Abstracts

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Biochemistry and nutrition

EFFECTS OF DIETARY PROTEIN AND EFA DEFICIENCY ON LIVER Δ5, Δ6 and Δ9 DESATURASE ACTIVITIES IN THE EARLY DEVELOPING RAT. M.E. De Tomás, O. Mercuri and A. Rodrigo (Cátedra de Bioquímica, Instituto de Fisiología, Facultad de Ciencias Médicas, Universidad Nacional de La Plata, calle 60 y 120, 1900 La Plata, Argentina) *J. Nutr. 110*(4), 595-9 (1980). The influence of protein restriction and EFA deficiency during early development in the rat on the activities of Δ5, Δ6, and Δ9 desaturases was studied. The effect of these diets on body weights and in the fatty acid composition of liver phospholipids was also investigated. The results indicate that the body weights of pups were lowered by feeding the dams both the low-protein and the EFA-deficient diet. The activities of Δ5, Δ6 and Δ9 desaturases were reduced in about 60% by protein deficiency but a rise in the activity of Δ9 desaturase of 362.2% was promoted by feeding the dams the low-fat diet. The fatty acid composition of liver phospholipids indicates that partial deprivation of proteins during early development is associated with a decreased ratio of arachidonate to linoleate. Besides the low-fat group shows in the fatty acid composition of liver phospholipids the typical pattern of EFA deficiency, increased 18:1 and 20:3ω9 and decreased 18:2 and 20:4. It is evident from the current investigation that partial deprivation of protein during early development may impair the conversion of linoleate to arachidonate in the rat and that the lack of arachidonic acid observed in the liver cells during protein deficiency would be the consequence of this impairment.

DEFINITION OF THE PATHWAY FOR MEMBRANE PHOSPHOLIPID FATTY ACID TURNOVER IN HUMAN ERYTHROCYTES. C.A. Dise, D.B.P. Goodman, and H. Rasmussen (Depts. of Internal Med. and Cell Bio., Yale Univ. Schl. of Med., New Haven, CT 06510) *J. Lipid Res. 21*(3), 292-300 (1980). Techniques have been developed to permit detection of acyl thioesters derived from exogenous fatty acids in erythrocytes. These acyl thioesters have been shown to act as intermediates in the acylation of endogenous lysopyospholipid. Release of fatty acids from erythrocyte phospholipids has also been detected. Such release may reflect the activity of an endogenous phospholipase that utilizes endogenous phospholipid as substrate. These observations permit further definition of the biochemical pathway for erythrocyte phospholipid fatty acid turnover.

ESTIMATING FAT BODY MASS FROM ANTHROPOMETRIC DATA. A.E. Dugdale, M. Griffiths (Univ. Paediatric Unit, Mater Children's Hosp., Mater Hill, Queensland, 4101, Australia) *Am. J. Clin. Nutr. 32*(12), 2400-3 (1979). Regression equations have been derived for the calculation of fat body mass in boys from 4 to 12½ years old and girls 4 to 19 years old. Height and weight give a good prediction of fat body mass, but the addition of skinfold thicknesses to the regression equations reduces the number of large errors in the estimates. The regression equations and the limits of accuracy are given.

MEASUREMENT OF THE BINDING OF COLIPASE TO A TRIACYLGLYCEROL SUBSTRATE. C. Erlanson-Albertsson (Dept. of Physiological Chem., Univ. of Lund, Lund, Sweden) *Biochim. Biophys. Acta 617*(3), 371-82 (1980). The binding between colipase and two triacylglycerol substrates, tributyrin and Intralipid®, in the presence of bile salts have been determined quantitatively by a method based on equilibrium partition in an aqueous two-phase system. In the model proposed the triacylglycerol, in the form of spherical droplets covered with bile salt, is assumed to have a certain number of independent binding sites at the surface for colipase. The binding of colipase to Intralipid®, an emulsion of a long-chain triacylglycerol stabilized with phosphatidylcholine and glycerol, was more complex with indications of several different binding sites with different affinity. The majority of these had a dissociation constant $K_d = 1.2 \cdot 10^{-6}$ M in the presence of 4 mM sodium taurodeoxycholate and 150 mM NaCl at pH 7.0. The concentration of binding sites was $2.5 \cdot 10^{-6}$ M. With each droplet having a diameter of 10^{-4} cm, the number of binding sites on each droplet was determined to $1.96 \cdot 10^5$ and the average area available for each colipase molecule to 1600 $Å^2$ at saturation. Colipase on denaturation has a surface of 1320 $Å^2$.

SPHINGOMYELIN SUPPRESSES THE BINDING AND UTILIZATION OF LOW DENSITY LIPOPROTEINS BY SKIN FIBROBLASTS. S. Gatt and E.L. Bierman (Div. of Metabolism and Endocrinology, Dept. of Med., Univ. of Washington, Seattle, WA 98195) *J. Biol. Chem. 255*(8), 3371-6 (1980). Cultured human skin fibroblasts incubated at 37°C with sonically dispersed, positively charged liposomes containing sphingomyelin internalized and metabolized the phospholipid. Sphingomyelin incorporation into the cells produced a reduction in low density lipoprotein binding and degradation. Lecithin-containing liposomes were much less effective. In addition, incubation with sphingomyelin resulted in a marked increase in acetate incorporation into sterol. These results suggest that sphingomyelin, which is required by cells for membrane synthesis, can influence the regulation of the cell surface low density lipoprotein receptor and intracellular cholesterol balance.

MILK, SERUM CHOLESTEROL, AND THE MAASAI. A HYPOTHESIS. M.J. Gibney and P.G. Burstyn (School of Biochem. and Physiological Sciences, Univ. of Southampton, S09 3TU, Great Britain) *Atherosclerosis 35*(3), 339-43 (1980). The Maasai of East Africa have been found to have low serum concentrations of cholesterol and a low incidence of cardiovascular disease in spite of apparently very high milk intakes. On that basis it has been frequently suggested that milk contains a "hypocholesterolaemic factor". The hypocholesterolaemia of the Maasai had also been attributed to a genetic adaptation. We feel that the milk intakes reported for the Maasai are excessively high and that the low incidence of cardiovascular diseases and low levels of serum cholesterol may be adequately explained by their variable and generally low energy intakes.

CHANGES IN FATTY ACID COMPOSITION OF MYELIN CEREBROSIDES AFTER TREATMENT OF THE DEVELOPING RAT WITH METHYLMERCURY CHLORIDE AND DIETHYLMERCURY. I.K. Grundt, E. Stensland, and T.L.M. Syversen (Univ. of Bergen, Lab. of Clinical Biochem., N-5016 Haukeland Sykehus, Norway) *J. Lipid Res. 21*(2), 162-8 (1980). Suckling rats were exposed to methylmercury chloride or diethylmercury in order to induce chronic sublethal intoxication during the period of active myelination. Doses of 5 mg Hg/kg body weight were injected every second day from 5-25 days of age. The rats were killed at 27-28 days of age, and the brains contained about 1 μg Hg/g wet weight. No changes in brain weight, myelin content of proteins or phospholipids were found, whereas the cholesterol and galactolipid levels were slightly reduced. The most significant change observed was a decrease in the ratio between α-hydroxy fatty acid and the non-substituted fatty acid in the myelin cerebrosides. The biochemical changes were less pronounced in the animals given diethylmercury than in animals receiving methylmercury.

THE INFLUENCE OF ADRENOCORTICOTROPIN ON TRANSPORT OF A CHOLESTERYL LINOLEATE-LOW DENSITY LIPOPROTEIN COMPLEX INTO ADRENAL TUMOR CELLS. P.F. Hall and M. Nakamura (Dept. of Physiology, California Coll. of Med., Univ. of California, Irvine, CA 92717) *J. Biol. Chem. 254*(24), 12547-54 (1979). The action of adrenocorticotropin (ACTH) on the specific (receptro-mediated) uptake of cholesteryl linoleate-low density lipoprotein complexes was examined in Y-1 mouse adrenal tumor cells. High affinity binding (K_A 4.1 x 10^8 M) was observed with ACTH; lower affinity was seen in the absence of ACTH. The effect of ACTH was observed within 10 min at physiological concentrations of low density lipoprotein (100 μg/ml). Binding was followed by uptake (internalization) of the ester lipoprotein complex which was transported to lysosomes. The site of action of ACTH was localized to the uptake process (internalization) since no effect of ACTH was observed on binding to the cell membrane nor on movement of internalized complex to lysosomes. ACTH in-

creases the transport of cholesterol derived from cholesterol ester to the mitochondria. This cholesterol is converted to 20_{α}-hydroxypregn-4-en-3-one and this conversion is accelerated by ACTH. Dibutyryl cyclic AMP (but not butyrate) also stimulates uptake of cholesteryl linoleate-low density lipoprotein. The process stimulated by ACTH and dibutyryl cyclic AMP is specific for low density (as opposed to high density) lipoprotein and for ACTH as distinct from other peptide hormones. The possible physiological importance of this response is considered.

EFFECT OF DIETARY FAT ON FATTY ACID COMPOSITION OF MOUSE AND RAT MAMMARY ADENOCARCINOMAS. L. Hillyard, G. Ananda Rao and S. Abraham (Bruce Lyon Memorial Res. Lab., Children's Hospital Med. Center, 51st and Grove Streets, Oakland, CA 94609) *Proc. Soc. Exp. Biol. Med. 163*(3), 376-83 (1980). The fatty acid composition of four mammary adenocarcinomas carried by C3H and BALB/c mice and one carried by the Fischer rat fed different dietary fats is presented. In general, the neoplastic tissue fatty acid profiles reflected those of the dietary fat in that those tumors taken from animals fed polyunsaturated fats contained greater amounts of linoleate and arachidonate than those fed a saturated fat or a fat-free diet. Mammary tumor fatty acid composition changed almost as rapidly as it did in host liver in response to alterations in the type of dietary fat. The rate of tumor growth could not be correlated with the levels of 20:4 found in all murine mammary adenocarcinomas. Although low levels (0.1%) of pure 18:0 and 18:2 had little effect on the fatty acid composition of tumor lipids, this level of 18:2 was sufficient to enhance tumor growth in BALB/c mice. The administration of 5,8,11,14-eicosatetraynoic acid (TYA) to BALB/c mice retarded the increased growth of transplanted mammary tumors in mice fed diets which contained pure *cis*-9-*cis*-12-octadecadienoic acid. This effect of TYA confirms previous observations made with mammary adenocarcinomas in C3H mice in that 18:2 levels increased while 20:4 and 20:3 $\omega 9$ levels decreased.

EFFECT OF SEX AND AGE ON FATTY ACID COMPOSITION OF HUMAN SERUM LIPIDS. R.T. Holman, L. Smythe and S. Johnson (Hormel Inst., Univ. of Minn., and St. Olaf Hospital, Austin, MN 55912) *Am. J. Clin. Nutr. 32*(12), 2390-9 (1979). Serum was obtained from approximately 10 individuals of each sex from each decade of life from 0 to 90 years of age. Most of the serum samples were obtained from the excess remaining after diagnostic procedures performed for hospitalized patients. The individuals were screened according to tentative diagnosis, and overt cases of diseases known to have effects upon essential fatty acid (EFA) metabolism were eliminated. Serum lipids were separated into phospholipids, cholesteryl esters, triglycerides, and free fatty acids. These lipid classes and a sample of the total lipids were subjected to fatty acid analysis by gas chromatography. The data produced were arranged by computer to compare the effects of age upon each fatty acid present and upon each parameter calculated from fatty acid composition for each lipid group and each sex. Some of the observations suggest that at birth the infant has marginal reserves of EFA. The drastic change in composition of serum lipid shortly after birth probably reflects a change in supply of EFA from one rich in 20:4ω6 and poor in 18:2ω6 to one high in 18:2ω6 and low in 20:4ω6. This may have significance in the nutrition of premature or very young infants.

SECONDARY REGULATORY SITES IN RAT LIVER CHOLESTEROL BIOSYNTHESIS: ROLE OF 5-PYROPHOSPHOMEVALONATE DECARBOXYLASE. A.M. Jabalquinto and E. Cardemil (Departamento de Medicina Experimental, Facultad de Medicina Oriente, and Unidad de Bioquímica, Facultad de Medicina Occidente, Universidad de Chile, Casilla 10455, Santiago, Chile) *Lipids 15*(3), 196-9 (1980). The activity of 5-pyrophosphomevalonate decarboxylase in 43,000 g supernatant fractions from livers and kidneys of male adult rats has been determined. Enzyme activity in liver is significantly increased when rats are fed a diet containing 3% cholestyramine (268% of control rats) and decreased when fed a diet containing 2% cholesterol (25% of control rats). No circadian rhythm of enzyme activity is found in liver or kidneys. These results show that variations in hepatic cholesterogenesis affect the activity of 5-pyrophosphomevalonate decarboxylase in a similar way as other enzymes involved in the biosynthesis of cholesterol.

EFFECTS OF DIET AND HIGH DENSITY LIPOPROTEIN SUBFRACTIONS ON THE REMOVAL OF CELLULAR CHOLESTEROL. R.L. Jackson, C.J. Glueck, S.N. Mathur and A.A. Spector (Depts. of Pharmacology and Cell Biophysics, Biol. Chem. and Med., General Clin. Res. Center, Univ. of Cincinnati College of Medicine, Cincinnati, OH 45267) *Lipids 15*(4), 230-5 (1980). The effects of isocaloric substitutions of dietary polyunsaturated and saturated fat on the composition and function of plasma high density lipoproteins (HDLs) were studied in 3 normal subjects who were fed saturate-rich and polyunsaturate-rich diet programs. Compared to the saturated diets (P/S = 0.4), polyunsaturated fat diets (P/S = 4 or 2) reduced both plasma cholesterol and triglyceride levels. In 2 of the subjects, HDL cholesterol concentrations increased with polyunsaturated fat feeding; the third subject had no change in HDL cholesterol. Dietary polyunsaturated fat caused a reduction in HDL fatty acyl content of oleate and an increase in linoleate. To determine whether the altered composition affected the removal of cell membrane cholesterol, HDL and their subfractions, HDL_2 and HDL_3, which were isolated from each of the diets, were incubated with Ehrlich ascites cells in vitro. The results indicate that HDL facilitates the removal of cholesterol from cells, but that the amount and rate of removal are independent of the changes in HDL composition that can be obtained by dietary perturbations.

DIETARY FIBER AND BLOOD LIPIDS; TREATMENT OF HYPERCHOLESTEROLEMIA WITH GUAR CRISPBREAD. D.J.A. Jenkins, D. Reynolds, B. Slavin, A.R. Leeds, A.L. Jenkins, and E.M. Jepson (Dept. of the Regius Professor of Med., Radcliffe Infirmary and Univ. Lab. of Physiology, Oxford and MRC Unit and Depts. of Gastroenterology, Cardiology and Chemical Pathology, Central Middlesex Hospital, London NW10, England) *Amer. J. Clin. Nutr. 33*(3), 575-81 (1980). Eleven hyperlipidemic patients took an average of 13 g guar in crispbread form over 2- to 8-week periods. Eight weeks' treatment (seven patients) reduced total serum cholesterol by 13% ($P<0.002$) while high-density lipoprotein cholesterol was unchanged. A 13% nonsignificant reduction was also seen in serum triglyceride. Comparison of blood lipid changes over 2-week periods showed guar crispbread to be as effective as guar given in hydrated (eight patients) or semihydrated form (four patients). In addition total serum cholesterol was lowered significantly (11%, $P<0.05$) in five patients where cholestyramine was ineffective. Due to its acceptability, guar crispbread is likely to prove a useful cholesterol-lowering agent.

