A Bacillus Species Growing on the Lipopolysaccharide Fraction of *Salmonella*

Salmonella minnesota R-2050 (a streptomycin sensitive strain) was grown in a 80 l batch on the following medium: beef extract 1%; peptone 1%; NaCl 0.5%. The pH of the medium was adjusted to 7.2 before sterilization. After a growth period of 24 h at 37 °C the cells were harvested by centrifugation and dried with acetone. From the acetone-dried cell material the lipopolysaccharides were extracted according to the method of GALANOS, LÜDERITZ and WESTPHAL[1].

A synthetic medium was composed containing: $(NH_4)_2SO_4$ 0.1%; K_2HPO_4 0.1%; NaH_2PO_4 0.125%; $MgSO_4.7H_2O$ 0.05%; $CaCl_2$ 0.001%; $FeSO_4.7H_2O$ 0.001%; yeast extract 0.3%; lipopolysaccharides 0.2%; agar 1.5%. The pH of the medium was adjusted to 7.2 before sterilization. The sterile medium was distributed in petri dishes. Soil particles were inoculated on the surface of this agar medium. After an incubation period of 48 h at 28 °C, microbial growth was observed around the soil particles. The colonies were purified on the same agar medium but without yeast extract. After several purification transfers colonies were obtained consisting of gram-positive rods. This gram-positive rod culture was purified by heating a suspension during 10 min at 80 °C and streaking on the lipopolysaccharide agar. Luxurious growth of the purified culture was obtained on the lipopolysaccharide agar medium (without yeast extract).

The microorganism occurs singly, in pairs and short chains. The cells are gram-positive and stain uniformly. Grown on the lipopolysaccharide medium they are 0.9 by 4 microns. Spores are 0.9 by 1.4 microns, ellipsoidal to subterminal. The sporangia are only slightly swollen if at all. The cells are motile. Acid but no gas is produced (with peptone as source of nitrogen) from xylose, glucose, fructose, galactose, mannose, lactose, sucrose, mannitol, sorbitol, dulcitol and dextrine. No acid or gas is produced on arabinose, rhamnose or sorbitol. Starch is not hydrolyzed. Ammonium salts are not utilized as source of nitrogen. Nitrites are produced from nitrates. Urease not produced. Indole is not formed. No growth occurs in 10% NaCl. Citrates not utilized. On potato a weak yellowish pigment is formed. Gelatine stab: slow crateriform liquefaction. H_2S is not formed. On broth a light uniform turbidity. Acetylmethylcarbinol is not produced. The MR-test is positive. Milk is coagulated.

According to Bergey's Manual of Determinative Bacteriology, the microorganism should be classified as *Bacillus firmus*.

Experiments are now being undertaken to study the breakdown of *Salmonella*-lipopolysaccharides by this microorganism.

Résumé. Un bacille gram-positif, capable de se développer sur des lipopolysaccharides isolées de *Salmonella*, comme seule source de carbone, fut isolé de son milieu et fut identifié comme *Bacillus firmus*.

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Microbial Degradation of Aromatic Hydrocarbons Used as Reactor Coolants

The organic heat-carriers used as coolants in nuclear reactors are usually mixtures of aromatic hydrocarbons: diphenyl, naphthalene and its alkylderivatives, terphenyls and higher aromatics. These compounds create serious difficulties in decontamination procedures when present or combined with radioactive contaminants, as they are chemically stable and insoluble in aqueous solutions. Consequently about 50 solvents have been examined for their solvent power and a choice was made on the basis of their chemical and physical properties, toxicity and cost for decontamination purposes[1].

Since the use of pure organic solvents is not possible at all in decontamination procedures, we successfully tried the use of solvent emulsions and two-phase systems[2]. However, the waste waters from this decontamination process could not easily be treated by usual coprecipitation method[3]. We therefore tried a bacteriological pretreatment of the waste waters, since some aromatic hydrocarbons are known to be metabolized by a large number of microorganisms[4].

The waste waters have approximately the following composition: 0.33‰ *m*-terphenyl; 0.17‰ *o*-terphenyl; traces of *p*-terphenyl and high-boilers; 1.5‰ thermip. Thermip is a heat-exchanger supplied by ESSO Standard Oil Co. with an approximative composition of 7% naphthalene, 70% methylnaphthalene, 23% diphenyl and alkylderivatives of naphthalene[5].

In the present paper the organisms able to grow on diphenyl, *m*-terphenyl and on the thermip-mixture are described, together with the biological decontamination procedure of the waste waters.

Experimental. The microbial degradation of the aromatic hydrocarbons which are present in the waste waters has been obtained in mineral medium cultures by 3 different organisms. The first one, *Pseudomonas desmolyticum*, able to utilize naphthalene and its alkylderivatives, had previously been isolated[6], while the other 2 organisms were obtained by enrichment cultures with diphenyl and *m*-terphenyl as sole carbon and energy source. Ispra soil was used as inoculum. The bacterium

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