COMMITTEE 2: WORKSHOP ON MICROBIOLOGY

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Animal sources of bacteria. Colonies of infected nine-banded armadillos are established in several countries. The nu/nu mouse is a promising alternative.

Purification. The "IMMLEP 1/79" process yields antigenically intact bacteria with some adsorbed host material (removable by further processing). Methods using density gradients, including unit gravity sedimentation, have been described; the products have been less well characterized.

Structure and ultrastructure. The capsular material around *Mycobacterium leprae* is ultrastructurally and chemically distinct from that around organisms of the *M. avium-intracellulare-scrofulaceum* (MAIS) group. The plasma membrane differs from that of other mycobacteria since the leaflets seem symmetrical. Polysaccharide-specific stains give a characteristic appearance.

Chemical structure. Four types of characteristically mycobacterial lipid occur in *M. leprae*: mycolic acids, phthiocerol dimycocerosate, phenolic glycolipid, and tuberculostearic acid. The glycolipid is serologically active and apparently antigenically unique; it is a major capsular component.

Molecular biology. DNA has been isolated from *M. leprae*. The genome size is in the mycobacterial range, but its G+C ratio is significantly lower. Hybridization confirms that the organisms from experimental and "natural" armadillo infection belong to the same species. Homology with other mycobacterial species is reported to be in the range of 7–26%; homology with some corynebacteria is 20–28%.

Although the whole genome is thought to have been cloned in *Escherichia coli*, no expression has been detected.

The organisms will bind some types of mycobacteriophage, but there is no evidence for multiplication.

Antigenicity. *M. leprae* possess specific antigens and common mycobacterial antigens, perhaps including one of ribosomal origin. Cell clones recognize antigenic determinants of mycobacteria that do not conform to conventional taxonomy. At least two different immune-suppressor activities have been recognized in other mycobacteria, and these may be present in *M. leprae*.

Biochemistry. Uptake of DOPA or incorporation of thymidine by suspensions, or incorporation of thymidine in macrophage cultures, have been used to screen drug sensitivity (and also viability). Measurement of ATP content is a sensitive measure of the metabolic state of organisms.

Uptake of glucose, amino acids, and other potential nutrients occurs. Glycolysis, the pentose-phosphate pathway, and the tricarboxylic-acid cycle appear to operate in *M. leprae*.

Nucleic acid synthesis uses "salvage" pathways, as in some protozoan parasites. Many individual enzyme activities have been detected and distinguished from host-derived activity. Superoxide dismutase is present but catalase has not been detected.

Cultivation. Three types of organisms have been cultivated from infected tissues: a) mycobacteria, b) corynebacteria resembling human pathogenic corynebacteria, and c) morphologically variable organisms with some acid-fast forms.

Type a) has been reported to change its properties, especially the effects on cells, during subculture. Traces of serologically active glycolipid have been detected. Type b) has been well characterized in biochemical terms. An improved culture system has been described for type c). None of these resembles *M. leprae* isolated from tissues.

Prospects. The leprosy bacillus grown *in vivo* emerges as a mycobacterium-like organism with several curious features. Its metabolic processes are understood in outline, and several measures of viability are, or are being, developed. The prospects for cultivation of organisms having identical properties seem good.