HYPOCHOLESTEROLEMIC ACTION OF DIETARY FIBER UNRELATED TO FECAL BULKING EFFECT. D.J.A. Jenkins, D. Reynolds, A.R. Leeds, A.L. Waller, J.H. Cummings (Dept. of the Regius Professor of Med., Radcliffe Infirmary and Univ. Lab. of Physiology, Oxford, England) *Am. J. Clin. Nutr. 32*(12), 2430-5 (1979). Twenty-two healthy volunteers took approximately 20 g/day of concentrated dietary fiber from either carrot, cabbage, apple, bran, or guar gum or 31 g from pectin, added for 3-week periods to controlled diets. Total serum cholesterol fell by 13% on both guar and pectin ($P<0.01$) with no significant change in high density lipoprotein cholesterol. Over the 3-week supplementation period, the other fibers were without effect with the exception of carrot, where both control and test high density lipoprotein levels fell ($P<0.05$ and <0.01, respectively). If, however, the 3rd week of the control was compared with the 3rd test week, the values for total cholesterol were 7% lower after apple ($P<0.01$). No significant change was seen in serum triglyceride or body weight either as judged by differences over the 3-week periods or by comparing test and control values at 3 weeks. Comparison of stool weights obtained in this study indicate that the fecal bulking action of dietary fiber is independent of its hypocholesterolaemic effect.

TWO TYPES OF COMPLEXES FORMED BY THE INTERACTION OF APOLIPOPROTEIN A-I WITH VESICLES OF L-α-DIMYRISTOYLPHOSPHATIDYLCHOLINE. A. Jonas, S.M. Drengler and B.W. Patterson (Dept. of Biochem., School of Basic Med. Sciences, and School of Chemical Sciences, Univ. of Illinois, Urbana, IL 61801) *J. Biol. Chem. 255*(5), 2183-9 (1980). The interaction of human and bovine A-I apolipoproteins with sonicated dimyristoylphosphatidylcholine vesicles was investigated at molar ratios of lipid to protein from 4000:1 down to 50:1. The complexes of apo A-I with dimyristoylphosphatidylcholine were separated by gel filtration or by density gradient centrifugation. The structure of the complexes was investigated by phosphorus NMR; electron microscopy was used to examine their morphology; and fluorescence and circular dichroism methods were employed to probe the fluidity of the lipid domains and the structural changes in the apolipoproteins upon complex formation. The results indicate the existence of two types of stable complexes: apo A-I bound to dimyristoylphosphatidylcholine vesicles with a maximum protein content of three or four apo A-Is per vesicle, and unique micellar complexes with a stoichiometry of 95 ± 15 phosphatidylcholines/apo A-I (mol/mol), and 3 protein molecules/particle.

KINETICS AND MECHANISM OF APOLIPOPROTEIN A-I INTERACTION WITH L-α-DIMYRISTOYLPHOSPHATIDYLCHOLINE VESICLES. A. Jonas and S.M. Drengler (Dept. of Biochem., School of Basic Med. Sci. and School of Chem. Sci., Urbana, Il 61801) *J. Biol. Chem. 255*(5), 2190-4 (1980). The dynamics of human apolipoprotein A-I (apo A-I) interaction with dimyristoylphosphatidylcholine (DMPC) vesicles were investigated in a 4000:1

DMPC/apo A-I (mol/mol) mixture where all the protein is bound to DMPC in stable vesicular complexes, and in a 100:1 DMPC/apo A-I (mol/mol) mixture which gives micellar complexes at equilibrium. Gel filtration and fluorescence methods (polarization and intensity) were used to follow the reaction kinetics. The binding of apo A-I to DMPC vesicles is a very rapid process which takes only a few minutes, while the formation of micellar complexes takes several hours at 25°C and involves saturated complexes of apo A-I ·DMPC and free apo A-I. The rate-limiting step in micellar complex formation is the breakdown of saturated vesicle · apo A-I complexes, a process that exhibits first order kinetics with a rate constant $k = 0.22\ h^{-1}$ and a half-life $t_{1/2} = 3$ h 9 min.

COENZYME A IS REQUIRED FOR RAT LIVER FATTY ACID SYNTHETASE ACTIVITY. T.C. Linn, M.J. Stark and P.A. Srere (Pre-Clin. Sci. Unit, Veterans Admin. Med. Center, Dallas, TX 75216) *J. Biol. Chem. 255*(4), 1388-92 (1980). Inhibition of highly purified rat liver fatty acid synthetase occurs when it is assayed in the presence of the ATP citrate lyase reaction components. Citrate, Mg^{2+}, ATP, and ATP citrate lyase were all necessary for the inhibition to take place. Inhibition was prevented by hydroxycitrate, a competitive inhibitor for ATP citrate lyase. The length of time for the onset of inhibition to take place was proportional to the ratio of ATP citrate lyase activity to the fatty acid synthetase activity. The inhibition was reversed by the addition of coenzyme A. This indicates a reaction mechanism for fatty acid synthetase which involves free coenzyme A. Two possible roles for CoA are discussed, one as an allosteric activator and the other in the cleavage of palmitoyl enzyme in the last step of the reaction.

SAPONIN-CHOLESTEROL INTERACTION IN THE MULTIBILAYERS OF EGG YOLK LECITHIN AS STUDIED BY DEUTERIUM NUCLEAR MAGNETIC RESONANCE: DIGITONIN AND ITS ANALOGUES. T. Akiyama, S. Takagi, U. Sankawa, S. Inari, and H. Sato (Fac. Pharm. Soc., Univ. of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113, Japan) *Biochemistry 19*(9), 1904-11 (1980). In order to gain an understanding of the hemolytic activity of digitonin, a ^3H NMR study was attempted with cholesterol and stearic acid as probes for the terminal methyl portions of cholesterol and lipids, respectively, for the multibilayers of egg yolk lecithin containing digitonin or its analogues. The interaction between digitonin and cholesterol was characterized by the following three stages which depend upon the digitonin/cholesterol ratio: "aggregated" species, the intermediate complex, and the equimolecular complex. Cholesterol, in this case, is rather immobilized as a result of formation of the rigid complex with digitonin in the bilayers. In the case of the intermediate complex, the rigid complex was present together with the aggregated species. Saponins with a reduced number of terminal sugar moieties with lower hemolytic activity exhibited no distinct feature to form the rigid complex. Thus, the configuration of the terminal sugar moiety should play a specific role in forming the rigid complex which might be related to the hemolytic activity.

ACTION OF DETERGENTS ON MEMBRANES: DIFFERENCES BETWEEN LIPID EXTRACTED FROM RED CELL GHOSTS AND FROM RED CELL LIPID VESICLES BY TRITON X-100. R.I. MacDonald (Dept. of Biological Sciences, Northwestern University, Evanston, IL 60201). *Biochemistry 19*(9), 1916-22 (1980). A comparative study was undertaken of the solubilization of red cell ghosts and red cell lipid vesicles by Triton X-100 (Triton) to assess the influence of ghost membrane proteins on the amounts and on head-group and fatty acyl compositions of phospholipids removed from both types of membranes. Both ghosts and liposomes were less readily solubilized than vesicles of red cell lipid from which cholesterol had been removed. The selective cosolubilization of phosphatidylserine and certain membrane proteins from ghosts but not from liposomes indicates that phosphatidylserine and at least one of those membrane proteins are associated in untreated ghost membranes. This protein-dependent, selective solubilization of ghost lipid by Triton is distinguishable from a protein-independent, selective solubilization of both ghost and liposome lipids by Triton, the soluble lipid from both membranes having a lower content of sphingomyelin relative to the total amount of lipid extracted.

PHOSPHOLIPID SYNTHESIS AND EXCHANGE BETWEEN RAT LIVER MICROSOMES AND MITOCHONDRIA IN THE PRESENCE OF BENZO(A)PYRENE. J. Baraud and A. Maurice (Lab. de Biochim. B.B.C., Univ. de Bordeaux-II, 146, rue Léo-Saignat, 33076 Bordeaux cedex, France) *J. Lipid Res. 21*(3), 347-53 (1980). Benzo(a)pyrene injection increased the phospholipid content in membranes of rat liver mitochondria and microsomes. There was a large relative increase of phosphatidylcholine, especially in microsomes, as compared with normal liver. The quantity of phosphatidylethanolamine seemed not to be affected and the other phospholipid classes decreased. In vivo [U-^{14}C] glycerol incorporation into phospholipids was greater after benzo(a)pyrene injection, especially into phosphatidylcholine. Liver microsomes derived from rats injected with [U-^{14}C] glycerol or from liver slices incubated with the same precursor were incubated with unlabeled mitochondria in the presence of 105,000 *g* supernatant fraction; labeled microsomal phospholipids exchanged to a greater extent in the presence of benzo(a)pyrene, suggesting either a stimulation of activity of the exchange proteins, or a relative membrane disorganization facilitating the phospholipid transfer.

COMPARISONS OF MONOACYLGLYCEROLS AND DIACYLGLYCEROLS OF VARYING FATTY ACID COMPOSITION AS SUBSTRATES FOR THE ACYLGLYCEROL KINASE(S) OF RAT BRAIN. H.H. Bishop and K.P. Strickland (Dept. of Biochem., Univ. of Western Ontario, London N6A 5C1, Ontario, Canada) *Lipids 15*(5), 285-91 (1980). The properties of diacylglycerol and monoacylglycerol kinase activities present in 90,000 × g pellet and 90,000 × g supernatant fractions from rat brain were examined and compared. Of the properties examined, time course (linear for 10 min), enzyme concentration, pH optimum (7.4-7.5), varying ATP (5 mM) and Mg^{2+} (10 mM) concentrations all showed similar optima for both activities. All fractions showed significant activities, but the most was in the supernatant fraction. The similarities in properties and localization of the 2 kinase activities suggest a single enzyme may function. On this assumption, an extensive study using mono- and diacylglycerols of varying fatty acid composition gave the following results: (a) acylglycerols with the same fatty acid present showed increasing activity in the order: 1-monoacylglycerol, 2-monoacylglycerol and 1,2-diacylglycerols; (b) when saturated fatty acids were present the order of decreasing activity varied directly with increasing chain length for $C_{10} \rightarrow C_{20}$; (c) when one or more unsaturated fatty acids were present good activities resulted, but no clear pattern emerged, although acylglycerols with 18:1 and 18:3 fatty acids were more active than those with 18:2 and 20:4 fatty acids.

ANALYSIS OF MEMBRANES PHOTOLABELED WITH LIPID ANALOGUES. REACTION OF PHOSPHOLIPIDS CONTAINING A DISULFIDE GROUP AND A NITRENE OR CARBENE PRECURSOR WITH LIPIDS AND WITH GRAMICIDIN A. J. Brunner and F.M. Richards (Dept. of Molecular Biophys. and Biochem., Yale University, New Haven, CT 06520). *J. Biol. Chem. 225*(8), 3319-29 (1980). Analogues of fatty acids have been synthesized which contain an S-S bridge in the aliphatic chain and at the ω-carbon the photoactivatable p-(3-trifluoromethyldiazirino)phenyl or p-azidophenyl group as a carbene and nitrene precursor, respectively. These acids were used to acylate 1-palmitoyl phosphatidylcholine. After photocross-linking, the disulfide bridge can be cleaved to generate a free sulfhydryl group which subsequently can be utilized for preparative or analytical purposes. Photolabeled lipids and peptides can be separated easily from the bulk of the unlabeled material. These phospholipid analogues are substrates for the phospholipid exchange protein isolated from calf liver. Transfer from sonicated dispersions of the analogues into an acceptor membrane was demonstrated. Individual monolayers can thus be labeled separately with these reagents.

RAT HEPATIC CYTOSOLIC GLUTATHIONE-DEPENDENT ENZYME PROTECTION AGAINST LIPID PEROXIDATION IN THE NADPH-MICROSOMAL LIPID PEROXIDATION SYSTEM. R.F. Burk, M.F. Trumble, and R.A. Lawrence (Liver and Nutr. Unit, Dept. of Med. and Dept. of Biochem., Louisiana St. Univ. Med. Center, Shreveport, LA 71130) *Biochim. Biophys. Acta 618*(1), 35-41 (1980). Dialyzed rat liver cytosol (105,000 × *g* supernatant), when added along with 2.5 mM glutathione, blocked malonaldehyde formation in the NADPH-microsomal lipid peroxidation system, thus protecting against lipid peroxidation. Preheating the cytosol for 10 min at 60 C destroyed its protective ability. Ammonium sulfate fractionation and Sephadex G-100 gel filtration of cytosol indicated that more than one glutathione-dependent protective enzyme was present. The glutathione *S*-transferases were purified with ion exchange chromatography and shown to have protective activity. The selenium-dependent glutathione peroxidase appears to have no protective effect in this system.

EFFECT OF GARLIC ON CARBOHYDRATE METABOLISM AND LIPID SYNTHESIS IN RATS. M.L.W. Chang and M.A. Johnson (Carbohydrate Nutr. Lab., Nutr. Inst., Human Nutr. Center, Science and Education Admin., U.S. Dept. of Agr., Beltsville, MD 20705) *J. Nutr. 110*(5), 931-6 (1980). Experiments were conducted to determine the effect of garlic on carbohydrate metabolism and lipid synthesis in rats fed a control diet (CD) containing 1% cholesterol and 46.8% sucrose as a sole source of carbohydrate or the control diet plus garlic (GD, 100 g CD + 5 g equivalent to wet weight of garlic). The peak was higher in rats fed GD than in rats

fed CD. At the end of the 48-hour refeeding, glycogen level was only 50% of the peak from the previous day in rats fed GD but was unchanged in rats fed CD. In both groups, specific activity of glycogen apparently did not change after 24 hours indicating that glycogen was not synthesized during this time. GD significantly reduced serum glucose but increased serum insulin and liver glycogen. The results suggest that garlic reduces lipid synthesis and influences glycogen metabolism in the liver of rats. The hypoglycemic effect of garlic seems associated with the increase of insulin level.

PREPARATIVE AND QUANTITATIVE ISOLATION OF PLASMA LIPOPROTEINS: RAPID, SINGLE DISCONTINUOUS DENSITY GRADIENT ULTRACENTRIFUGATION IN A VERTICAL ROTOR. B.H. Chung, T. Wilkinson, J.C. Geer, and J.P. Segrest (Depts. of Pathology, Biochem., and Microbio., Inst. of Dental Res. and Comprehensive Cancer Ctr., Univ. of Alabama in Birmingham Med. Ctr., Birmingham, AL 35294) *J. Lipid Res. 21*(3), 284-91 (1980). A rapid method has been developed for separation of the major plasma lipoproteins from up to 96 ml of plasma by a single ultracentrifugation step. This separation was achieved by a discontinuous density gradient centrifugation between the density range of 1.006 and 1.30 g/ml in Sorvall vertical rotors. Each lipoprotein fraction was sharply banded with VLDL at the top, LDL in the upper middle, and HDL in the lower middle portion of the tube. The lipoprotein fractions prepared by this technique have properties indistinguishable from those isolated by the sequential flotation method in regard to their equilibrium banding density, electrophoretic mobility, and apolipoprotein composition. Used as an analytical tool this method allows samples as small as 1 ml of plasma and spin times as short as 45 min. Cholesterol levels in HDL fractions separated by this method have significantly lower values ($P < 0.05$) than those estimated by the heparin-manganese chloride precipitation method.

