where E-OH represents the enzyme with its non-thiol binding site and ACP-SH represents acyl-carrier protein.

- Joshi, V. C., Plate, C. A. & Wakil, G. J. (1970) *J. Biol. Chem.* **245**, 2857
 Lynen, F. (1967) in *Organizational Biosynthesis* (Vogel, H. J., Lampen, J. O. & Bryson, V.), p. 243, Academic Press, New York
 Phillips, G. T., Nixon, J. E., Abramovitz, A. S. & Porter, J. W. (1970) *Arch. Biochem. Biophys.* **138**, 357.
 Plate, C. A., Joshi, V. C. & Wakil, S. J. (1970) *J. Biol. Chem.* **245**, 2868

Incorporation of Fatty Acids into Monogalactosyl Diglycerides by Spinach Leaf Cell-Free Preparations

By S. S. BAIWA and P. S. SASTRY (*Department of Biochemistry, Indian Institute of Science, Bangalore-12, India*)

Mono- and di-galactosyl diglycerides are the major lipid components of chloroplasts and, in contrast with phospholipids, these plant galactolipids contain unsaturated fatty acids, usually α -linolenate, in both the 1- and the 2-position of the diglyceride moiety (Sastry & Kates, 1964). Although it has been shown in spinach that monogalactosyl diglyceride is synthesized from diglyceride and UDP-galactose (Neufeld & Hall, 1964; Ongun & Mudd, 1968), the enzymic mechanisms for the biosynthesis of the dilinolenin moiety in monogalactosyl diglyceride are not clearly understood.

Dialysed spinach (*Tetragonia expansa*) leaf homogenate and chloroplast preparations were found to incorporate 1-¹⁴C-labelled palmitate, stearate, oleate and linolenate into monogalactosyl diglyceride. This incorporation was much higher in the chloroplast fraction. It was enhanced by CoA and ATP. The activity increased with time, showing that it was enzymic, and was optimum at 30°C. A higher rate of incorporation was obtained with unsaturated fatty acids than with saturated fatty acids. Addition of galactosyl glycerol significantly stimulated the incorporation of oleate and linolenate only. These studies indicate the possible existence of deacylation and reacylation with specific fatty acids as a mechanism for attaining the peculiar fatty acid distribution in monogalactosyl diglyceride of higher plants.

- Neufeld, E. F. & Hall, C. W. (1964) *Biochem. Biophys. Res. Commun.* **14**, 503.
 Ongun, A. & Mudd, J. B. (1968) *J. Biol. Chem.* **243**, 1558
 Sastry, P. S. & Kates, M. (1964) *Biochemistry*, **3**, 1271

The Fatty Acid Composition of Different Classes of Lipids in Developing Human Brain

By P. SRINIVASA RAO and KALLURI SUBBA RAO (*National Institute of Nutrition, Hyderabad-7, A.P., India*)

Information on the lipid composition of developing human brain, particularly during its intrauterine growth, is scanty. Whatever data available so far are concerned mainly with the quantitative changes in various lipids. However, it is equally important to consider the qualitative changes in these lipids that would be reflected in the fatty acid constituents of given class of lipids. An attempt has therefore been made to determine the fatty acid composition of various classes of lipids in different regions (namely cerebrum, cerebellum and medulla oblongata) of brains of foetuses aged 13, 22, 26, 30, 34 and 40 weeks. The extracted lipids were fractionated into neutral lipids (cholesteryl esters, glycerides etc.), glycolipids and phospholipids on a silicic acid column. The fatty acid pattern, after methanolysis of these fractions, was determined by g.l.c. in a column packed with diethylene glycol succinate in Chromosorb W. The fatty acid profile of neutral lipids indicated palmitate, stearate and oleate as major components in all the regions of brain studied. This trend remained almost constant with the progress of gestation. Analysis of the glycolipid fraction showed that lignocerate (C_{24:0}) and nervonate (C_{24:1}) were absent at earlier periods of intrauterine life, but made their appearance towards term, though at a much lower concentration than expected. Studies with the phospholipid fraction also pointed out palmitate, stearate and oleate as predominant components and this pattern did not alter with the gestational age. Analysis of fatty acids in the glycolipid fraction of the brain of a child (4 years old) who had died of kwashiorkor revealed a considerably low content of lignocerate and nervonate, indicating the possibility of defective myelination.

