globin. HRP bears a resemblance to the acute-phase proteins such as C-reactive protein (Hedlund, 1961) showing many of the characteristics of an antibody without being immunoglobulin.

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COMMUNICATIONS

Biosynthesis of *N*-Acetylanthranilic Acid by Aromatic Auxotrophs of *Aerobacter aerogenes* and *Escherichia coli*

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N-Acetylanthranilic acid has been isolated from culture filtrates of *Aerobacter aerogenes* N5-36 (a mutant lacking phosphoribose anthranilate transferase) utilizing either shikimic acid or quinic acid (Ratledge, 1967, 1968). The role of this compound in the biosynthesis and metabolism of aromatic compounds was not clear. Present work has shown that during growth of this mutant on quinic acid medium supplemented with 10 μ M-L-tryptophan anthranilate accumulation commences immediately whereas that of *N*-acetylanthranilate begins about 90 min later. Maximum concentrations are reached at the beginning of the stationary phase of growth and are 190 μ M and 100 μ M respectively. By increasing the tryptophan concentration to 30 μ M anthranilate accumulation is decreased and that of *N*-acetylanthranilate is completely arrested. At 50 μ M-tryptophan or above no anthranilate accumulates but if 70 to 360 μ M anthranilate is added into such a medium from *N*-acetylanthranilate can be detected once more in the culture filtrates.

Extracts of this mutant catalyse the synthesis of *N*-acetylanthranilate from anthranilate in the presence of either acetyl-CoA or acetate, CoA and ATP. No deacylation of the product could be demonstrated. The apparent K_m for anthranilate in crude extracts is about 10 mM. Similar acetylating enzymes are also present in extracts prepared from *A. aerogenes* NCW (parent wild-type), *A. aerogenes* 62/1 (a multiple auxotroph: phe⁻, tyr⁻, try⁻) and *Escherichia coli* B37 (a mutant lacking phosphoribose anthranilate transferase). These organisms also accumulate *N*-acetylanthranilate in the growth medium (but for *A. aerogenes* NCW 360 μ M-anthranilate had to be included in the medium;

and *Escherichia coli* B37 was grown on glucose with 10 μ M-tryptophan). *N*-Acetylanthranilate is not found, however, when *A. aerogenes* NC3 (a mutant lacking anthranilate synthetase) is grown on quinic acid medium but does accumulate upon the addition of 360 μ M-anthranilate into the medium.

All available evidence suggests that *N*-acetylanthranilate arises from, and is not a precursor of, anthranilate. The acetylase appears to be a constitutive enzyme as it is not repressed in *A. aerogenes* N5-36 by up to 150 μ M-tryptophan and is present in cells of *A. aerogenes* NCW and NC3 which do not, under normal conditions, accumulate anthranilate. The high K_m value suggests that this enzyme may well have a broad specificity although this has yet to be tested.

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The Precursors of Nicotinic Acid in Bacteria

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Tryptophan is the precursor of nicotinic acid in fungi (Bonner & Yanofsky, 1951) and mammalian tissues (Nishizuka & Hayaishi, 1963), but does not appear to be a precursor in most bacteria and plants.

In studies with *Escherichia coli*, the carbon skeleton of nicotinic acid was found to be derived from a C₄ dicarboxylic acid and a C₃ unit such as glycerol (Ortega & Brown, 1960). Similar findings were reported with *Mycobacterium tuberculosis*, when it was found that [1,3-¹⁴C]glycerol was