FATTY ACID SPECIFICITIES OF MICROSOMAL ACYLTRANSFERASES ESTERIFYING POSITIONS-1 AND -2 OF ACYLGLYCEROLS IN MAMMARY GLANDS FROM LACTATING RATS. S.M. Cooper and M.R. Grigor (Dept. of Biochem., Univ. of Otago, P.O. Box 45, Dunedin, New Zealand) *Biochem. J. 187*(2), 289-95 (1980). The acyl specificities of several acyltransferases located in the microsomal fraction of lactating rat mammary gland have been investigated using palmitate and oleate as substrates along with CoA, ATP and Mg^{2+}, bovine serum albumin and NaF. With either *sn*-glycerol 3-phosphate or dihydroxyacetone phosphate (plus NADPH) as acyl acceptor, phosphatidic acid containing palmitate preferentially esterified at position-2 and oleate at position-1 was the major product. The specificities of the acyl-CoA-1-monoacyl-*sn*-glycerol 3-phosphate and the acyl-CoA-2-monoacyl-*sn*-glycerol 3-phosphate acyltransferases were also studied. The specificities observed combined with the relative velocities of these reactions suggest that phosphatidic acid is formed in the mammary gland with the first acylation occurring at position-1 favouring oleate followed by the second acylation at position-2 favouring palmitate. This is consistent with the unusual structure found in the triacylglycerols of rat milk. When a mouse liver microsomal fraction was used the opposite specificities were observed consistent with the structure of the triacylglycerols of mouse liver. The microsomal acylation of the monoacyl-*sn*-glycerol 3-phosphocholines was also investigated.

DIETARY ARACHIDONIC ACID REDUCES FATTY LIVER, INCREASES DIET CONSUMPTION AND WEIGHT GAIN IN ETHANOL-FED RATS. S.C. Goheen, E.C. Larkin, M. Manix and G.A. Rao (Hematology Res. Lab., Veterans Administration Med. Ctr., Martinez, CA 94553) *Lipids 15*(5), 328-36 (1980). We fed young male Sprague-Dawley rats for 4 wk ad libitum liquid diets containing 34% of the calories as ethanol and 35% as fat with (AA+) and without (AA-) arachidonic acid (20:4). Additional rats in the control groups were fed similar diets made isocaloric with dextrose with (CA+) and without (CA-) 20:4. The liver triglyceride (TG) content of rats in the AA+ group was reduced ca. 3-fold over that of rats in the AA-group. The diet consumption and body wts. of rats in the AA+ group were significantly greater than those of rats fed alcohol without the 20:4 supplement (AA-). Also livers from rats in the AA+ group were as large as those from rats in control groups (CA+, CA-) and ca. twice as large as those from rats in the AA-group. The fatty acid composition of liver TG in rats fed the alcohol diet was similar to that of dietary fat. Levels of 20:4 and docosatetraenoic acid (22:4) in liver TG fatty acids from rats fed diets without arachidonate (AA-, CA-) were low (trace to 1.6%). After ingestion of arachidonic acid, 20:4 increased to ca. 10% and 22:4 to ca. 5%. The content of liver phospholipids was higher in livers of rats fed ethanol (AA-) than in those of controls (CA-).

THE EFFECT OF POLYUNSATURATED PHOSPHATIDYLCHOLINE ON PLASMA LIPIDS AND FECAL STEROL EXCRETION. H. Greten, H. Raetzer, A. Stiehl and G. Schettler (Medizinische Universitäts-klinik Heidelberg, Bergheimer Str. 58, 6900 Heidelberg (F.R.G.)) *Atherosclerosis 36*(1), 81-8 (1980). Highly polyunsaturated phosphatidylcholine (PC) was orally administered to patients with familial hypercholesterolemia and normal controls. Plasma lipid and lipoprotein composition as well as fecal sterol excretion and bile lipid composition were analyzed. Two dietary regimens were given, containing similar amounts of calories, cholesterol and polyunsaturated fatty acids in order to evaluate the spcific effect of phosphorylcholine. No change in plasma lipid or lipoprotein concentration was observed. However, fecal sterol excretion was substantially increased in all subjects when PC was added to the diet. Bile acids, phospholipid and cholesterol content in bile did not vary.

STEREOCHEMISTRY IN THE FORMATION OF 9-HYDROXY-10,12-OCTADECADIENOIC ACID AND 13-HYDROXY-9,11-OCTADECADIENOIC ACID FROM LINOLEIC ACID BY FATTY ACID CYCLOOXYGENASE. M. Hamberg and B. Samuelsson (Dept. of Chem., Karolinska Institutet S-104 01 Stockholm 60 Sweden) *Biochim. Biophys. Acta 617*(3), 545-7 (1980). 9-Hydroxy-10,12-octadecadienoic acid and 13-hydroxy-9,11-octadecadienoic acid are formed from linoleic acid upon incubation with the microsomal fraction of homogenates of the sheep vesicular gland (Hamberg, M. and Samuelsson, B. (1967) *J. Biol. Chem. 242*, 5344-5354.) This communication is concerned with the stereochemical aspects of the conversion. The ratio between the 9- and 13-hydroxy isomers was 77:23. Steric analysis of the individual isomers showed that the hydroxyl group of both isomers had mainly the L configuration, i.e. 9L:9D, 79:21 and 13L:13D, 78:22. Incubation of [11L-^{3}H; 1-^{14}C] linoleic acid led to the formation of 9- and 13-hydroxyoctadecadienoates which had largely lost the tritium label (6% and 7% retention of tritium relative to precursor, respectively) showing that the hydrogen which is removed from C-11 during the conversion has the L (pro-*S*) configuration.

THE EXTRACTION OF INOSITOL-CONTAINING PHOSPHOLIPIDS AND PHOSPHATIDYLCHOLINE FROM *SACCHAROMYCES CEREVISIAE* AND *NEUROSPORA CRASSA*. B.A. Hanson and R.L. Lester (Dept. of Biochem., College of Med., Univ. of Kentucky, Lexington, KY 40536) *J. Lipid Res. 21*(3), 309-15 (1980). By use of fungi grown in the presence of [^{3}H]-inositol and [^{14}C] choline, we have explored methods for the quantitative extraction of inositol-containing phospholipids and phosphatidylcholine. Slightly alkaline mixtures of both ethanol-water and ethanol-diethylether-water at elevated temperatures were shown to effectively extract these lipids from intact *Saccharomyces cerevisiae* and *Neurospora crassa*. Some previously published procedures fail to completely extract the very polar phosphoinositol-containing sphingolipids of these organisms. Trichloroacetic acid can be used with caution in killing cells prior to extraction; lipid destruction can occur at elevated concentrations and temperatures. Complete extraction of these very polar lipids with polar solvents also results in an extract containing significant amounts of non-lipids.

EFFECTS OF PHOSPHOLIPID FATTY ACID COMPOSITION AND MEMBRANE FLUIDITY ON THE ACTIVITY OF BOVINE BRAIN PHOSPHOLIPID EXCHANGE PROTEIN. G.M. Helmkamp, Jr. (Dept. of Biochem., Univ. of Kan. Med. Center, Kansas City, KS 66103) *Biochemistry 19*(10), 2050-6 (1980). The interaction of bovine brain phospholipid exchange protein with membranes has been investigated as a function of membrane phospholipid fatty acid composition. Single bilayer vesicles were prepared by sonication, centrifugation, and molecular sieve chromatography and were used as acceptor membranes in the exchange protein catalyzed transfer of phosphatidylinositol from rat liver microsome donor membranes. A progressive decrease in transfer rate was noted with vesicles containing a mixture of egg phosphatidylcholine and dimyristylphosphatidylcholine as the molar proportion of the latter phospholipid increased. The fluorescence polarization of diphenylhexatriene in vesicle preparations also decreased in the same order, under conditions well above the thermotropic gel to liquid-crystalline phase transition of all phospholipids studied. These results suggest that the fatty acid composition, the degree of unsaturation, and in particular the hydrocarbon fluidity of the membrane are important determinants in the activity of bovine brain phospholipid exchange protein.

HYDROLYSIS AND EXCRETION OF CYTOPLASMIC CHOLESTERYL ESTERS BY MACROPHAGES: STIMULATION BY HIGH DENSITY LIPOPROTEIN AND OTHER AGENTS. Y.K. Ho, M.S. Brown, and J.L. Goldstein (Depts. of Molecular Genetics and Internal Med., Univ. of Texas Health Sci. Ctr. at Dallas, 5323 Harry Hines Blvd., Dallas, TX 75235) *J. Lipid Res. 21*(4), 391-8 (1980). The ability of mouse peritoneal macrophages to hydrolyze and excrete cytoplasmic cholesteryl ester droplets was studied. The

macrophages were loaded with cholesteryl esters by incubationwith acetylated low density lipoprotein (acetyl-LDL), which is internalized by adsorptive endocytosis. The cholesteryl esters of acetyl-LDL are hydrolyzed within lysosomes and the liberated cholesterol is re-estified in the cytoplasm where it accumulates as cytoplasmic cholesteryl ester droplets. Hydrolysis and excretion of these stored cholesteryl esters were quantified by gas-liquid chromatographic measurement of the content of free and esterified cholesterol in cells and in medium. After removal of acetyl-LDL from the culture medium, the cytoplasmic cholesteryl esters were rapidly hydrolyzed and large amounts of free cholesterol were excreted from the cells. The results indicate that net hydrolysis of cytoplasmic cholesteryl esters in macrophages is coupled to the process of cholesterol excretion and that net hydrolysis does not occur unless an effective cholesterol acceptor is present in the culture medium.

EFFECT OF PLANT STEROLS, FATTY ACIDS AND LECITHIN ON CHOLESTEROL ABSORPTION IN VIVO IN THE RAT. Daniel Hollander and Donna Morgan (Univ. of California, Irvine, and the Veterans Administration Medical Center, Long Beach, CA 90822) *Lipids 15*(6), 395-400 (1980). The inhibitory effect of plant sterols, fatty acids and lecithin on cholesterol intestinal absorption was studied in the unanesthetized rat using a single pass perfusion technique. Bile was excluded from the perfused intestine. Cholesterol absorption did not change following the additions of cholestanol, cholestanone, lanosterol, stigmasterol and β-sitosterol. A 3-fold increase in the molarity of cholestanol and β-sitosterol or the separate additions of the saturated short and medium chain fatty acids, butyric and octanoic, also did not change cholesterol absorption. The unsaturated long chain fatty acids, oleic, linoleic, linolenic and arachidonic, inhibited cholesterol absorption. Lecithin additions at concentrations of 0.5-1.5 mM caused a progressive, dose-related inhibition of cholesterol absorption. The inhibitory effect of these agents on cholesterol absorption is likely to have been caused by changes in cholesterol solubility in the micelle and shift in the partition coefficient of cholesterol away from the cell membrane to the micelle.

RESPONSE TO FIVE GENERATIONS OF SELECTION FOR BLOOD CHOLESTEROL LEVELS IN WHITE LEGHORNS. K.G. Hollands, A.A. Grunder, and C.J. Williams (Animal Research Institute, Agr. Canada, Ottawa, Ontario, Canada K1A 0C6) *Poult. Sci. 59*(6), 1316-23 (1980). The response to five generations of selection for high and low plasma cholesterol level was examined in two lines of Single Comb White Leghorn chickens derived from the same population. An unselected control line was also maintained. Juvenile cholesterol levels of blood plasma were measured in 24,754 birds during the experiment. Males at 9 to 10 weeks of age had higher plasma cholesterol levels than females of the same age. Estimates of the heritability of plasma cholesterol level for males and females from the sire and dam components of variance in the unselected population, ranged from .19 to .30. Realized heritabilities from the selected lines were lower and ranged from .14 to .19 with no significant differences between lines or sexes. Differences between the two selected lines in the fifth generation were 37 mg% for males and 33 mg% for females. High cholesterol levels were associated with high mortality. The estimated genetic correlation between plasma cholesterol and egg production was negative. After five generations of selection for plasma cholesterol, yolk cholesterol was 108 mg% lower in the low selected line than in the controls, but there was little difference between the high selected line and controls in this trait.

EFFECT OF DIETARY PROTEIN LEVEL UPON ESSENTIAL FATTY ACID (EFA) DEFICIENCY. E.G. Hill and R.T. Holman (The Hormel Institute, Univ. of Minnesota, Austin, MN 55912) *J. Nutr. 110*(5), 1057-60 (1980). Rats were fed EFA-low diets containing vitamin-free casein varying from 5 to 40% and were assessed for severity of EFA deficiency by growth response, dermal symptoms and by the biochemical lesion of elevated triene/tetraene ratio in heart and liver lipids, the dermal signs of EFA deficiency increased in severity at levels of protein above 30%. The biochemical lesion of elevated triene/tetraene ratio in liver phospholipids was most severe at the lower protein levels. The two measures of EFA deficiency thus respond to different functions of EFA. Protein deficiency may thus increase the EFA requirement as measured by the biochemical criteria.

α-FETOPROTEIN BINDING SPECIFICITY FOR ARACHIDONATE, BILIRUBIN, DOCOSAHEXAENOATE, AND PALMITATE. A SPIN LABEL STUDY. J.C. Hsia, S.S. Er, C.T. Tan, T. Estes, and E. Ruoslahti (Dept. of Pharm., Faculty of Med., Univ. of Toronto, Ontario, Canada M5S 1A8) *J. Biol. Chem. 255*(9), 4224-7 (1980). A dianionic spin label has been used to probe the relative binding specificity of a single anionic ligand site on bovine α-fetoprotein (AFP) to arachidonate, bilirubin, docosahexaenoate, and palmitate. The binding isotherm of the spin label with AFP, as shown by a Scatchard plot, indicates the presence of a single high affinity binding site. Scatchard plots of the spin label in the presence of 1 to 3 molar equivalents of arachidonate, bilirubin, and docosahexaenoate and up to 6 molar equivalents of palmitate have been determined. These results indicate that polyunsaturated essential fatty acids and bilirubin share a high affinity binding site on AFP. We propose that the function of this anionic ligand binding site of AFP is for the transport of bilirubin and polyunsaturated fatty acids in fetal serum, as well as for the cross-placental transfer of this metabolite and of essential fatty acids.

IDENTIFICATION OF AN ENDOGENOUS ELECTRON DONOR FOR BIOHYDROGENATION AS α-TOCOPHEROLQUINOL. P.E. Hughes and S.B. Tove (Dept. of Biochem., North Carolina State University, Raleigh, NC 27650) *J. Biol. Chem. 225*(10), 4447-52 (1980). Four fluorescent compounds present in solvent extracts of Butyrivibrio fibrisolvens could serve as electron donors for the biohydrogenation of cis-9, trans-11-octadecadienoate in the presence of dithionite, which was itself inactive. One of the compounds was identified as α-tocopherolquinol and another as α-tocopherolquinone. A partially purified soluble enzyme preparation from B fibrisolvens catalyzed the reduction of α-tocopherolquinone to α-tocopherolquinol in the presence of NADH with a stoichiometry of 1:1. The ratio of α-tocopherolquinol produced to fatty acid reduced was 2:1 when the tocopherol derivatives were extracted aerobically. When the extraction was carried out anaerobically, the ratio was 1. It is suggested that the oxidation of 2 molecules of α-tocopherolquinol, each to the semiquinone, provides the electrons required for the reduction of the cis-bond of the conjugated dienoic fatty acid. Although α-tocopherol, phylloquinol, and reduced menadione are inactive, ubiquinol-4, ubiquinol-10, and trimethylhydroquinone show about one-half the activity of α-tocopherolquinol. Plastoquinol and trimethylphytylbenzoquinol are as active as α-tocopherolquinol.

