- Smith, J. N., Smithies, R. H. & Williams, R. T. (1954b)
Biochem. J. **57**, 74
 Sundvik, E. (1886) *Jahresber. Thierchem.* **16**, 76

Liver L-Serine-Pyruvate Aminotransferase Activity in Different Animal Species

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In a comparative survey for liver serine dehydratase, covering the pig, sheep, rabbit, guinea pig, rat, mouse and common shrew, activity was found to increase consistently with decreasing body size—with increasing basal metabolism (Rowsell *et al.*, 1965). From recent assays we can report that the body size relationship still holds when we include values for cat and dog liver. With amphibian liver (from common frog, green tree frog, natterjack toad), however, we find no measurable activity.

The distribution pattern for L-serine-pyruvate aminotransferase activity is altogether different. Assays were made on homogenates of fresh liver by measuring hydroxypyruvate formation with D-glycerate dehydrogenase (Rowsell *et al.*, 1969). The results obtained, expressed as μmol of hydroxypyruvate/h per g of tissue, as means $\pm$ S.D. (nos. of animals), were as follows: mouse, 4.66 ± 0.86 (5); blackhooded rat, 1.59 ± 0.27 (10); Sprague-Dawley rat, 4.45 ± 0.77 (9); Wistar rat, 3.30 ± 0.47 (7); guinea pig, 0.53 ± 0.19 (3); rabbit, 24.8 ± 4.5 (12); sheep, 1.07 ± 0.20 (4); pig, 1.42 ± 0.44 (4); cat, 94 ± 32 (6); dog, 126 ± 49 (14); common frog, 54 ± 10 (5); common toad, 51.5 and 46.3. The most notable feature is the outstandingly high activity in the carnivorous species.

The reverse reaction, with hydroxypyruvate and L-alanine as substrates, was assayed, by measuring serine formation with ninhydrin after separation by paper chromatography (Kay *et al.*, 1956). Dog and frog liver activities were 2–3-fold greater than with L-serine and pyruvate as substrates; and we note that Sallach's (1956) original studies on serine formation by transamination employed a dog liver enzyme. Even so, it is difficult to accept that the function of this enzyme is to form L-serine: the flesh eater, presumably, derives an abundant supply of amino acids from its food; it seems unlikely it would be especially well equipped for their synthesis. We assume, rather, that the enzyme operates, at least in the carnivore, to convert L-serine into hydroxypyruvate as the first step towards glucose formation via D-glycerate.

Moreover for rat liver there is evidence that L-serine is converted into glucose without being liberated as pyruvate, from perfusion studies; testing the effects of quinolinate, a potent inhibitor of phosphoenolpyruvate carboxykinase (Lardy *et al.*, 1969). The authors conclude that L-serine-pyruvate aminotransferase, rather than L-serine dehydratase, is the enzyme initiating gluconeogenesis from L-serine. Our comparative findings are consistent with that suggestion.

- Kay, R. E., Harris, D. C. & Entenman, C. (1956) *Arch. Biochem. Biophys.* **63**, 14
 Lardy, H. A., Veneziale, C. M. & Gabrielli, F. (1969) *FEBS Symp.* **19**, 55
 Rowsell, E. V., Carnie, J. A. & Wahbi, S. D. (1965) *Biochem. J.* **96**, 13P
 Rowsell, E. V., Snell, K., Carnie, J. A. & Al-Tai, A. H. (1969) *Biochem. J.* **115**, 1071
 Sallach, H. J. (1956) *J. Biol. Chem.* **223**, 1101

Activities of Phosphopyruvate Carboxylase and Citrate Synthase in Rat and Cow Liver after Glucocorticoid Administration

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The administration of a glucocorticoid to rats increases hepatic gluconeogenesis and ketogenesis. However, Baird & Heitzman (1971) have shown that glucocorticoids are antiketogenic and possibly do not increase gluconeogenesis in bovine liver.

In investigations of the reasons for this difference, the metabolic role of oxaloacetate has been an important consideration. Oxaloacetate is at a key branching point: it can be converted into phosphoenolpyruvate via the phosphopyruvate carboxylase reaction or into citrate through the citrate synthase reaction. The activities of these enzymes are important, since they could affect the fate of oxaloacetate and thus gluconeogenesis and ketogenesis. The sub-cellular distribution of these enzymes is also important; in rat liver phosphopyruvate carboxylase is almost exclusively located in the cytoplasm whereas citrate synthase is a mitochondrial enzyme. The enzymes distribute much more evenly between cytoplasm and mitochondria in bovine liver cells.

The administration of 10mg of dexamethasone 21-isonicotinate to healthy cows resulted, 48h later, in a significant decrease of the hepatic phosphopyruvate carboxylase activity in the cytoplasm to 36% of the control value with no effect on the activity of the particulate enzyme. The citrate synthase activity in bovine liver was increased to 180% of the control value in the particulate fraction and to 187% in the