be completely reversible. The retention of this characteristic by disaggregated material suggests that the substances responsible on the original membrane surface remain in an accessible position on the particles. If the precipitate is washed with water to remove detergent and is resuspended in water, addition of M-tris-HCl to a final concentration of 5 mM causes a decrease in turbidity and a new material is obtained, which is totally excluded by agarose gels but which may be disaggregated by re-addition of detergent. The detergent-free suspension retains acetylcholinesterase activity and can be shown by light-scattering to be osmotically sensitive. It is believed that the re-aggregate may correspond to that obtained by other workers who have shown its membrane-like nature and vesicular form by electron microscopy (Green *et al.* 1967).

Although it cannot necessarily be inferred that particles obtained by detergent disaggregation of membranes represent fundamental structural units, their properties suggest that further study of them may help to elucidate the role of proteins and protein-lipid interactions in maintaining the integrity of membranes.

R. W. B. is the holder of a Medical Research Council Research Studentship.

- Dodge, J. T., Mitchell, C. D. & Hanahan, D. J. (1963). *Arch. Biochem. Biophys.* **100**, 119.
 Green, D. E., Allman, D. W., Bachmann, E., Baum, H., Kopaczky, K., Korman, G. F., Lipton, S., MacLennan, D. H., McConnell, D. G., Perdue, J. F., Rieske, J. S. & Tzagaloff, A. (1967). *Arch. Biochem. Biophys.* **119**, 312.
 Mitchell, C. D., Mitchell, W. B. & Hanahan, D. J. (1965). *Biochem. biophys. Acta*, **104**, 348.
 Schneidermann, L. J. (1965). *Biochem. biophys. Res. Commun.* **20**, 763.

The Effect of Conjugated Bile Salts on the Esterolytic Activity of Rat Serum

By J. BARROWMAN (introduced by C. W. PARR).
 (Department of Physiology, The London Hospital Medical College, London, E. 1)

Fatty acid esters of the naphthols have been extensively used in the assay of esterases and lipases. The influence of sodium taurocholate on the hydrolysis of a large series of esters of α - and β -naphthol by various esterases has been studied by Gomori (1953); human serum esterase activity towards β -naphthyl acetate was found to be inhibited by sodium taurocholate. In methods for determining serum and urinary lipase with these chromogenic substrates, bile salts have been used as inhibitors of esterase and activators of lipase. Recently, it has been shown that esterolytic activity of rat pancreatic juice towards β -naphthyl acetate

and p -nitrophenyl acetate is enhanced by conjugated bile salts (Barrowman & Borgström, 1968). It was decided, therefore, to study the esterolytic activity of rat serum in systems containing conjugated bile salts.

The incubation systems used were essentially the same as those described by Nachlas & Blackburn (1958), with β -naphthyl acetate as substrate. The bile salts used were sodium taurocholate and sodium taurodeoxycholate. Synthetic sodium taurocholate was shown by thin-layer chromatography to be approximately 96% pure; this preparation contained 4% of sodium taurodeoxycholate, but no unconjugated salts were present. The sodium taurodeoxycholate was also synthetic and shown to be better than 97% pure by thin-layer chromatography. Fresh rat serum, diluted 200-fold with 0.15 M-sodium chloride, was used and incubation systems contained samples corresponding to 0.5 or 1 μ l. of whole serum.

Within the range 0.1–10 mM-bile salt in the incubation system, enhanced esterolysis by serum was observed; sodium taurodeoxycholate was the more active of the two bile salts in this respect. A maximum activation of the esterase activity of 0.5 μ l. of serum was obtained with 0.4 mM-sodium taurocholate in the incubation system; this represented approximately 130% of the non-activated value. No further activation was observed with larger amounts of the bile salt. Sodium taurodeoxycholate gave maximum activation at approximately 165% of the non-activated value.

Rat serum samples of 10–20 mg. of protein were subjected to chromatography on Sephadex G-200 and esterolytic activity was determined in the fractions. Two peaks of activity against β -naphthyl acetate were obtained, a major peak having a K_{av} of 0.42 and a broad minor peak with a K_{av} of 0.14. The activity of the major peak was enhanced by both bile salts; no significant activation of the minor peak could be detected in the presence of either bile salt.

- Barrowman, J. & Borgström, B. (1968). *Gastroenterology*, **55**, 601.
 Gomori, G. (1953). *J. Lab. clin. Med.* **42**, 445.
 Nachlas, M. M. & Blackburn, R. (1958). *J. biol. Chem.* **230**, 1051.