EFFECT OF STRAIN, SEX AND DURATION OF FEEDING ON PLASMA FATTY ACIDS OF RATS FED VARIOUS DIETARY OILS. S.M. Innis and M.T. Clandinin (Dept. of Nutr. and Food Sci., Faculty of Med., Univ. of Toronto, Toronto, Ontario, Canada, M5S 1A8) *J. Nutr. 110*(5), 1006-13 (1980). Experiments were conducted to determine if regression of cardiac lipidosis and strain or sex differences in susceptibility to cardiopathological change induced by rapeseed oils are coincident with physiological differences in fatty acid substrates supplied to the heart. Plasma fatty acid composition was determined in male Sprague-Dawley rats after 7 or 28 days and in female Sprague-Dawley and male Chester-Beatty rats after 28 days of feeding high or low erucic acid rapeseed oils, soybean oil or peanut oil. After 28 days, $C_{14:0}$ and $C_{18:1}$ fell and $C_{20:4}$ increased as a percent of total fatty acid in all animals irrespective of oil fed, suggesting that changes in plasma fatty acids normally occur with development. Saturated and essential fatty acid profiles of male and female rats were different. Differences in plasma fatty acids stemming from sex-related physiological differences in whole body fat metabolism may form the basis of lower cardiopathological involvement for females. Results suggest physiological differences unrelated to plasma fatty acids determine strain differences in timing and severity of rapeseed oil-induced cardiac pathology.

EFFECT OF CORN OIL FEEDING ON LIPID PEROXIDATION IN RATS. N. Iritani, E. Fukuda and Y. Kitamura (Tezukayama Gakuin College, Sumiyoshi-ku, Osaka 558 Japan) *J. Nutr. 110*(5), 924-30 (1980). Three groups of male rats were maintained on 10% fat diets containing 0.5, 5 or 10% corn oil or olive oil with 80-400 mg DL-α-tocopherol per kilogram. After 4 weeks on such regimens, TBA (thiobarbituric acid) values in serum, liver mitochondria and microsomes, and adipose tissue increased with rising amounts of dietary corn oil. TBA values in rats fed the 10% corn oil diet were reduced with the increase of dietary tocopherol but were still higher than the corresponding values of the 10% olive oil and 0.5% corn oil groups. When the liver microsomes were incubated with Fe^{3+}-ADP and NADPH, the relative chemiluminescence emission in the visible region with the peroxidative cleavage of endogenous lipid was higher in the 5 and 10% corn oil groups than in the 0.5% group. On the other hand, when oxidized corn oil was given orally to rats with thoracic lymph fistula, TBA-reacting substances were recovered in thoracic lymph, but idometric peroxide was undetectable. Therefore, TBA-reacting substances in rats fed the corn oil diets could have originated from the oxidative product of linoleic acid metabolism and also from the diet.

EFFECT OF CORN OIL FEEDING ON TRIGLYCERIDE SYNTHESIS IN THE RAT. N. Iritani and E. Fukuda (Dept. of Nutr., Tezukayama Gakuin College, Sumihoshi-ku, Osaka 558, Japan) *J. Nutr. 110*(6), 1138-43 (1980). When rats were fed diets

containing 10% corn oil for 2 weeks, α-glycerophosphate acyltransferase and diacylglycerol acyltransferase levels were reduced to 75% of that of control fed a 0.5% corn oil diet, while glucose-6-phosphate dehydrogenase, malic enzyme and acetyl-CoA carboxylase levels were reduced to 28, 33 and 66%, respectively. The incorporation of labeled glycerol or palmitic acid into triglycerides by liver slices was also reduced by corn oil feeding. Therefore, it is suggested that although the major reduction of triglyceride synthesis by linoleic acid feeding is due to fatty acid synthesis, glycerolipid synthesis is also reduced.

EFFECT OF OXIDIZED OIL ON LIPOGENIC ENZYMES. N. Iritani, E. Fukuda and Y. Kitamura (Tezukayama Gakuin College, Sumiyoshi-ku, Osaka 558, Japan) *Lipids 15*(5), 371-4 (1980). Male Wistar rats were fed for 4 wk on diets containing 2% oxidized corn oil. Liver tissue was then studied to determine the effect of feeding peroxidized oil on lipogenic enzymes. Although substances which reacted with thiobarbituric acid increased in liver microsomes and mitochondria with increasing peroxide values of the dietary corn oil fed, the activities of glucose-6-phosphate dehydrogenase, malic enzyme and acetyl-CoA carboxylase in liver remained unchanged. However, when rats were fed for 2 wk on diets containing 10% fat, of which 0/5, 5 or 10% was unoxidized corn oil and the remainder was hydrogenated beef tallow filler, the lipogenic enzyme activities and also the liver triglyceride levels were observed to decrease with increasing amounts of dietary corn oil. Therefore, although a synthetic diet containing corn oil was easy to oxidize spontaneously, the reductions of lipogenic enzymes in rats fed the diet would not have been caused by lipid peroxides but by unsaturated fatty acids themselves.

IDENTIFICATION OF SHELLFISH FATTY ACIDS AND THEIR EFFECT ON LIPOGENIC ENZYMES. N. Iritani, K. Inoguchi, M. Endo, E. Fukuda, and M. Morita (Dept. of Nutrition, Tezukayama Gakuin College, Sumiyoshi-ku, Osaka 558; and Suntory Institute for Biomedical Research, Suntory Ltd., 1-1 Wakayama-dai, Shimamoto-cho, Mishima-gun, Osaka 618 (Japan)) *Biochim. Biophys. Acta 618*(3), 378-82 (1980). The fatty acids which are common to and characteristic of shellfish identified by mass spectrometry and NMR spectral analyses as being: octadecatetraenoic acid, eicosapentaenoic acid, docosapentaenoic acid and docosahexaenoic acid. When the fatty acids isolated by high performance liquid chromatography were separately intubated into rats, hepatic glucose-6-phosphate dehydrogensae (EC 1.1.1.49), malic enzyme (EC 1.1.1.40) and acetyl-CoA carboxylase (EC 6.4.1.2) were reduced more effectively as compared with linoleic acid intubation. These enzymes were reduced most markedly by eicosapentaenoic acid-intubation. The fatty acids seem to be effective components in reduction of triacylglycerol and lipogenic enzyme levels in rats fed on shellfish.

REGULATION OF RATES OF CHOLESTEROL SYNTHESIS IN VIVO IN THE LIVER AND CARCASS OF THE RAT MEASURED USING [^{3}H] WATER. D.J. Jeske and J.M. Dietschy (Dept. of Internal Medicine, Univ. of Texas Health Science Center at Dallas, Dallas, TX 75235). *J. Lipid Res. 21*(3), 364-76 (1980). This study was undertaken to determine the mechanisms that regulated cholesterol synthesis in vivo and to quantitate the relative importance of the liver and extra-hepatic tissues as sites for sterol synthesis. Cholesterol feeding suppressed synthesis in the liver but not in the extrahepatic tissues, while fasting for 48 hr suppressed synthesis in both the liver and carcass. In fasted animals subjected to stress there was a 5-fold increase in hepatic synthesis but no change in synthesis by the extrahepatic tissues. Similarly, incorporation of [^{3}H] water into sterols by the carcass was unaffected by light cycling while the liver showed a definite diurnal rhythm. In control rats, 34.5 μmol of [^{3}H] water was incorporated into sterols by the whole animal per hour. Of this amount of sterol synthesis about 54% took place in the liver while the remaining amount occurred in the tissues of the carcass. With cholesterol feeding or fasting, or during the mid-light phase of the light cycle, synthesis in the extra-hepatic tissues accounted for 69 to 90% of total body sterol synthesis.

CHAIN ELONGATION OF *TRANS*-OCTADECENOIC ACID ISOMERS IN RAT LIVER MICROCOMES. K. Kameda, A.J. Valicenti, and R.T. Holman (Hormel Institute, Univ. of Minnesota, Austin, MN 55912) *Biochim. Biophys. Acta 618*(1), 13-7 (1980). The chain elongations of *trans*-octadecenoic acid isomers with double-bond positions Δ4 to Δ15 were studied with rat liver microsomes. The Δ7 and Δ9, *trans* isomers were converted to *trans*-9 and *trans*-11-eicosenoic acids, respectively, at about 40% of the rate of conversion of *cis*-9-octadecenoic acid to *cis*-11-eicosenoic acid. The rates of conversion of Δ8, Δ10, Δ11, and Δ12 *trans* isomers were lower than those of Δ7 and Δ9 *trans* isomers, but the Δ4, Δ5, Δ6, Δ13, Δ14, and Δ15 *trans* isomers were not elongated at rates exceeding experimental error.

SUBSTRATE STABILIZATION OF THE PALMITOYL-COENZYME A HYDROLASE ACTIVITY OF RAT SUBMAXILLARY GLAND. T.E. Knauer, J.J. Gurecki and G.R. Knauer (Dept. of Med., Medical College of Virginia, Richmond, VA 23298). *Biochem. J. 187*(1), 269-72 (1980). The long-chain acyl-CoA hydrolase (EC 3.1.2.2) activity of rat submaxillary salivary gland, found in the postmicrosomal supernatant fraction, has a pH optimum of 7.4. This hydrolase activity was found to be extremely labile, but inclusion of glycerol or the substrate palmitoyl-CoA in the preparations markedly stabilized the activity. Gel-filtration studies revealed multiple forms of the hydrolase, a lower-molecular-weight species of approx. 45000 and a higher-molecular-weight species of approx. 130000 observed when glycerol (20%, v/v) or palmitoyl-CoA (10 μm) were included in the eluting buffer. This phenomenon is similar to that observed with palmitoyl-CoA hydrolase of rat brain, except that there is no evidence that the higher-molecular-weight species of the hydrolase of submaxillary gland is generated by substrate-induced dimerization of the lower-molecular-weight species.

RELATIVE SUSCEPTIBILITY OF MICROSOMES FROM LUNG, HEART, LIVER, KIDNEY, BRAIN AND TESTES TO LIPID PEROXIDATION: CORRELATION WITH VITAMIN E CONTENT. D.J. Kornbrust and R.D. Mavis (Dept. of Radiation Biology and Biophys., Univ. of Rochester Sch. of Med. and Dentistry, Rochester, NY 14642) *Lipids 15*(5), 315-22 (1980). Rates of in vitro lipid peroxidation of microsomes and homogenates were found to vary widely among different tissues and species. In rats and rabbits, lung microsomes peroxidized at a 25- to 50-fold lower rate than liver, kidney, testes and brain microsomes. Heart microsomes peroxidized at a rate slightly greater than, but most similar to, lung microsomes. Comparison of tissue homogenates also revealed the unique resistance of lung and heart to lipid peroxidation. The ratio of vitamin E to peroxidizable polyunsaturated fatty acids in lung and heart microsomes was several-fold higher than in microsomes from the other tissues studied, which accounted for the relative resistance of lung and heart to lipid peroxidation. These data provide strong support for the role of vitamin E as the major cellular antioxidant, especially in the highly oxygenated tissues of heart and lung, and demonstrate the utility of the microsomal system in characterizing tissue differences in susceptibility to peroxidative membrane decomposition.

THE ADSORPTION OF BILE SALTS ON ACTIVATED CARBON. J.C. Krasopoulos, V.A. DeBari, and M.A. Needle (Renal Div. and Dept. of Med., St. Joseph's Hosp. and Med. Ctr., Paterson, NJ) *Lipids 15*(5), 365-70 (1980). Activated carbon (AC) has been shown to be effective in reducing serum cholesterol and triglycerides. The mechanism for this action is proposed to be a result of the removal of bile salts in the gut. In this paper, the adsorption of cholate, glycocholate, taurocholate, chenodeoxycholate and deoxycholate on AC is studied in vitro. The results indicate that AC has a high capacity for bile salts, completely removing them from solutions of up to 5 mM and at a rate consistent with physiological activity. Of the 2 types of AC tested, one was shown to exhibit greater capacity and selectivity over the other. A negligible effect was seen with variation of pH through the range 7-9. Desorption occurs in the presence of bile salt-free buffer, but to a minimal extent. Based on these data, the adsorption of bile salts by AC appears to be a likely mechanism for AC-induced reduction of serum lipids.

EFFECT OF ESSENTIAL FATTY ACID DEFICIENCY ON EXPERIMENTAL ALLERGIC ENCEPHALOMYELITIS IN RATS. S. Levine and R. Sowinski (Pathology Dept., New York Med. College and Westchester County Med. Center, Valhalla, NY 10595) *J. Nutr. 110*(5), 891-6 (1980). Previous claims that experimental allergic encephalomyelitis (EAE) was enhanced by essential fatty acid (EFA) deficiency were reinvestigated. Deficiency was induced in Lewis rats by feeding a fat-free diet starting in late gestation, at weaning or in adult life with or without a previous period of starvation. Retardation of growth, the typical dermatitis, increased water consumption and testicular atropy gave evidence of EFA deficiency. Control rats were fed a complete diet or a fat-free diet supplemented with corn oil. EAE was induced in EFA-deficient and control rats by conventional active sensitization with neural antigen and adjuvants or by passive transfer of living lymphoid cells from sensitized nutritionally normal donors. Contrary to previous reports, EFA deficiency did not enhance EAE in any of seven experiments, and these results were supported by histological examinations. In fact, we found inhibition of clinical signs, but not histological lesions, when EFA deficiency was moderately advanced. This was accompanied by (and probably related to) thymic atrophy, possibly due to nonspecific stress. Also we found that EFA deficiency had no effect on a non-immunological model of brain inflammation that resembles EAE in the occurrence of lymphocytic infiltrates.

DESATURATION OF ISOMERIC *TRANS*-OCTADECENOIC

ACIDS BY RAT LIVER MICROSOMES. M.M. Mahfouz, A.J. Valicenti, and R.T. Holman (Hormel Inst., Univ. of Minnesota, 801 16th Avenue N.E., Austin, MN 55912) *Biochim. Biophys. Acta 618*(1), 1-12 (1980). Desaturation of twelve labeled positional isomers of *trans*-18:1 acids was investigated using enzymes of liver microsomes from essential-fatty-acid-deficient rats. Oleic acid was used as model for comparison and for optimizing the incubation conditions. The *trans*-8-, *trans*-9-, and *trans*-10-isomers were not measurably desaturated. The site of desaturation of the *trans*-18:1 isomer was the 9-position, indicating action of Δ9 desaturase. The isomeric *trans*-18:1 acids present in partially hydrogenated fats can be converted to *cis, trans*- or *trans, cis*- and *cis,cis*-18:2 isomers, and *trans*-18:1 isomers in food may have effects upon metabolic control because of the products derived from them.

EFFECT OF SEX, AGE AND DIETARY MODIFICATION ON PLASMA LIPIDS AND LIPOPROTEINS OF *MACACA NEMESTRINA*. M.R. McMahan, A.L. Rhyne, H.B. Lofland and G.P. Sackett (Arteriosclerosis Res. Center, Bowman Gray Schl. of Med. of Wake Forest Univ., Winston-Salem, NC 27103) *Proc. Soc. Exp. Biol. Med. 164*(1), 27-34 (1980). Female *Macaca nemestrina* fed a Monkey Chow diet had higher total plasma cholesterol (TPC) and low-density lipoprotein + very low-density lipoprotein cholesterol concentrations than males. These data suggest the potential for male-female differences in atherosclerosis in this species. No correlation was found between basal TPC concentration and the magnitude of response of TPC levels to the fat and cholesterol enriched diet, indicating that the response of individual animals cannot be predicted on the basis of basal concentrations. The lack of correlation between these two parameters also suggests that different physiological mechanisms control TPC concentrations in the presence or absence of dietary cholesterol.

