


**FIGURE 208-1** Differentiation of pathogenic, intermediate, and nonpathogenic (saprophytic) *Leptospira* species by molecular phylogenetic analysis using the *rrs* gene and including the potentially new pathogenic species *Leptospira borgpetersenii* group B and the saprophytic species *Leptospira idonii*. Scale bar indicates the rate of nucleotide substitutions per base pair. (Figure prepared and provided by Dr. A. Ahmed, KIT Biomedical Research, Amsterdam, The Netherlands.)

analyses (Fig. 208-1). Genome sequences of five *Leptospira* species (*L. biflexa*, *L. interrogans*, *L. santarosai*, *L. borgpetersenii*, and *L. licerasiae*) have been published, and the availability of genome sequences of a wide variety of *Leptospira* strains will undoubtedly lead to a better understanding of the pathogenesis of leptospirosis. However, classification based on serologic differences better serves clinical, diagnostic, and epidemiologic purposes. Pathogenic *Leptospira* species are divided into serovars according to their antigenic composition. More than 250 serovars make up the 26 serogroups.

Leptospires are coiled, thin, highly motile organisms that have hooked ends and two periplasmic flagella, with polar extrusions from the cytoplasmic membrane that are responsible for motility (Fig. 208-2). These organisms are 6–20  $\mu\text{m}$  long and  $\sim 0.1 \mu\text{m}$  wide;

they stain poorly but can be seen microscopically by dark-field examination and after silver impregnation staining of tissues. Leptospires require special media and conditions for growth; it may take weeks to months for cultures to become positive.

#### EPIDEMIOLOGY

 Leptospirosis has a worldwide distribution but occurs most commonly in the tropics and subtropics because the climate and occasionally poor hygienic conditions favor the pathogen's survival and distribution. In most countries, leptospirosis is an underappreciated problem. Most cases occur in men, with a peak incidence during the summer and fall in both the Northern and Southern Hemispheres and during the rainy season in the tropics.