Kotelnikova S., 2001, **“**Respiration of iron and manganese by anaerobic methane-oxidizing microorganisms in Witwatersrand Gold Mines at depth of 3.1 km,” *Magnus Bergvalls Stiftelse (MBS) Life and Stiftelsen Lars Hiertas Minne*, Sweden, , pp. 1-45.

The Witwatersrand mining levels at Western Deep Levels Inc. are the deepest in the world. The most productive "reef" is a thin organic-rich layer, called the Carbon Leader, which also contains high uranium concentrations. The gold mines of South Africa provide a unique "window" into the deep, continental biosphere. During the Witwatersrand Deep Microbiology Project we have collected biofilms from a dolomite chamber at 1000 meters, from beneath a weeping borehole and dripping fracture at 3100 meters, as well as Carbon Leader rock and groundwater samples. These samples were inoculated into a variety of microbiological media of different pH to culture aerobic and anaerobic, mesophilic and thermophilic bacteria capable of utilising methane and hydrogen as energy sources. Methane and hydrogen occur frequently in the mines. Our results of most probable number, radiotracer experiments and enrichment cultures showed that methane and hydrogen have been consumed by microbes both in the presence and in the absence of oxygen. At anaerobic conditions methane and hydrogen were respired with ferric iron and manganese (Mn^{3+}, Mn^{4+}). We assume the presence of syntrophic consortia of hydrogen-producing methanotrophs and anaerobic organisms respiring sulphate, ferric iron and/or manganese thereby able to oxidise methane under anoxic conditions. Methane and hydrogen may contribute to the organic carbon production of the ultradeep system, constituting the energy base of subterranean microbial ecosystems. An understanding of the energy giving mechanisms under the Earth´s surface, in deep hot methane and hydrogen rich-environments, may be a key for approaching studies of metabolisms of extraterrestrial life.