A SPECIFIC 1,25-DIHYDROXYVITAMIN D_3 BINDING MACROMOLECULE IN CHICKEN BONE. W.S. Mellon and H.F. DeLuca (Dept. of Biochem., Col. of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, WI 53706) *J. Biol. Chem. 255*(9), 4081-6 (1980). Cytosol prepared from homogenates of bone from vitamin D_3 deficient chicks contains a 3.7 S macromolecule having high affinity and low capacity for 1,25-dihydroxyvitamin D_3. Under low salt conditions the 3.7 S macromolecule migrates to 4.3 S and 5.5 S regions on sucrose gradients suggesting aggregation of the protein. Several vitamin D_3 metabolites are capable of specifically binding to the 3.7 S macromolecule. The relative order of potency for several analogs causing displacement of specifically bound 1,25-dihydroxy-26,27-[^{3}H]vitamin D_3 is: 1,25-dihydroxyvitamin D_3 > 1α-hydroxyvitamin D_3 ⩾ 25-hydroxyvitamin D_3 > 24(R),25-dihydroxyvitamin D_3. It is concluded that chick bone cytosol contains a macromolecule of high affinity and low capacity for 1,25-dihydroxyvitamin D_3 which may function as a receptor for some physiological events in bone.

SULFATE METABOLISM IN VITAMIN A-DEFICIENT RATS. P.S. Mohan and K.S. Jaya Rao (Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad–500 007, India) *J. Nutr. 110*(5), 868-75 (1980). Vitamin A deficiency has been shown to produce a reduction in the sulfation process. Somatomedin, a growth hormone dependent factor has also been shown to stimulate the uptake of sulfate by cartilage. Studies were therefore carried out on vitamin A-deficient rats to determine both in vitro and in vivo uptake of sulfate by cartilage, the activity of enzymes believed to be involved in the sulfation process and overall sulfate kinetics. In addition any possible interrelationship between vitamin A and somatomedin was also looked into. The results of the study showed that the in vitro uptake of sulfate by cartilage in the presence of plasma is lowered in vitamin A-deficient animals. Enzymes involved in the sulfation process and overall sulfate kinetics however remained unaltered.

THE INFLUENCE OF CHOLESTEROL AND FAT IN MATERNAL DIET OF RATS ON THE DEVELOPMENT OF HEPATIC CHOLESTEROL METABOLISM IN THE OFFSPRING. S.M. Naseem, M.A. Khan, F.P. Heald and P.P. Nair (Dept. of Pediatrics, Univ. of Maryland Schl. of Med., Baltimore, MD 21201) *Atherosclerosis 36*(1), 1-8 (1980). The influence of a high cholesterol-high fat (HC-HF) diet on the hepatic synthesis and catabolism of cholesterol in the offspring was investigated at various stages of growth and development in the rat. Pregnant rats were fed HC-HF or the control diet throughout the period of pregnancy and newborn pups were suckled by mothers fed either the control or experimental diet throughout the period of lactation. Microsomal cholesterol in newborn pups was not influenced by maternal diet. Weanlings nursed by mothers fed the HC–HF diet showed a 66% reduction in HMG-CoA reductase activity and 150% increase in cholesterol 7α-hydroxylase when compared to those nursed by animals on the control diet. The results are compatible with the thesis that exposure to high dietary cholesterol and fat in gestation has a significant influence on the development of enzymes regulating cholesterol metabolism at weaning.

INITIAL RATE OF CHOLESTEROL ESTERIFICATION ASSOCIATED WITH HIGH DENSITY LIPOPROTEINS IN HUMAN PLASMA. J.C. Pinon, A.M. Bridoux, and M.H. Laudat (Dept. of Lipid Metabolism, INSERM U-35, Hospital Henri Mondor, 94010 Creteil, France) *J. Lipid Res. 21*(4), 406-14 (1980). The enzyme lecithin: cholesterol acyl transferase has been measured both in total plasma and in the fraction of plasma from which very low and low density lipoproteins have been removed by ultracentrifugation. Subjects with the highest levels of high density lipoprotein cholesterol were found to have the lowest enzyme activity, but this correlation was disclosed only in apoB-deficient plasma. The inverse relationship was abolished when the enzyme activity was measured in the absence of all lipoproteins with a density less than 1.125 g/ml. Cholesterol esterification, when determined after removal of lipoproteins with a density less than 1.063 g/ml, was negatively correlated with the in vivo plasma concentration of lipoproteins in the density range 1.063-1.125 g/ml. The same results were obtained in vitro by addition of increasing amounts of this class of high density lipoproteins either in total plasma or in the ultracentrigufed fractions of plasma. This provides further evidence that the lighter density class of high density lipoproteins inhibits the enzyme reaction under physiological conditions.

DESATURATION OF POSITIONAL AND GEOMETRIC ISOMERS OF MONOENOIC FATTY ACIDS BY MICROSOMAL PREPARATIONS FROM RAT LIVER. M.R. Pollard, F.D. Gunstone, A.T. James and L.J. Morris (Dept. of Biochem., Med. Sciences Inst., The Univ. Dundee DDI 4HN Scotland, U.K.) *Lipids 15*(5), 306-14 (1980). A range of *cis*- and *trans*-monoenoic fatty acids was tested as substrates for desaturation in microsomal preparations from rat liver. *Trans*-monoenoic acids were generally desaturated in the Δ9 position to the same extent as stearic acid. Many of the monoenoic acids tested were also desaturated at the Δ5 and/or Δ6 positions, although the percentage conversions were always low. Δ9-*cis*, 11-*trans*-, Δ9-*cis*,12-*trans*- and Δ9-*cis*, 13-*trans*-dienoic acids, produced in situ by Δ9 desaturation of the corresponding monoenoic acids, were extensively desaturated in the Δ6 position. These results are discussed in terms of: (a) the various models proposed to explain the substrate specificities of the desaturases, and (b) the metabolism of unnatural fatty acids ingested from dietary sources.

SUPPRESSION OF CHOLESTEROL AND STIMULATION OF FATTY ACID BIOSYNTHESIS IN CHICKEN LIVERS BY DIETARY CEREALS SUPPLEMENTED WITH CULTURE FILTRATE OF *TRICHODERMA VIRIDE*. A.A. Qureshi, W.C. Burger, N. Prentice, H.R. Bird and M.L. Sunde (USDA, SEA, Barley and Malt Lab., 501 N. Walnut St., and Dept. of Agronomy, Univ. of Wisconsin, Madison, WI 53705) *J. Nutr. 110*(5), 1014-22 (1980). The level of activity of β-hydroxy-β-methylglutaryl-CoA (HMG-CoA) reductase, acetyl-CoA carboxylase, fatty acid synthetase and the rate of conversion of [2-^{14}C]acetate and mevalonate to non-saponifiable compounds and digitonin-precipitable sterol were measured in subcellular fraction of livers of chickens fed diets supplemented with various cereals with and without solids from culture filtrate of *trichoderma viride*. When diets were supplemented with the culture filtrate, low body weight were corrected and cholesterol synthesis was suppressed even more by inhibiting HMG-CoA reductase and conversion of acetate and mevalonic acid to cholesterol. Chickens fed barley and fungal product (0.008%) had 90% lower cholesterol synthesis than controls. Acetyl-CoA carboxylase and fatty acid synthetase showed a two to sixfold increase with cereals and three to 11-fold with cereal plus culture filtrate-supplemented diets. The drastic decreases of cholesterol biosynthesis observed indicate the presence of inhibitor(s) in T. *viride* culture filtrate, which may provide insight into the control mechanism of cholesterol biosynthesis.

METABOLISM BY CELLS IN CULTURE OF LOW-DENSITY LIPOPROTEINS OF ABNORMAL COMPOSITION FROM NON-HUMAN PRIMATES WITH DIET-INDUCED HYPERCHOLESTEROLEMIA. R.W. St. Clair, J.J. Mitschelen, and M. Leight (Dept. Path., Bowman Gray Sch. of Med. of Wake Forests Univ., Winston-Salem, NC 27103) *Biochim. Bioph. Acta 618*(1), 63-79 (1980). Diet-induced hypercholesterolemia in non-human primates results in the production of a low-density lipoprotein (LDL) of abnormal size and composition. This LDL from hypercholesterolemic monkeys has been shown to be more atherogenic than the same amount of LDL from normocholesterolemic animals. Those cells with the greatest capacity to metabolize LDL generally accumulated the most cholesterol with either hypercholesterolemic or normal LDL. In all cell lines, nearly twice as much cholesterol accumulated in cells incubated with hypercholesterolemic LDL compared with normal LDL, and this differential could not be explained by differences in metabolism of the two lipoproteins, suggesting that some cholesterol entered the cells independent of

the uptake of the intact LDL molecule. LDL receptors appear necessary for this to occur, since no difference in cholesterol accumulation was observed in cells genetically deficient in LDL receptors.

EFFECTS OF AN ESSENTIAL FATTY ACID DEFICIENCY ON SERUM LIPOPROTEINS IN THE RAT. M. Sano and O.S. Privett (The Hormel Inst., Univ. of Minnesota, Austin, MN 55912) *Lipids 15*(5), 337-44 (1980). Studies are reported on the effect of an essential fatty acid (EFA) deficiency in male Sprague-Dawley rats and its exacerbation by inclusion of *trans* fatty acids in the diet on the level and composition of serum lipoproteins. For the final 3 wk of each experiment, animals were switched from each group to a 5% supplement of a concentrate of ethyl linolelaidate (TRANS). In addition, a group of animals fed the HCO diet in the first experiment were also switched to the SAFF Diet. With the development of an EFA deficiency in the HCO group, there was a decrease in the high density lipoprotein (HDL) and an increase in the very low density plus the low density (VL-LDL) lipoprotein fractions separated by heparin-manganese precipitation. Switching animals of the HCO group to the TRANS supplement exaggerated this effect and produced a very low ratio of HDL-to-VL-LDL. Analysis of the serum lipoproteins by polyacrylamide disc gel electrophoresis showed that an EFA deficiency produced a marked alternation of the HDL fraction. The data suggested a general relationship between arachidonic acid and the level and composition of HDL on the one hand, and 18:1 and VL-LDL on the other. Accordingly, the ratio of HDL-to-VL-LDL appears to provide a sensitive biochemical index of the EFA status of the rat.

EFFECT OF FATTY ACIDS ON PHYSICAL PROPERTIES OF MICROSOMES FROM ISOLATED PERFUSED RAT LIVER. F. Schroeder and E.H. Goh (Dept. of Pharmacology, University of Missouri, School of Medicine, Columbia, MO 65212) *Chem. Phys. Lipids 26*(3), 207-24 (1980). A computer-centered spectrofluorimeter was used to examine the physicochemical properties of hepatic microsomes and microsomal lipids obtained from isolated rat livers perfused with medium containing palmitate or oleate. The fatty acid composition and degree of unsaturation of the liver microsomal lipids reflected that the fatty acid present in the perfusate. The probe molecules β-parinaric acid and 1,6-diphenyl-1,3,5-hexatriene had higher values for each of these parameters when incorporated into microsomes obtained from livers perfused with a medium containing palmitate than with oleate. Break points occurred at 10°C and 26°C for microsomes from livers perfused with palmitate and at 12°C and 17°C for microsomes from livers perfused with oleate containing medium. These results suggest that the physicochemical properties of liver microsomes were determined in part by the fatty acid in the perfusate.

CONVERSION OF [2-^{14}C] MEVALONATE INTO CHOLESTEROL, LANOSTEROL AND SQUALENE IN COPPER-DEFICIENT RATS. M.J.S. Shao and K.Y. Lei (Nutr. Program, Dept. of Home Economics, Mississippi Agr. and Forestry Experiment Station, Mississippi State Univ., MS 39762) *J. Nutr. 110*(5), 859-67 (1980). This study was designed to examine the effect of copper deficiency on the conversion of mevalonate into cholesterol in rats. In rats fed the copper-deficient diet, the serum free cholesterol concentration was significantly elevated and the serum ester cholesterol concentration appeared to be elevated, but the trend was not significant. The liver free cholesterol concentration appeared to be reduced, but the trend was not significant, and the liver ester cholesterol concentration was significantly reduced in the rats fed the copper-deficient diet. The liver ester cholesterol SA reached a peak at or before 40 minutes in rats fed the copper-deficient diet. The SA of liver ester cholesterol from the rats fed the copper-adequate diet increased between 40 and 120 minutes. The results suggest that in the rats fed the copper-deficient diet the liver ester cholesterol, newly synthesized from [^{14}C] mevalonate, was leaving the liver pool at an increased rate. The serum ester cholesterol SA was elevated in rats fed the copper-deficient diet at all times suggesting that the newly synthesized ester cholesterol may be entering the serum pool at an increased rate or leaving the serum pool at a reduced rate or both: This may account for the hypercholesterolemia observed in rats fed the copper-deficient diet.

IN VITRO EFFECT OF TESTOSTERONE AND CAMP ON CHOLESTEROL SYNTHESIS IN RAT VENTRAL PROSTATE. A.K. Singhal and C.P. Schaffner (Waksman Inst. of Microbiol., Rutgers–The State University, New Brunswick, NJ 08903) *Proc. Soc. Exp. Biol. Med. 164*(1), 45-50 (1980). The effect of testosterone and cAMP on the *in vitro* synthesis of cholesterol in minced tissues of ventral prostate gland from castrated rats was studied. The synthesis of cholesterol was found to increase by 85% after incubation with testosterone for 4 hr. The increase in cholesterol synthesis was completely inhibited by blocking RNA or protein synthesis using actinomycin D or cycloheximide, respectively. Whereas cAMP, like testosterone, increased the *in vitro* synthesis of prostatic protein and RNA in tissues obtained from castrated rats, unlike testosterone, it inhibited the *in vitro* synthesis of cholesterol by 73% after 4 hr of incubation. Thus, although both testosterone and cAMP increased the synthesis of protein and RNA, they showed an opposite effect on cholesterol synthesis, indicating that cAMP, if at all, may be only partially mediating testosterone action.

DIGESTION AND ABSORPTION OF CASEIN AT DIFFERENT DIETARY LEVELS IN THE CHICK: EFFECT ON FATTY ACID AND BILE ACID ABSORPTION. D. Sklan (Faculty of Agr., Hebrew Univ., Rehovot, Israel) *J. Nutr. 110*(5), 989-94 (1980). The site of digestion and absorption of protein was determined in chicks fed diets containing 10, 30 and 45% casein as the protein source, 3% added oil with ^{91}Y Cl_3 added as a non-absorbed reference substance. Digestion of protein to low molecular weight (MW) peptides and amino acids was rapid in all diets with major absorption occurring between duodenum and lower jejunum. Increasing the dietary casein resulted in increases in low MW peptide levels in the duodenum. This increase was disproportionate with intake when 45% casein was fed, suggesting that absorptive capacity of the duodenum was exceeded. Overall nitrogen absorption was similar in all treatments reflecting the increased participation of the ileum in nitrogen absorption when high dietary casein levels were fed. Fatty acid and bile acid absorption was depressed when 45% casein was fed, mainly due to inhibition of absorption in the ileum, presumably by binding to undigested protein.

