

addition, other organisms that have been reported rarely as causing TB include *M. pinnipedii* (a bacillus infecting seals and sea lions in the southern hemisphere and recently isolated from humans), *M. mungi* (isolated from banded mongooses in southern Africa), *M. orygis* (described in oryxes and other Bovidae in Africa and Asia and a potential cause of infection in humans), and *M. microti* (the “vole” bacillus, a less virulent organism). Finally, *M. canetti* is a rare isolate from East African cases that produces unusual smooth colonies on solid media and is considered closely related to a supposed progenitor type. There is no known environmental reservoir for any of these organisms.

M. tuberculosis is a rod-shaped, non-spore-forming, thin aerobic bacterium measuring 0.5 μm by 3 μm . Mycobacteria, including *M. tuberculosis*, are often neutral on Gram’s staining. However, once stained, the bacilli cannot be decolorized by acid alcohol; this characteristic justifies their classification as acid-fast bacilli (AFB; [Fig. 178-1](#)). Acid fastness is due mainly to the organisms’ high content of mycolic acids, long-chain cross-linked fatty acids, and other cell-wall lipids. Microorganisms other than mycobacteria that display some acid fastness include species of *Nocardia* and *Rhodococcus*, *Legionella micdadei*, and the protozoa *Isospora* and *Cryptosporidium*. In the mycobacterial cell wall, lipids (e.g., mycolic acids) are linked to underlying arabinogalactan and peptidoglycan. This structure results in very low permeability of the cell wall, thus reducing the effectiveness of most antibiotics. Another molecule in the mycobacterial cell wall, lipoarabinomannan, is involved in the pathogen–host interaction and facilitates the survival of *M. tuberculosis* within macrophages.