

the stepwise reactions of the cycle. Recently Ramakrishnan and Martin<sup>12</sup> studied the enzymes involved in the formation of citric acid in *A. niger* with a view to find out how far the cycle operates during formation and accumulation of citric acid in *A. niger*. The citric acid producing strain of *A. niger*, N.R.C. 233 has been grown in non-citrate accumulating medium containing malt extract, yeast extract and glucose in shake flasks for 18 hours and the mat obtained. The different enzymes have been extracted from the mat. Recently, the condensing enzyme has been isolated with a high degree of purity and it has been successfully established that the enzyme can affect the synthesis of citrate from acetyl phosphate, coenzyme A and oxalacetate according to the reaction  $\text{acetyl-phosphate} + \text{coenzyme A} \rightarrow \text{acetyl-coenzyme A} + \text{P}$ ;  $\text{acetyl-coenzyme A} + \text{oxalacetate} \rightarrow \text{citrate} + \text{coenzyme A}$ . The condensing enzyme in *A. niger* appears to be different from the one isolated from animal tissues in that it is inhibited by  $\text{Mg}^{++}$  whereas it has been found essential for the latter.<sup>13</sup> It has been possible to detect the presence of all the enzymes of Krebs' tricarboxylic acid cycle in the cell free extracts of *A. niger*.<sup>4</sup> Thus, evidence for the operation of Krebs' cycle in *A. niger* when grown in a non-citrate accumulating medium has been obtained.

Since the medium used in these investigations is a non-citrate accumulating medium which is different from the one used in industry for large-scale production of citric acid, mold pellets from the actively fermenting molasses medium (in which citric acid is formed and accumulated) were taken out at different periods of citric acid production, the cell free extracts prepared and tested for the presence of the enzymes of Krebs' citric acid cycle. It was found that in the initial stages when no citric acid accumulated, all the enzymes of

Krebs' cycle were present and as citric acid started accumulating, aconitase and isocitric dehydrogenase activities became zero. It seems Krebs' cycle enzymes are present in *A. niger* during non-accumulation of citrate and the cycle gets broken down at aconitate and isocitrate levels when citrate starts accumulating in the medium. Even though the reason for the inhibition of aconitase has not been worked out, it is found that addition of excess citrate inhibits isocitric dehydrogenase.<sup>11</sup> From the above discussions, it would seem logical to assume that the formation and accumulation of citric acid in *A. niger* is the net outcome of several reactions like stoppage of operation of Krebs' cycle at a definite stage. Since most of the enzymes required for all these reactions have been detected and many of them purified, it will be possible to study the reactions stepwise, using isotopic and chemical methods, and come to a definite conclusion as regards the mechanism of formation and accumulation of citric acid in *A. niger*.

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### 'ATOMS FOR PEACE' EXHIBITION

DR. K. S. KRISHNAN, Director, National Physical Laboratory, declared open the "Atoms for Peace" exhibition in New Delhi on March 10, 1955. The exhibition was organised by the U.S. Information Service with the help of the U.S. Atomic Energy Commission, to illustrate and explain the peaceful uses of atomic energy, depict the various phases of atomic

energy development through pictorial panels and charts, miniature working models of Geiger counters, atomic reactors and atomic power plants, and practical uses of various forms of atomic energy. The exhibition will be shown in 50 towns and Universities in India during the next two years.