VISUAL PIGMENTS. 11. SPECTROSCOPY AND PHOTOPHYSICS OF RETINOIC ACIDS AND *ALL-TRANS*-METHYL RETINOATE. T. Takemura, K. Chihara, R.S. Becker, P.K. Das, and G.L. Hug (Dept. of Chem., Univ. of Houston, Houston, TX 77004) *J. Am. Chem. Soc. 102*(8), 2604-9 (1980). The photophysics of hydrogen-bonded complexes of retinoic acid and its 9-cis and 13-cis isomers and the photophysics of the dimers of these isomers of retinoic acid were studied. The investigation indicated that complexes of retinoic acid and molecules that form hydrogen bonds with the carbonyl oxygen of retinoic acid (type I complexes) have both higher radiative and nonradiative rate constants than do hydrogen-bonded complexes of retinoic acid and molecules that form hydrogen bonds only with the hydroxyl oxygen of retinoic acid (type II complexes). The dimer of retinoic acid behaves like a type I complex, and its excited-state properties are better understood in terms of hydrogen bonding than in terms of an exciton model. The photophysical properties and triplet-triplet absorption spectrum of methyl retinoate were measured. The study concluded with an examination of some of the implications of this work for the role of hydrogen bonding in the dimers and monomers of retinal and retinol.

STUDIES ON THE TRANSFER OF PHOSPHATIDYLCHOLINE FROM UNILAMELLAR VESICLES INTO PLASMA HIGH DENSITY LIPOPROTEINS IN THE RAT. Alan R. Tall (Gastroenterology Division, Dept. of Medicine, Columbia Univ. College of Physicians and Surgeons, New York, NY 10032) *J. Lipid. Res. 21*(3), 354-63 (1980). To investigate the metabolic disposition of phosphatidylcholine vesicles, unilamellar vesicles of egg phosphatidylcholine or cholesterol/phosphatidylcholine were injected intravenously into rats. With increasing cholesterol/phosphatidylcholine ratio of injected vesicles, there was progressively less incorporation of phospholipid into HDL and vesicles retaining [^{3}H] inulin were reisolated from plasma. Sixty minutes after injection of cholesterol/phosphatidylcholine vesicles, phospholipid appeared to be partly transferred into HDL and partly taken up by the liver. In summary, injection of unilamellar egg phosphatidylcholine vesicles results in a rapid incorporation of vesicle phospholipid into plasma HDL, primarily as a result of insertion of phospholipid into pre-existing HDL. This process is inhibited by a high content of vesicle unesterified cholesterol. These studies may have relevance to the mechanisms of transfer of phosphatidylcholine from chylomicrons into plasma HDL.

DIFFERENTIAL TRANSPORT OF CHOLESTEROL AND OLEIC ACID IN LYMPH LIPOPROTEINS: SEX DIFFERENCES IN PUROMYCIN SENSITIVITY. G.V. Vahouny, E.M. Blendermann, L.L. Gallo, and C.R. Treadwell (Dept. of Biochem., Schl. of Med. and Health Sci., George Washington Univ., Washington, DC 20037) *J. Lipid Res. 21*(4), 415-24 (1980). Adult rats of both sexes were prepared with indwelling drainage catheters in the left thoracic lymphatic duct, and with duodenal infusion catheters. Control and puromycin-treated animals were administered an aqueous test emulsion containing [7α-^{3}H] cholesterol and [1-^{14}C] oleic acid, followed two hours later, by a tracer dose of [1-^{14}C]-leucine. Successive 2-hr lymph samples were subjected to ultracentrifugal separations of the major lipoprotein classes. These were specifically extracted for lipids, and for DNA- and lipid-free protein. With both sexes 25-35% of the absorbed cholesterol appearing in lymph was recovered in the

VLDL fraction. Furthermore, there were statistically greater levels of cholesterol in this lymph fraction in females than in males. Cumulative protein levels and leucine incorporation into chylomicron proteins was comparable in both sexes. However, VLDL protein in the female was significantly greater than in the male and this difference was mimicked by the greater incorporation of leucine into VLDL proteins in the female. These results emphasize the importance of non-chylomicron transport of cholesterol during absorption and suggest a hormonal influence on intestinal VLDL synthesis in female rats.

SUBFRACTIONATION OF HUMAN HIGH DENSITY LIPOPROTEINS BY HEPARIN-SEPHAROSE AFFINITY CHROMATOGRAPHY. K.H. Weisgraber and R.W. Mahley (Gladstone Fdn. Lab. for Cardiovas. Dis., Univ. of Calif., San Francisco, CA 94140 and Nat'l Heart, Lung, and Blood Inst., Nat'l Inst. of Health, Bethesda, MD 20205) *J. Lipid Res. 21*(3), 316-25 (1980). A reproducible and quantitative subfractionation of human high density lipoproteins (HDL) by heparin-Sepharose affinity chromatography has been developed. The first subclass, referred to as HDL_2- without E, passed through the affinity column unretarded and represented approximately 85% of the HDL_2 lipoprotein protein. The β subclass accounted for approximately 3-8% of the HDL_2 protein and was similar to Lp(a) in composition and size. Method B further subdivided the β subclass into two fractions (β_1 and β_2) with slightly different electrophoretic mobilities. The β subclass possessed binding capability similar to that of LDL. Subfractionation of HDL by heparin-Sepharose affinity column chromatography provides an attractive alternative to methods based solely on ultracentrifugation, in that it subfractionates HDL into subclasses with differing apoprotein contents that impart distinct metabolic characteristics to each class.

REGULATION OF FATTY ACID SYNTHETASE CONCENTRATION AND ACTIVITY DURING ADIPOCYTE DIFFERENTIATION. G.H. Weiss, O.M. Rosen, and C.S. Rubin (Depts. of Molecular Pharmacology, Med., and Neurosci., Albert Einstein College of Med., Bronx, NY 10461) *J. Biol. Chem. 255*(10), 4751-7 (1980). The activity, content, and turnover of the key lipogenic enzyme fatty acid synthetase were studied during the differentiation of 3T3-L1 preadipocytes into adipocytes. The specific activity of the enzyme began to rise sharply when triglyceride droplets were first detected in the cells (Day 3) and ultimately increased 13-fold to a new steady state level in adipocytes 7 days after the initiation of differentiation. Direct determinations of enzyme mass by competitive displacement radioimmunoassays disclosed that the cellular content of fatty acid synthetase increased in parallel with augmentations in activity. Treatment of developing adipocytes with adrenocorticotropic hormone, isoproterenol, or dibutyryl cyclic AMP elicited a 4-fold decrement in the rate of synthetase synthesis, thereby suggesting a possible role for lipolytic hormones in modulating the expression of fatty acid synthetase during development.

Fats and oils

FAST DETERMINATION OF FATTY ACIDS IN OIL-UTILISING RESINS BY NMR SPECTROSCOPY. J. Rybicky. *J. Appl. Polym. Sci. 23*(1), 25-38 (1979). This work describes the determination of oil, either as such or in oil-based resins such as alkyds and urethanes, by means of NMR. Both qualitative and quantitative analyses are demonstrated and the accuracy is assessed. Typically, the complete analysis of an alkyd resin takes less than 1 hr. (World Surface Coatings Abs. No. 448)

WOOD LAMINATE ADHESIVES. Yu. G. Doronin et al. *U.S.S.R. 612,947*. Adhesives based on resole type phenol-formaldehyde resins have increased strength through incorporation of a mixture of fatty acids, e.g. myristic acid, palmitic acid, stearic acid, oleic acid and linoleic acid. (World Surface Coatings Abs. No. 452)

DETECTION OF PONGAM OIL USING ACETIC ANHYDRIDE SULPHURIC ACID REAGENT. G. Ramakrishna, G. Azeemoddin, and S.D. Thirumala Rao (Oil Technological Research Institute, Anantapur-515 001 India) *J. Food Sci. Technol. 16*; 172 (1979). A simple and rapid colour reaction for detection of pongam seed (*Pongamia glabra*) oil in binary oil mixtures using a modified acetic anhydride-sulphuric acid reagent is reported. The reaction produces an instant red to deep red colour sensitive at 1-2 percent level of pongam oil in simple mixtures.

OXIDATIVE RANCIDITY IN THE SKIN AND MUSCLE LIPIDS OF OIL SARDINE (*SARDINELLA LONGICEPS*). P.G. Viswanathan Nair, P.D. Antony and K. Gopakumar (Central Institute of Fisheries Technology, Cochin, India). *J. Food Sci. Technol. 16*; 151 (1979). Development of oxidative rancidity in the skin and muscle lipids of oil sardine during frozen storage (at -18°C) was investigated by measuring the peroxide value, thiobarbituric acid number and polyene indices and determining fatty acid compositions. Skin lipids contained slightly higher proportion of monounsaturated acids and lower levels of polyunsaturated acids than muscle lipids. Increase in the peroxide value and thiobarbituric acid value, and fall in the polyene indices, are faster in skin lipids indicating more rapid autoxidation in the latter. Peroxide value reached a maximum after four weeks of storage. The increased susceptibility of skin lipids towards autoxidation could be due either to the accumulation of prooxidant substances or depletion of naturally occurring antioxidants.

ABUTILON INDICUM SEED OIL – CHARACTERIZATION OF HBR-REACTIVE ACIDS. M. Babu et al. *Fette, Seifen, Anstrichm. 82*(2), 63-6 (1980). The seed oil of Abutilon indicum (Malvaceae) contains three HBr-reactive fatty acids. Quantitative results are obtained by combining information about the HBr-titration, the preparative thin layer separation of oxygenated and non-oxygenated acids, and gas liquid chromatographic analyses.

COULOMETRIC METHOD FOR THE DETERMINATION OF IODINE VALUE BY HYDROGEN UPTAKE. P.W. Hendrikse et al. *Fette, Seifen, Anstrichm. 82*(2), 66-70 (1980). A rapid method for the determination of degree of unsaturation of oils and fats is of importance. In addition to the common methods for the determination of iodine value, alternative methods based on hydrogenation are available. In the methods involving the hydrogenation of the oil or fat, as described in the literature, hydrogen is either externally added to the system or generated internally by chemical means, by the addition of standardized sodium boronate solution to the reaction mixture.

CYCLOPROPENOID FATTY ACIDS OF SIDA GREWIOIDES AND HIBISCUS CAESIUS (MALVACEAE) SEED OILS. S. Husain et al. *Fette, Seifen, Anstrichm. 82*(1), 29-31 (1980). Evidence is provided that sterculic and malvalic acids occur together in seed oils of Sida grewioides and Hibiscus caesius. Sida grewioides oil contains 1.3% sterulic and 2.1% malvalic acids. Hibiscus caesius oil contains 1.0% sterculic and 5.7% malvalic acids. The cyclopropenoid acids were characterized by gas liquid chromatography of the silver nitrate-methanol treated methyl esters using Sterculia foetida esters as reference standard: A third unusual component identified as epoxy acid, also occurs in Sida grewioides oil as a trace component.

SANITARY STATE OF PROCESSING AND BACTERIOLOGICAL PROPERTIES OF MARGARINES. H. Beerens Rev. Fr. Corps Gras, *27*, 221-3, (1980). The microbiology of margarines depends on raw materials, formulation, good practice of manufacture, required quality standards. The up-to-date technology leads to margarines responding to more and more drastic biological criteria.

SELECTION OF RAW MATERIALS IN THE MARGARINE INDUSTRY: INTERCHANGEABILITY DEPENDING ON STOCKS, PROCESSINGS AND UTILISATIONS OF PRODUCTS. J. Klere Rev. Fr. Corps Gras, *27*, 225-7 (1980). The use of different technologies leads to manufactured products with constant properties, whatever the used raw materials may be. Examples are given, pointing out the part played by the hydrogenation, the fractionation and the interesterification.

SULFUR COMPOUNDS IN THE RAPESEED OILS. G. Devinat, S. Biasini and M. Naudet Rev. Fr. Corps Gras, *27*, 229-36 (1980). In cruciferae oils, the sulfur is determined by microcoulometry accurately and reproducibly. Sulfur content of raw oils is varying; it decreases during refining, but never is reduced to zero. The sulfur compounds are classified in volatile, thermolabile and nonvolatile compounds. The relative proportions of those are different in each oil and change differently during refining. The volatile sulfur compounds and, to a lesser degree, the thermolabile compounds inhibit the hydrogenation catalysts. The volatile sulfur compounds isolated by cold finger technique are studied by gas-liquid chromatography with specific detector.

INFLUENCE OF TECHNIQUES ON THE QUALITY OF FOOD PRODUCTS IN THE FATS AND OILS INDUSTRY. J.P. Helme, *Oléagineux, 34*(12), 591-600 (1979); *35*(1), 37-45 (1980) and *35*(2), 93-103 (1980). The possible chemical reactions on triglycerides are briefly described, for example: ester and hydroxyl functions; double linkage. But in France, in the domain of food, legislation concerning standard refining processes as well as authorised technologies (interesterification, fractionating and hydrogenation) is particularly strict. We give the structure of the food fats and oils industry (oil mills, margarine factories, animal fats in particular) and examine the various raw materials used, as well as the techniques involved and the products made. We examine the important

analytical means used (spectrophotometry, various chromatography techniques, atomic absorption...) to ensure strict and precise control of the quality of products manufactured by the industry. This quality will be studied under 4 main headings: – nutritional, biochemical and toxicological, – acceptability to the housewife, – legislation, – physical, chemical and physico-chemical standards. We will conclude by enumerating the effect which fats industry technologies can have on quality (positive and even negative points) as well as the means to be used to overcome problems when they arise. Given the existence of increasingly precise and sophisticated instrumental techniques (ppb titration, for example) the notion of "purity" has considerably evolved in the last few years to the consumer's benefit.

A SINGLE-STEP METHOD FOR DETERMINATION OF THE SPECIFIC RADIOACTIVITY OF LIPIDS. R.C. Noble and J.H. Shand (Hannah Research Institute, AYR, Scotland KA6 5HL) *Lipids 15*(4) 269-71 (1980). The use of a liquid scintillation counter to measure both the mass and the radioactivity content of charred ^{14}C-labeled lipid bands from thin layer chromatoplates has been evaluated. Following lipid mass determination from a measurement of the external standard channels ratio, a suitable choice of counting parameters enabled a reproducible and efficient ^{14}C count to be obtained over virtually the whole range of lipid concentrations tested. Although the charring procedure resulted in some loss of radioactivity, the efficiency of counting remained high enough for accurate dpm measurements.

ETUDE DE MELANGES BINAIRES DE TRIGLYCERIDES DERIVES DES ACIDES PALMITIQUE ET STEARIQUE. M. Ollivon and R. Perron (Organisation Moléculaire et Macromoléculaire, GR 35, C.N.R.S. BP 28 Thiais 94320 France) *Chem. Phys. Lipids 25*(4) 395-414 (1979). The phase diagrams of the SSS--PSP, PSP--SPP and SSS--SPP systems have been established, using DTA and X-ray diffraction. In all cases, a demixtion was found in the solid state, and an intermediate phase was evidenced for the PSP--SPP and SSS--SPP systems. Relations between the diagrams of stable and unstable forms are considered for the system SSS--PSP. Moreover, the influence of structuration in the liquid state on the drawing of liquidus is discussed.

A NEW SYNTHESIS OF α-TOCOPHEROL. G.L. Olson, H.-C. Cheung, K. Morgan, and G. Saucy (Chem. Res. Dept., Hoffmann-La Roche Inc., Nutley, NJ 07110) *J. Org. Chem. 45*(5) 803-9 (1980). α-Tocopherol (vitamin E, 1) has been synthesized in racemic form following a new strategy in which the aromatic ring of the chroman is constructed by addition of the dianion of 2,4-pentanedione to 1,2-epoxy-2,6,10,14-tetramethylpentadecane (5) as a side-chain precursor, followed by condensation with dimethyl acetonedicarboxylate and reduction to the key "tocopherylphenol" 8. Oxidation of 8 with a new organic-soluble bis(quaternary ammonium) salt of Fremy's radical gives tocopherylquinone (9), a known precursor of α-tocopherol (1).

