Physiological properties of a non-autotrophic sulphur-oxidizing bacterium

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It is generally assumed that sulphide oxidation in waste water purification plants often is carried out by heterotrophic sulphide-oxidizing bacteria. This has also been claimed for sulphur oxidation

in soil and marine environments. Although much is known about the physiology of the obligately and facultatively autotrophic sulphide oxidizers very little is known of these heterotrophic sulphide oxidizers (chemolithoheterotrophs). Recent work of our group has indicated that the latter group of organisms would be particularly important in those environments where high turnover rates of organic compounds would be combined with low rates of reduced inorganic sulphur compounds. Indeed, enrichments using mixed feed of acetate (15 mM) and thiosulphate (10 mM) yielded a dominant culture of a chemolithoheterotroph (Gottschal and Kuenen, 1980). In order to obtain a better understanding of this type of metabolism physiological studies were made on this organism, provisionally called *Thiobacillus* strain Q.

This organism is able to oxidize thiosulphate completely to sulphate. Thiosulphate-oxidizing capacity measurements indicate that the necessary enzymes are also present when *Thiobacillus* Q is grown on acetate alone and can be induced to full capacity in several hours. The addition of thiosulphate (5 mM) to acetate-limited (10 mM) chemostat cultures resulted in an increase in yield from 60 to 85 mg protein per litre indicating that *Thiobacillus* Q can indeed make use of the energy liberated by thiosulphate oxidation. All attempts to grow this organism autotrophically have failed. This indicates that *Thiobacillus* Q should be considered a chemolithoheterotroph, able to utilize energy derived from the oxidation of reduced sulphur compounds and unable to grow autotrophically.

GOTTSCHAL, J. C. and KUENEN, J. G. 1980. Selective enrichment of facultatively chemolithotrophic thiobacilli and related organisms in continuous culture. — FEMS Microbiol. Lett. 7: 241–247.