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nature
REVIEWS

MICROBIOLOGY



ARMAGEDDON AVERTED?
Following the spread of drug-resistant
tuberculosis

Say hello to our little
friends
by George Marshall

► **COVER:** 'The end is nigh?' by George Marshall, inspired by the Opinion article on p81.



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Bacteria that occupy intracellular niches inside host cells avoid host immune responses and benefit from ready access to a range of nutrients. However, an intracellular lifestyle presents several challenges that bacteria have evolved to overcome. One model intracellular pathogen is the bacterium *Legionella pneumophila*, which, following inhalation of aerosols from contaminated water sources, infects lung macrophages and co-opts host cell trafficking pathways to establish a membrane-bound replication vacuole. On page 13, Ralph Isberg and colleagues focus on the strategies that *L. pneumophila* uses to subvert host cell processes to form the replication vacuole and in particular the unprecedented large number of translocated proteins that are secreted by the bacteria into the host cell.

Another pathogen that forms a replicative vacuole within the host cell is the Gram-negative bacterium *Salmonella enterica*. Infection with *S. enterica* can result in several life-threatening diseases in humans, including enteric fever and gastroenteritis. In their Opinion article on page 73, Pietro Mastroeni and colleagues reveal how gaining detailed information on *S. enterica* pathogenesis at the single-cell level during infection of mouse models is beginning to provide a better understanding of the location and spread of infection and how functionally independent subpopulations of the bacteria exist in different tissues.

Finally, on page 25, Kevin Waldron and Nigel Robinson describe how metal homeostasis is achieved in bacteria. Metalloproteins constitute up to one-third of the total cellular protein content in some bacteria and archaea, so ensuring that each metalloprotein selects the right metal is a challenge. This Review describes how metal sensors, transporters and stores have a crucial role in ensuring metalloproteins are populated with the correct metal.

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