A PRELIMINARY SURVEY OF THE BUDDING AND PROSTHECATE BACTERIA OF SELECTED KENYAN LAKES.

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ABSTRACT

Water samples were collected from lakes Naivasha, Victoria, Elmenteita, Nakuru and Magadi and enrichment cultures set up either without substrate addition or with the addition of specified concentrations of methanol, methylamine hydrochloride, casein hydrolysate, yeast extract and peptone. Periodic examination of these enrichments showed that different morphotypes of budding and prosthecate bacteria were present. Routine examination of the water samples was done using a phase contrast light microscope while, occasionally, a transmission electron microscope was used and electron micrographs of the budding and prosthecate bacteria observed were taken.

There was marked variation in the abundance and kinds of budding and prosthecate bacteria observed in fresh and alkaline water samples. Lake Nakuru had the greatest number of different bacterial morphotypes especially those belonging to the genus Hyphomicrobium. Bacterial morphotypes of the genera Pasteuria, Blastobacter, Planctomyces and Pedomicrobium were more frequently observed in fresh than alkaline water enrichments. Budding and prosthecate bacteria were not observed in enrichment samples from Lake Magadi.

The morphology and size of budding and prosthecate bacteria tended to vary with the type of enrichment medium used. In general, the bacterial cells observed in enrichment media without substrate addition and those

with the addition of yeast extract tended to be large and less aggregated. Rosette formation and prostheca number increased in liquid enrichment cultures containing methanol, casein hydrolysate, peptone and methylamine hydrochloride.

Quantitative data on budding and prosthecate forms which attach to glass slides and cover glasses, using the submerged slide, agar-coated slide and water-petri-dish methods, revealed that certain types attach more frequently than others. Thus, Hyphomicrobium, Caulobacter, Pedomicrobium and mushroom-shaped types were seen to attach to surfaces more frequently than the other morphotypes. The submerged electron microscope grid method was found not suitable for quantitative studies of budding and prosthecate bacteria as the grid surfaces were quickly overgrown by non-budding and non-prosthecate forms; also the grid surfaces tended to be covered with various salts and other debris, thus, making it almost impossible to view the bacteria that had adhered to the grid surfaces.

Pure culture studies were generally a failure due to lack of rapid methods for isolation. This was mainly due to the slow growth rates exhibited by these bacteria and the fact that the budding and prosthecate types tended to be overgrown by other forms, especially in alkaline water enrichments. For future isolation of these bacteria from alkaline water samples, Grant's medium is recommended.

Several seemingly 'new' forms of budding and prosthecate bacteria were encountered. These included

the 'apple'-shaped budding and prosthecate forms, 'Triangular' budding and prosthecate types and prosthecate 'flat angular' types. For proper characterisation and identification of these and other bacterial morphotypes belonging to the budding and prosthecate group, long term studies aimed at pure culture isolations and quantitative studies of each lake water samples should be carried out. A more detailed nutritional study should be undertaken to help determine the physiology and biochemistry of these bacteria. This should lead to a complete comparison and taxonomy of budding and prosthecate bacteria occuring in fresh and alkaline lakes in Kenya. Such information might be useful in determining the ecological significance of these bacteria in the environments in which they occur.

Finally, the objectives set up at the beginning of the present study were partially accomplished. This was partly due to lack of rapid methods for enrichment and isolation of budding and prosthecate bacteria and partly to the short period of research covered.