-stranded RNA virus that infects honeybees while feeding on their blood, are also colonized with, but not infected by, TRSV. Because the viruses remain in the gastric cecum of such mites, it “appears that they facilitate the horizontal spread of TRSV without becoming systemically invaded themselves,” note Li, Chen, and their collaborators.

“The discovery that a plant virus, TRSV in this case, replicates, spreads, and has [an] increased prevalence in weak honeybee colonies will lead to additional studies on the mechanisms of host-specific adaption and the role of cross-kingdom infections in the transmission of this and possibly other viruses,” says Michelle Flenniken at Montana State University in Bozeman. “It will be very interesting to compare the complete genome sequence of honeybee-associated TRSV to currently circulating plant TRSV sequences from diverse geographic regions.”

Some scientists insist that testing for viral replication in one of the recently developed honeybee cell lines is the only way to rule out any possibility of plant contamination. Chen agrees, but says that the limited availability of honeybee-derived cell lines makes it difficult to plan such investigations. However, cell lines derived from Lepidoptera insects such as butterflies are available, and she considers them very helpful for studying viral propagation and pathogenesis in these pollinators.

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PUBLIC HEALTH

Aquavalens Project To Develop Tests To Improve European Water Safety

Barry E. DiGregorio

The year-old European Aquavalens Project, led by the University of East Anglia (UEA) in Norwich, England, is applying genetic techniques such as 16S rRNA/rDNA fingerprinting combined with nanotechnology for detecting microorganisms in water as part of a