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MEVALONIC ACID CONCENTRATIONS IN HALOPHILIC BACTERIA

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It is an established fact that isoprenoid compounds in all organisms are biosynthesized from mevalonic acid (MVA). A survey of the polar [1] and nonpolar lipids [2] of several strains of halophilic bacteria has shown that virtually all neutral lipids consist exclusively of isoprenoid-derived compounds. Even the side chains of phospholipids, glycolipids and sulfolipids of extreme halophiles are isoprenoid derived [1]. Despite the interest shown in the metabolism of isoprenoid compounds in halophilic bacteria, no report of the presence of MVA in halpohilic bacteria has yet appeared. In this paper, we report determinations of the levels of MVA in several strains of moderately to extremely halophilic bacteria.

Halobacterium cutirubrum and *H. salinarium* showed the highest levels of MVA with *H. halobium* the lowest (Table 1). The values observed for MVA are much higher than those reported [3] for many fruits and vegetables (e.g. tomato, carrot, cucumber, bananas, peas, egg plants, cabbage), but are comparable to those reported for peach, nectarines and sweet corn. The concentration of MVA in the one moderate halophile examined was only slightly lower than extreme halophiles. The high amounts of MVA in halophilic bacteria are not surprising in view of the fact that these bacteria contain lipids which are exclusively derived from isoprenoid chains.

Table 1. Concentration of mevalonic acid in halophilic bacteria

Organisms*	MVA (mg/100 g)
Extreme halophiles	
H. cutirubrum, 54001	1.7
H. halobium, 34020	1.0
H. halobium M, 34014	0.8
H. salinarium, PN	1.6
H. salinarium, PN (colorless)	1.5
Amoebobacter morrhuae, 51001	1.4
Sarcina litoralis, 16006	1.3
Moderate halophiles	
$A_{31}C$, 41017	1.1

* For details of microorganisms and their number from the National Research Council of Canada Culture collection, see ref. [2].

EXPERIMENTAL

Halophilic bacteria were grown and harvested as described elsewhere [2]. The harvested cells (10 g wet wt) were suspended in 100 ml of buffered salt soln (M NaCl–HCl, pH 1.5) and blended for 5 min. The pH was adjusted to 1.5 with conc H_2SO_4 and the whole incubated at 37° for 18 hr to allow the full conversion of MVA to mevalonic acid lactone (MVAL). The cell debris were removed by centrifugation and the supernatant extracted with EtOAc (4 × 400 ml). The solvent was dried (Na_2SO_4) and then taken to small vol.

The sample was purified on Si gel H TLC plate in C_6H_6–Me_2CO (1:1). The bands of MVAL (R_f 0.45 ± 0.05) were located by $FeCl_3$–HCl [4], eluted with dry MeOH and analysed by GLC using a stainless steel column (0.46 m) of 5% SE-30 on chromosorb W. Column temp.—120°, injector temp.—200°, detector temp.—210°, carrier gas (N_2) pressure—3 kg/cm², H_2—0.7 kg/cm², air—1.5 kg/cm².) The amount of MVAL was calculated from standard curves. The R_f of MVAL was 0.088 (to methyl myristate).

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