

NOTE

A NOTE ON pH TOLERANCE OF AEROBACTER AEROGENES AND AEROBACILLUS MACERANS AS RELATED TO NATURAL ECOLOGY AND DECOMPOSITION OF ACID FOOD PRODUCTS

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Recently, two instances of spoilage of high-acid food products by bacteria generally considered as low-acid-tolerant types have been observed. In the first case, strains of *Aerobacter aerogenes* were found to decompose potassium bitartrate (cream of tartar) in liquid media having pH values of 3.9 to 4.2. In the other instance strains of *Aerobacillus macerans* were found to cause spoilage of canned fruits having original pH values of 3.8 to 4.0. Evidence for the unusual tolerance of both *Aerobacter aerogenes* and *Aerobacillus macerans* was obtained by repeated growth of the purified cultures in media of high acidity. All pH values were determined with the glass electrode.

The cultures of both *Aerobacter aerogenes* and *Aerobacillus macerans* were typical of the species as described in the literature. The strains of *Aerobacter aerogenes* were obtained from spoiled calcium tartrate and soil. The cultures of *Aerobacillus macerans* were obtained from water, canned peaches, and diced, mixed fruit (peaches and pears). These observations indicate that environment played no significant role in the possible creation of the acid tolerance of the cultures studied. This suggestion is supported by the fact that no purified cultures were carried on media with pH values less than 6.0. Yet transfers of cultures from these nearly neutral media to highly acid media grew and caused decomposition of the fermentable constituents of the media.

It is believed rather generally, with some substantiating evidence, that neither *Aerobacter aerogenes* nor *Aerobacillus macerans* is particularly tolerant of acid surroundings. From the ecological standpoint most consider these two species to be found growing only in neutral or nearly neutral surroundings such as waters and soils, low-acid vegetables, cereals, and other neutral products. (Consult Levine: Iowa State Coll. Eng. Expt. Sta., Bull. 62; Porter, McCleskey, and Levine: J. Bact., **33**, 163; Parr: Bact. Revs., **3**, 1; Vaughn and Levine: J. Bact., **44**, 487.)

The mere isolation of either *Aerobacter aerogenes* or *Aerobacillus macerans* from acid substrates does not constitute proof of their ability to tolerate and, more particularly, to grow actively in such acid surroundings as described. Since, however, these bacteria were proved to grow and decompose fermentable carbohydrates at such low pH values, it seems advisable to suggest the possibility that present conceptions of acid tolerance among certain groups of bacteria should be re-evaluated. Precedent for such re-evaluation of limits of tolerance of bacteria to acid surroundings has been set by Spiegelberg (J. Bact., **31**, 85; Food Research, **5**, 115) and Townsend (J. Bact., **36**, 315; Food Research, **4**, 231) who worked with *Clostridium pasteurianum*.