STEREOSELECTIVITY OF RANEY NICKEL CATALYST IN HYDROGENOLYSIS OF A STEROIDAL α,β-UNSATURATED EPOXIDE. CHEMICAL SYNTHESIS OF 3β-BENZOYLOXY-5α-CHOLEST-8(14)-en-15α-OL. E.J. Parish and G.J. Schroepfer, Jr. (Depts. of Biochem. and Chem., Rice Univ., Houston, TX 77001) *Chem. Phys. Lipids 26*(2), 141-7 (1980). Hydrogenation of 3β-benzoyloxy-14α,15α-epoxy-5α-cholest-7-ene in benzene over a Raney nickel catalyst gave 3β-benzoyloxy-5α-cholest-8(14)-en-15α-ol and 3β-benzoyloxy-5α-cholest-8(14)-ene in 39% and 46% yields, respectively. Hydrogenation of the same α,β-unsaturated epoxy steryl ester under the same conditions except with the inclusion of triethylamine (4%) gave 3β-benzoyloxy-5α-cholest-8(14)-en-15α-ol in 89% yield.

CHOLESTEROL ESTERS OF SKIM MILK. O.W. Parks (Eastern Regional Res. Center, AR, SEA, USDA, Philadelphia, PA 19118) *J. Dairy Sci. 63*(2) 295-7 (1980). Cholesterol esters in raw skim milk differed in fatty acid composition from their composition in whole milk. The esters, isolated by chloroform-methanol extraction and preparative thin-layer chromatography, are characterized by an octadecadienoic acid content greater than 70 wt %. In all, unsaturated fatty acids contribute 90 wt % of the fatty acids in the cholesterol ester fraction of skim milk. These results with previous observations suggests that unsaturated lipids may be associated preferentially with the aqueous phase of milk.

THE FREE RADICAL OXIDATION OF POLYUNSATURATED LECITHINS. N.A. Porter, R.A. Wolf and H. Weenen (Paul M. Gross Chem. Lab., Duke Univ., Durham, NC 27706) *Lipids 15*(3) 163-7 (1980). Two unsymmetric polyunsaturated lecithins were allowed to air oxidize and the primary products of autoxidation were isolated and characterized. 1-Palmitic-2-linoleic-phosphatidylcholine undergoes significant oxidation after 16 hr at room temperature under air. A new phospholipid product may be isolated by reverse phase high pressure liquid chromatography (HPLC) and this HPLC fraction is shown to be made up of lipid hydroperoxides formed by free radical oxidation of the homoconjugated diene of the linoleate component of the lecithin. 1-Stearic-2-arachidonic-phosphatidylcholine undergoes a similar oxidation with the arachidonate polyunsaturated functionality being oxidized. The structure of the oxidation products was established by reduction of hydroperoxide with triphenylphosphine, snake venom hydrolysis of the C-2 ester, and HPLC analysis of the resulting hydroxy fatty acids or their methyl esters.

DIFFERENTIAL EFFECTS ON PHOSPHOLIPID PHASE TRANSITIONS PRODUCED BY STRUCTURALLY RELATED LONG-CHAIN ALCOHOLS. M.J. Pringle and K.W. Miller (Harvard Med. School and Mass. General Hospital, Depts. of Pharmacology and Anesthesia, Boston, MA) *Biochemistry 18*(15) 3314-20 (1979). The thermotropic behavior of aqueous dispersions of dipalmitoylphosphatidylcholine and, in a few cases, dimyristoylphosphatidylcholine and distearoylphosphatidylcholine, was measured spectroscopically by using the spin probe, 2,2,6,6-tetramethylpiperidine-1-oxyl (Tempo[1]). From the resulting sigmoidal phase transition profiles, the main gel to liquid-crystalline transition temperature (T_m) was obtained, an estimate was made of the mean transition half-width ($W_{1/2}$) and, where it was observed, the small pretransition (T_1) was also determined. The effects on these parameters of incorporating the long-chain alcohols, $C_{14:0}$, *cis*- and *trans*-$C_{14:1}$, $C_{16:0}$, and *cis*- and *trans*-$C_{16:1}$, were studied as a function of the concentration of alcohol.

SEPARATION OF INDIVIDUAL SULFATED BILE ACID CONJUGATES AS CALCIUM COMPLEXES USING REVERSED-PHASE PARTITION THIN-LAYER CHROMATOGRAPHY. R. Raedsch, A.F. Hofmann, and Kou-Yi Tserng (Dept. of Medicine, Univ. of Calif., San Diego, CA 92103) *J. Lipid Res. 20*(6) 796-800 (1979). A method for separating individual monosulfated primary bile acid conjugates by reversed-phase partition thin-layer chromatography on octadecyl-bonded silica gel is described. The solvent system is acetonitrile containing calcium, probably as calcium carbamate. Excellent resolution of the 3- and 7-monosulfated glycine conjugates, as well as 3- and 7-monosulfated taurine conjugates of cholic and chenodeoxycholic acids is reported. A convenient class separation of sulfated from nonsulfated primary bile acid conjugates by adsorption thin-layer chromatography on low-polarity silica gel is also described.

DEUTERIUM NUCLEAR MAGNETIC RESONANCE STUDIES OF THE INTERACTION BETWEEN DIMYRISTOYLPHOSPHATIDYLCHOLINE AND GRAMICIDIN A'. D. Rice and E. Oldfield (Dept. of Chem., Univ. of Il., Urbana, Il) *Biochemistry 18*(15) 3272-9 (1979). Deuterium nuclear magnetic resonance spectra of dimyristoylphosphatidylcholines (DMPCs) specifically labeled with deuterium at one of positions 2', 3', 4', 6', 8', 10', 12', or 14' of the 2-chain have been recorded at 34.1 MHz in the presence of varying concentrations of the linear pentadecapeptide antibiotic gramicidin A'. Deuterium quadrupole splittings ($\Delta\nu_Q$) have been used to partially characterize the motion and hydrocarbon chain order of phospholipid in contact with the polypeptide surface. The time constants characterizing the decays of the echo intensity (T_{2e}) are correspondingly reduced in the lipid-polypeptide complexes. This implies in general for studies of protein-lipid organization in both model and biological membranes that T_{2e} values should be determined routinely in order to eliminate spectral distortions due to relaxation.

A FLUORESCENCE STUDY WITH POLARISED INCIDENT LIGHT OF THE COMPRESSION OF PHOSPHOLIPID MONOLAYERS SPREAD AT THE AIR/WATER INTERFACE: ORIENTATION PROCESSES IN THE GLYCEROL REGION. J. Teissie (Centre de recherches de Biochimie et de Genetique Cellulaires du C.N.R.S. 118, Route de Narbonne, F-31077-Toulouse Cedex France) *Chem. Phys. Lipids 25*(4) 357-68 (1979). Monolayers of phospholipids spread at the air/water interface were studied by means of fluorescence measurements. Using linearly polarised incident light and following the behaviour of a fluorescent covalently-labelled phospholipid (dansylphosphatidylethanolamine) embedded in the monolayer, it was possible to obtain information about the orientation changes at the glycerol level of the phospholipid. When using dipalmitoylphosphatidylcholine as phospholipid, the main orientation of the probe appears unchanged during the phase transition process. On the other hand, the standard deviation of the distribution function of orientations is larger in the liquid-expanded state relative to the condensed state. When using phosphatidic acid or a mixture of dipalmitoylphosphatidylcholine and phosphatidic acid as phospholipids, the same orientation of the probe is observed as with

pure dipalmitoylphosphatidylcholine. The glycerol region of a phospholipid spread in monolayer at the air/water interface appears unaffected structurally either by the nature of the polar moiety, by its ionisation state, or by the physical state of the hydrocarbon chains.

COLORING CONDITIONS OF THIOBARBITURIC ACID TEST FOR DETECTING LIPID HYDROPEROXIDES. T. Asakawa and S. Matsushita (Research Institute for Food Science, Kyoto Univ., Uji, Kyoto, 611, Japan) *Lipids 15*(3), 137-40 (1980). The coloring reaction of the thiobarbituric acid test for hydroperoxides was completely inhibited by the addition of EDTA. Therefore, it was necessary to add a metal salt to the reaction mixture to complete the reaction and also to add an antioxidant to prevent autoxidation when unoxidized unsaturated fatty acids co-exist. The optimal pH of the reaction was found at 3.6 using glycine-hydrochloric acid buffer.

SYNTHESIS OF CHOLINE AND ETHANOLAMINE PHOSPHOLIPIDS WITH THIOPHOSPHOESTER BONDS AS SUBSTRATES FOR PHOSPHOLIPASE C. J.W. Cox, W.R. Snyder and L.A. Horrocks (Dept. of Physiological Chem., The Ohio State Univ., 1645 Neil Ave., Columbus, OH 43210) *Chem. Phys. Lipids 25*(4), 369-80 (1979). Spectrophotometric assays of esterases are sensitive, rapid, and quite specific when thioester substrates are used. Glycerophospholipids with thiophosphoester bonds may be useful as substrates for phospholipase C (EC 3.1.4.3). These have been made from mercaptoglycerol and mercaptoethanol. The thiols were oxidized to disulfides, acylated, and reduced with dithiothreitol. Phosphocholine derivatives were made by the classical methods for oxyphosphoesters. The phosphatidyl choline analogue was converted to the phosphatidyl ethanolamine analogue by transphosphatidylation with cabbage phospholipase D and ethanolamine. Structures were proved with enzymic hydrolysis, infrared spectra, TLC behavior, and elemental analyses. The synthesized compounds were *rac*-1-S-phosphocholine-2,3-0-didecanoyl-1-mercapto-2,3-propanediol, 1-S-phosphoethanolamine-2,3-0-didecanoyl-1-mercapto-2,3-propanediol, and 1-S-phosphocholine-2-0-hexadecanoyl-1-mercapto-2-ethanol.

HIGH RESOLUTION NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY OF GLYCOSPHINGOLIPIDS. I: 360 MHz ^{1}H and 90.5 MHz ^{13}C NMR ANALYSIS OF GALACTOSYLCERAMIDES. J. Dabrowski, H. Egge, and P. Hanfland (Max-Planck-Institut für Medizinische Forschung, Heidelberg) *Chem. Phys. Lipids 26*(2), 187-96 (1980). The high resolution ^{1}H and ^{13}C nuclear magnetic resonance (NMR) spectra of galactosylceramides containing *n*-fatty acids and α-hydroxy fatty acids were recorded in dimethylsulfoxide solution with and without addition of D_2O. From the coupling constants of the sugar ring protons, a $^{4}C_{1}$ conformation can be deduced. In contrast to the confirmation in aqueous solution, the C^{6} hydroxymethylene group is freely rotating around the C^{6}–C^{5} bond. In the ceramide residue all signals produced by protons linked to carbons bearing electronegative substituents could be attributed. The large difference in coupling constants of the methylene protons of $C^{1'}$ to the $C^{2'}$ methine proton of the sphingosine indicates a restricted rotation around the $C^{1'}$–$C^{2'}$ bond. The assignments of the hydroxy and amino protons follow from the decoupling of the corresponding methine protons.

ANALYSIS OF DOLICHOL IN HUMAN TISSUES BY HIGH PRESSURE LIQUID CHROMATOGRAPHY. D.J. Freeman, C.A. Rupar and K.K. Carroll (Dept. of Biochem., Univ. of Western Ontario, London, Ontario, Canada N6A 5C1) *Lipids 15*(3), 191-3 (1980). Dolichol from human liver was shown by reverse-phase high pressure liquid chromatography to consist of a series of homologues ranging in length from 17 to 23 isoprene units. The two major components, corresponding to 19 and 20 isoprene units, respectively, were isolated and identified by mass spectrometry. Dolichyl palmitate, synthesized from liver dolichol, showed an identical series of peaks with longer retention times. Attempts to chromatograph dolichyl phosphate under similar conditions were unsuccessful. Dolichol from uterine tissue and several other human tissues showed a shift toward shorter chain length, with a predominance of homologues containing 18 and 19 isoprene units.

DISTEAROYLPHOSPHATIDYL CHOLINE/AMMONIOHEXANOATE SURFACTANT INTERACTIONS. Y.C. Fu and R.G. Laughlin (Miani Valley Labs., The Procter and Gamble Co., P.O. Box 39175, Cincinnati, OH 45247) *Chem. Phys. Lipids 26*(2), 121-39 (1980). The interactions which occur between a homologous series (C_{10}-C_{20}) of 6-alkyldimethylammoniohexanoates (AHs) and large unilamellar vesicles of DSPC have been investigated. The major findings are: (1) That when the temperature is below T_c of the DSPC and for short times (<1 h), the interaction between surfactant and vesicle is probably limited to superficial adsorption of both monomer and micellar species; (2) That under the proper conditions, AH surfactants (like other types) solubilise DSPC to form mixed AH/DSPC micelles; (3) That the concentration of the AH must be either close to or somewhat above its critical micelle concentration (cmc) for solubilisation to occur, depending on other factors. At temperatures above T_c and with very small vesicles solubilisation begins to occur just below the cmc, while at temperatures below T_c and when the DSPC exists as very large vesicles the AH concentration must exceed its cmc (by about an order of magnitude) for solubilisation to occur; (4) That C_{20}AH interacts with DSPC vesicles in ways not observed with the shorter AHs. At concentrations which the shorter AHs dissolve the DSPC, these soluble ultralong-chain surfactants interact with the vesicles to form large, rapidly sedimented particles.

QUANTITATIVE DETERMINATION OF RETINALS WITH COMPLETE RETENTION OF THEIR GEOMETRIC CONFIGURATION. G.W.T. Groenendijk, W.J. De Grip and F.J.M. Daemen (Dept. of Biochem., Univ. of Nijmegen, Nijmegen, The Netherlands) *Biochim. Biophys. Acta 617*(3), 430-8 (1980). A method is described for the quantitative extraction of retinal in its original isomeric configuration from retinal-containing pigments. Using excess of hydroxylamine under denaturing conditions, the chromophore of retinal bearing natural products is converted into the corresponding retinaloxime with complete retention of geometric configuration. The retinaloximes can be quantitatively extracted with dichloromethane and analyzed by high-performance liquid chromatography.

INFLUENCE OF CALCIUM ON PHOSPHATIDYLGLYCEROL. TWO SEPARATE LAMELLAR STRUCTURES. K. Harlos and H. Eibl (Max-Planck-Institut für biophysikalische Chemie, 34 Göttingen-Nikolausberg, West Germany) *Biochemistry 19*(5), 895-9 (1980). The influence of calcium on the structure of *rac*-1,2-ditetradecylglycerol-3-phosphoglycerol is investigated by differential scanning calorimetry and by X-ray diffraction. It is shown that 1 M $CaCl_2$ (pH 4.6) induces two separate lamellar phases in the same sample at 20°C. These two phases can be clearly distinguished by their X-ray diffraction patterns. The type of phase observed depends on the pretreatment of the sample. At high temperature (90°C), when the hydrocarbon chains are in the disordered state, the small angle reflections are in the ratio $1:1/\sqrt{3}:1/2$ and thus indicate the presence of a hexagonal phase.