The Gross Fatty Acid Composition of the Body Fat from the Termite (*Odontotermes assmuthi*) Queen

By S. BASALINGAPPA,* R. C. BADAMI† and S. M. KUDARI† (**Department of Zoology and †Department of Chemistry, Karnatak University, Dharwar, Mysore, India*)

An analysis of the total body fat of the termite (*Odontotermes assmuthi*) queen by reversed-phase partition column chromatography (Badami, 1964, 1965) reveals a total of 13 fatty acids as against nine

from two other species (*Macrotermes natalensis* and *Macrotermes goliath*) (Cmelik, 1969). Two other species (*Coptotermes lacteus* and *Nasutitermes exitiosus*) (Moore, 1969) showed only four fatty acids. The 13 fatty acids recorded in the species *O. assmuthi* are C_{10:0}, C_{12:0}, C_{14:0}, C_{15:0}, C_{16:0}, C_{17:0}, C_{18:0}, C_{16:1}, C_{18:1}, C_{18:2}, C_{18:3}, C_{20:0} and C_{22:0}.

Badami, R. C. (1964) *Chem. Ind. (London)* 1920
 Badami, R. C. (1965) *Chem. Ind. (London)* 1211
 Cmelik, S. H. W. (1969) *J. Insect Physiol.* **15**, 1487
 Moore, B. P. (1969) in *Biology of Termites* (Krishna, K. & Weesner, F. M., eds.), vol. 1, p. 407, Academic Press, New York

Effects of Cabbage Phospholipase D on the Lipids and Enzyme Activities of Rat Liver Microsomal Fraction

By C. L. KAPOOR, RAJENDRA PRASAD and N. K. GARG
 (Division of Biochemistry, Central Drug Research Institute, Lucknow, India)

Phospholipase A cleaves fatty acid chains and phospholipase C removes polar groups (phosphorylcholine, phosphorylethanolamine and phosphorylserine) from membrane phospholipids. The activities of certain membrane-bound enzymes of isolated mitochondrial and microsomal membranes are profoundly affected under the action of these phospholipases *in vitro* (Awasthi *et al.*, 1969; Poulter *et al.*, 1971). The specificity of the action of phospholipase is now beginning to prove useful in obtaining and understanding the role of polar and non-polar regions of phospholipid molecules in the maintenance of structure and function in biological membranes.

Phospholipase D specifically removes only bases from isolated phospholipids (Kates, 1965; Davidson & Long, 1958; Talwalkar *et al.*, 1969) and also mediates transphosphatidylolation in the presence of choline, ethanolamine, serine, glycerol etc. (Yang *et al.*, 1966). Its action on biological membranes does not seem to have been adequately studied.

The action of partially purified phospholipase D of savoy cabbage on rat liver microsomal fraction has been studied. Evidence is presented for the degradation of membrane phospholipids with concomitant loss of glucose 6-phosphatase and adenosine triphosphatase activities in phospholipase D-treated microsomal fraction and release of phospholipid bases, cholesterol, uncharacterized lipid and protein (including glucose 6-phosphatase and adenosine triphosphatase) into the medium. The results obtained indicate a role for phospholipid bases in the binding of membrane cholesterol and protein.

Awasthi, Y. C., Berezney, R., Ruzicka, F. J. & Crane, F. L. (1969) *Biochim. Biophys. Acta* **189**, 457
 Davidson, F. M. & Long, C. (1958) *Biochem. J.* **69**, 458

Kates, M. (1955) *Can. J. Biochem. Physiol.* **33**, 575
 Poulter, J., Cater, B. R. & Hallinan, T. (1971) *Biochem. J.* **121**, 21P
 Talwalkar, R. T., Garg, N. K. & Krishna Murti, C. R. (1969) *Indian J. Biochem.* **6**, 228
 Yang, S. F., Freer, S. & Benson, A. A. (1967) *J. Biol. Chem.* **242**, 477

Do Phospholipases Cause the Breakdown of Mitochondrial Membrane?

By K. DHARMALINGAM and J. J. JAYARAMAN
 (Department of Biological Sciences of Madurai University, Madurai-2, Tamil Nadu, India)

The essential role of phospholipids in the structural and functional integrity of mitochondrial membrane needs no stressing. Any study of the assembly and disassembly of this membrane must take into consideration the phospholipid metabolism.

We have confined ourselves in this investigation to the changes in the phospholipase D content of yeast cells under conditions where mitochondria are being disintegrated (glucose repression) and assembled (de-repression). The enzyme content remains high during the repression period and decreases during the de-repression phase, concomitant with an increase in the O₂ uptake (and, by implication, the mitochondrial content of the cell). Extension of the repression phase by adding glucose keeps the enzyme content high throughout. Yeast cells grown in maltose, which does not have any repressing effect on the O₂ uptake, have low contents of the enzyme. Addition of glucose to maltose-grown cells raises the enzyme content. In a similar way, addition of chloramphenicol, which blocks the mitochondrial assembly, increases the content of the phospholipase D.

In short, under circumstances where the mitochondria are disintegrated *in vivo* the phospholipase D content of the yeast cells is high. Conversely the enzyme content remains low when mitochondria are formed. The crucial question as to whether the increase in the phospholipase D content is the cause or the effect of the breakdown of the mitochondrial membrane is yet to be answered.