

CHARACTERISATION OF THE ORGANELLES OF PAPAVER SOMNIFERUM LATEX

M.F. Roberts*, Pharmacognosy Department, The School of Pharmacy, London University, U.K. and T.M. Kutchan and C.J. Coscia, Department of Biochemistry, St. Louis University Medical School, St. Louis, Mo. 63104, U.S.A.

The biosynthesis of morphine and related alkaloids from labelled amino acid precursors has been demonstrated in both whole latex and unwashed 1000 g sedimentable organelles of P. somniferum (Wilson and Coscia 1975). Since the latter contains a heterogeneous population of organelles, it was of interest to determine the loci at which morphinan alkaloids, their precursors and enzymes implicated in their biosynthesis are compartmentalised. 1000 g organelle preparations were subject to sucrose density gradient centrifugation and resolved fractions were examined by electron microscopy and analysed for morphine and thebaine content, ($^{14}\text{C}_3$)-morphine uptake and enzyme activity. A distinct alkaloid containing population of vesicles was separated and demonstrated to contain a latent phenolase (Roberts 1974). Another group of organelles occurred just below the surface of the gradient which were smaller and lighter. These contained the bulk of the latex phenolase which was readily released on plasmolysis of these apparently fragile organelles. The remnants of dopa decarboxylase and acid phosphatase activities which were previously demonstrated to be in the 1000 g supernatant (Antoun and Roberts 1975, 1978) were detected at the top of the gradient.

Sucrose gradients of poppy latex 1000g organelle preparations show high levels of phenolic material which are in excess of the morphine content. Analysis for catechols (Mitchell and Coscia 1978) showed high levels of dopamine (2.7 mg/ml of latex) are present both in the 1000 g supernatant and in the population of organelles containing the morphinan alkaloids. Other phenolic material is also present. The high levels of endogenous catechols may be one of the reasons for the low incorporation of labelled catechols into the alkaloids in many of the earlier experiments investigating biosynthetic pathways.

These results suggest that alkaloids are localised in discrete organelles but both the 1000 g and supernatant fractions of the latex contain the enzymes of alkaloid biosynthesis and the alkaloid precursors.

Wilson, M.L., Coscia, C.J. (1975) *J. Am. Chem. Soc.* 97:431 and ref. therein
Roberts, M.F. (1974) *Phytochemistry* 13:119
Antoun, M.D., Roberts, M.F. (1975) *Phytochemistry* 14:1275
Antoun, M.D., Roberts, M.F. (1978) *Ibid.* 17:1083
Mitchell, J. Coscia, C.J. (1978) *J. Chromatog.* 145:295

Supported in part (C.J.C.) by NSF Grant PCM 80-11741