LIPIDS OF MYELIN, WHITE MATTER AND GRAY MATTER IN A CASE OF GENERALIZED DEFICIENCY OF CYTOCHROME B_5 REDUCTASE IN CONGENITAL METHEMOGLORINEMIA WITH MENTAL RETARDATION. H. Hirono (Univ. of Göteborg, Dept. of Neurochem., Psychiatric Res. Centre, Sweden) *Lipids 15*(4), 272-5 (1980). The lipid classes and fatty acid compositions of myelin, white matter and gray matter were analyzed in a case of generalized deficiency of cytochrome b_5 reductase in congenital methemoglobinemia with mental retardation. When compared with normal data, the percentage of 24:1 was considerably decreased and diminished unsaturation was observed in cerebrosides, whereas the sum of 24:0 and 24:1 was the same as in normals. The ratio of hydroxy fatty acids to total fatty acids in cerebrosides was low. The contents of cholesterol and phospholipids in white matter were reduced to 80% or the normal, whereas cerebroside was reduced to 48% of the normal.

GAS CHROMATOGRAPHIC SEPARATIONS OF DI- AND MONOACYLGLYCEROLS BASED ON THE DEGREE OF UNSATURATION AND POSITIONAL PLACEMENT OF ACYL GROUPS. Y. Itabashi and T. Takagi (Dept. of Chem., Faculty of Fisheries, Hokkaido Univ., Hakodate, Japan) *Lipids 15*(4), 205-15 (1980). Gas liquid chromatographic analysis of diacylglycerols (DGs) and monoacylglycerols (MGs) prepared by Grignard degradation of the triacylglycerols of plant and fish oils was examined as acetate and trimethylsilyl (TMS) ether derivatives on several polar cyanosiloxanes. Satisfactory separations of mixtures of DGs or MGs from simple plant oils based on carbon number and degree of unsaturation, as either acetates of TMS ethers, were obtained on SILAR 10C. In addition, the TMS ethers were effectively separated on the basis of the positional distribution of fatty acid in the acylglycerol molecule, but the acetates of the positional isomers overlapped. The equivalent chain lengths (ECLs) of DGs with 28-42 total acyl carbons and 0-6 double bonds, and MGs with 14-22 acyl carbons and 0-6 double bonds, are presented for both derivatives. The influence of column temperature on the ECLs is discussed.

A SIMPLIFIED PROCEDURE FOR THE PREPARATION OF 2,3-0-ISOPROPYLIDENE-*SN*-GLYCEROL FROM L-ARABINOSE. P. Kanda and M.A. Wells (Dept. of Biochem., Arizona Health Sciences Center, Univ. of Arizona, Tucson, AZ 85724) *J. Lipid Res. 21*(2), 257-8 (1980). A new procedure for the preparation of 2,3-*O*-isopropylidene-*sn*-glycerol is described. L-arabinose is converted to its 4,5-monoisopropylidene diethyl mercaptal derivative. This com-

pound is then subjected to periodate oxidation and borohydride reduction. Following neutralization, the acetone-glycerol is extracted from the aqueous solution into chloroform. Evaporation of the chloroform and subsequent distillation yielded pure 2,3-O-isopropylidene-*sn*-glycerol($[\alpha]_D^{22}$ = -14.5 (in substance)) in an overall yield of 15-25%.

HAEMOPROTEIN- AND TRANSITION METAL ION-CATALYSED OXIDATION OF LINOLEIC ACID. SELECTIVITY OF THE POSITION OF OXYGENATION. H.W.-S. Chan and V.K. Newby (Agricultural Res. Council's Food Res. Institute, Colney Lane, Norwich NR4 7UA (U.K.) *Biochim. Biophys. Acta 617*(3), 353-62 (1980). Oxidation of linoleic acid in aqueous buffers favoured the formation of the 13 positional isomers of hydroperoxylinoleic acid. The reaction which was catalysed by haemoproteins and Fe(II) and Cu(II) ions showed positional selectivity that was similar to lipoxygenase-catalysed reactions but yielded equal proportions of both enantiomers of the hydroperoxides. There was little selectivity when methyl linoleate was used as the substrate or when linoleic acid was oxidised in organic solvents. The results indicated that positional selectivity was, at least in part, due to the conformation of the fatty acid molecule in aqueous media. Implication of the selectivity in a non-enzymic reaction is discussed especially in relation to its effect on the determination of lipoxygenase specificities.

ROLE OF MICROFLORA IN PRODUCTION OF FREE FATTY ACIDS AND FLAVOR IN SWISS CHEESE. P.V. Paulsen, J. Kowalewska, E.G. Hammond, and B.A. Glatz (Dept. of Food Technology, Iowa State Univ., Ames, IA 50011) *J. Dairy Sci. 63*(6), 912-8 (1979). Cheese was made in a sterile 8-liter hooded vat from milk with a low bacterial count under conditions typical for Swiss cheese. *Streptococcus thermophilus, Lactobaccilus helveticus,* and *Propionibacterium shermanii* were added to the vat, singly and in various combinations. The cheese was brined and ripened for 60 days under carbon dioxide at temperatures typical for Swiss cheese. Analyses for free fatty acids revealed that all three organisms were able to produce more free fatty acid than an uninoculated control. The flavor of cheeses inoculated with all three organisms was indistinguishable from Swiss cheese. Cheeses inoculated with a single organism or with two of the organisms lacked cheesy flavor except for those made with *S. thermophilus* plus *L. helveticus,* which were cheesy but not Swiss-like. The organisms used in cheese making did not affect formation of nonacid, oil-soluble cheese flavors.

RAMAN SPECTRA AND CONFORMATIONS OF THE *CIS*-UNSATURATED FATTY-ACID CHAINS. Y. Koyama and K.-I. Ikeda (Faculty of Sci., Kwansei Gakuin Univ., Uegahara Nishinomiya 662 Japan) *Chem. Phy. Lipids 26*(2), 149-72 (1980). Raman spectra of low (13°C) and high (16°C) m.p. crystals of oleic acid were recorded and the spectral differences were ascribed to different conformations around a pair of sp^2, C--C axes, i.e. (skew, skew') and (skew, skew). Crystalline modifications (m.p. 29°C and 29.5°C) of petroselinic acid were found for the first time; after spectral comparison with oleic acid conformations in those crystals were predicted to be (skew, skew') and (skew, skew). Raman spectra of dioleoyl- and dipetroselinoyl-L-α-phosphatidylcholines were measured for different crystalline phases and the conformation was examined. The skeletal vibration bands of the polymethylene chains of *cis*- and *trans*-unsaturated fatty-acids were analysed by using the frequency-phase difference relationships of saturated fatty-acids. Implications of the *cis*-olefin group for the physical properties of phospholipid bilayers and the applicability of Raman spectroscopy in probing chain conformations were discussed.

COMPOSITION OF THE LIPIDS IN HUMAN MILK: A REVIEW. R.G. Jensen, R.M. Clark, and A.M. Ferris (Dept. of Nutr. Sci., Univ. of Connecticut, Storrs, CT 06268) *Lipids 15*(5), 345-55 (1980). Recent publications on the composition of human milk are reviewed. The importance of proper sampling is discussed. Fat contents of 2.6-4.5% and cholesterol amounts of 200-650 mg/100 g fat were reported. The phytosterols in milk were increased by the consumption of these sterols. Phytosterols could contribute to the "total cholesterol" in milk if analyses are done colorimetrically. The fatty acid composition is remarkably uniform unless bizarre diets are consumed; the amounts of linoleic acid vary the most. Phospholipids contained more long chain polyunsaturated fatty acids than triacylglycerols.

COMPOSITION OF LIPIDS FROM MECHANICALLY DEBONED POULTRY MEATS AND THEIR COMPOSITE TISSUES. P. Jantawat and L.E. Dawson (Michigan State Univ., East Lansing, MI 48824) *Poult. Sci. 59*(5), 1043-52 (1980). Lipids from light and dark mechanically deboned chicken and turkey meats (MDCM and MDTM), light and dark hand deboned chicken and turkey meat (HDCM and HDTM), their corresponding bone residues, and skin tissues were analyzed for total cholesterol, phospholipids (total and fraction), and fatty acid distribution profiles (polar and nonpolar fractions). Small differences were found in the fatty acid components of neutral lipids from various tissue samples. The fatty acid components of the phospholipids from MDCM and MDTM more closely resemble the fatty acids of their corresponding bone or hand deboned meat phospholipids than skin phospholipids. The cholesterol content of MDCM and MDTM lipids resembled more closely that of skin lipids or bone lipids than muscle lipids.

PROTON NUCLEAR MAGNETIC RESONANCE IDENTIFICATION AND DISCRIMINATION OF SIDE CHAIN ISOMERS OF PHYTOSTEROLS USING A LANTHANIDE SHIFT REAGENT. T. Iida, T. Tamura, and T. Matsumoto (Coll. of Eng., Nihon Univ., Koriyama-shi, 963 Japan). *J. Lipid Res. 21*(3), 326-38 (1980). Proton nuclear magnetic resonance (^{1}H-NMR) spectra at 90 MHz were measured for a number of side chain isomers of phytosterols with or without lanthanide shift reagent, and the effect of Yb(fod)$_3$ on the side chain methyl protons is discussed. The change of the chemical shifts induced by Yb(fod)$_3$ for the side chain methyls was expressed in terms of the induced shift ratios (ISR values), i.e., the ratios of the induced chemical shifts of the respective side chain methyls to that of the fastest moving side chain methyl. The ISR values were sensitive to minor structural and stereochemical differences, but almost independent of ring structures and of substrate concentrations, thus providing confirmatory evidence for the side chain structures. Also, the Yb(fod)$_3$-induced spectral patterns observed in the high-field methyl region bore the fingerprints of the side chain structures.

IDENTIFICATION OF CAMPESTERYL PALMITATE AND SITOSTERYL PALMITATE IN WHEAT FLOUR. C.C. Hsieh, C.A. Watson, and C.E. McDonald (Dept. of Cereal Chemistry and Technology, North Dakota State Univ., Fargo, ND 58105). *J. Food Sci. 45*(3), 523-5 (1980). This study shows that both campesteryl and sitosteryl esters, which appeared as one spot by thin-layer chromatography, were identified as the palmitates of campesterol and sitosterol by gas-liquid chromatography and infrared studies. Campesteryl palmitate and sitosteryl palmitate and sitosteryl palmitate were present in proportions of about 1 to 5 in wheat flour in amounts of 0.0043 and 0.021%, respectively.

SYNTHESIS OF GLYCOLIPIDS. Roy Gigg (Laboratory of Lipid and General Chem., National Institute for Med. Res., Mill Hill, London NW7 1AA (United Kingdom). *Chem. Phys. Lipids 26*(4), 287-404 (1980). The chemical syntheses of naturally occurring glycolipids derived from sphingosine bases and glycerol derivatives, and the syntheses of polyisoprenoid lipid intermediates and other miscellaneous glycolipids records up to the end of 1977 are reviewed.

ANALYSIS OF OLEATE, LINOLEATE AND LINOLENATE HYDROPEROXIDES IN OXIDIZED ESTER MIXTURES. S.H. Fatemi and E.G. Hammond (Dept. of Food Technology, Iowa State Univ., Ames, IA 50011) *Lipids 15*(5), 379-85 (1980). The hydroperoxides in oxidized mixtures of methyl oleate, linoleate, and linolenate were analyzed by reducing the hydroperoxides to the corresponding hydroxyesters and separating the hydroxyesters from the unoxidized esters by thin layer chromatography (TLC). The hydroxyesters from linolenate were separated from the other hydroxyesters by TLC on silver ion plates. The hydroxyesters were converted to TMS-hydroxy derivatives. The TMS-hydroxyoleate and TMS-hydroxylinoleate were separated by gas chromatography (GC), and all the TMS-derivatives were quantified by GC. The relative rates of oxidation of methyl oleate, linoleate and linolenate in mixtures were ca. 1:10.3:21.6. The hydroperoxides formed in the oxidation of soybean and olive oils were similar before and after randomization and similar to corresponding methyl ester mixtures.

SYNTHESIS OF GLYCEROPHOSPHOLIPIDS. H. Eibl (Max-Planck-Institut für biophysikalische Chemie, D-3400 Göttingen-Nikolausberg (F.R.G.). *Chem. Phys. Lipids 26*(4), 405-29 (1980). Recent advances in the synthesis of phosphatidic acids, phosphatidylethanolamines and phosphatidylcholines are described. Methods for the synthesis of some alkylacyl and alk-1-enylacyl analogues of the common diacylglycerophospholipids are also discussed. In addition, synthetic routes are described, that lead to unusual phospholipids such as compounds containing the polar group at position 2 of the glycerol moiety, glycerophospholipids containing alkanolamines of different chain lengths, and glycolphospholipids. All of the common glycerophospholipids can be prepared without the use of protecting groups. Major advances in phospholipid synthesis involve the application of novel phosphorylating agents and the use of cyclic intermediates. Although phosphatidylserines and phosphatidylthreonines as well as phosphatidylglycerol and cardiolipins can be prepared by chemical synthesis, further

studies are required to work out procedures that lead to these compounds in high yields.

AN EFFICIENT SYNTHESIS OF MIXED ACID PHOSPHOLIPIDS USING 1-PALMITOYL-*SN*-GLYCEROL-3-PHOSPHORIC ACID BROMOALKYL ESTERS. H. Eibl (Max-Planck-Institut für biophysikalische Chemie D-3400 Göttingen-Nikolausberg, Germany). *Chem. Phys. Lipids 26*(3), 239-47 (1980). The preparation of mixed-acid phospholipids is possible in high yields from 1,2-dipalmitoyl-*sn*-glycerol-3-phosphoric acid bromoalkyl esters. The fatty acid in the 2-position of these general intermediates for phospholipid synthesis was completely removed by hydrolysis with phospholipase A_2. The resulting 1-palmitoyl-*sn*-glycerol-3-phosphoric acid bromoalkyl esters were reacylated in high yields with fatty acid anhydrides in the presence of perchloric acid. Transformation of the mixed-acid phosphatidyl cholines or -ethanolamines was possible by direct amination.

SKIN SURFACE LIPIDS OF THE HORSE. D.T. Downing and S.W. Colton VI (Dept. of Dermatology, Univ. of Iowa Col. of Med., Iowa City, IA 52242) *Lipids 15*(5), 323-7 (1980). Skin surface lipids from the sides of male and female horses (*Equus caballus*) were collected in acetone and analyzed by thin layer chromatography and gas liquid chromatography. The sole components in both sexes were cholesterol, cholesteryl esters and the lactones of 30-, 32- and 36-carbon ω-hydroxy acids, each including a methyl group in the n-1 position. Most of the lactones were monounsaturated (either n-8 or n-10), but small amounts of saturated and dienoic species were present. A pooled sample of the skin surface lipids contained 14% cholesterol, 38% cholesteryl esters and 48% lactones.

LASER RAMAN SPECTROSCOPIC STUDY OF SPECIFICALLY DEUTERATED PHOSPHOLIPID BILAYER. R. Bansil, J. Day, M. Meadows, D. Rice, and E. Oldfield (Dept. of Physics, Boston Univ., Boston, MS 02215) *Biochemistry 19*(9), 1938-43 (1980). Raman spectra of 1,2-dimyristoyl-*sn*-glycero-3-phosphocholines specifically deuterated in the 2 chain at one of positions 3, 4, 6, 10, 12, and 14 have been obtained as a function of temperature. The frequencies of the CD_2 vibrational stretching modes depend on the position of the labeled CD_2 group, being maximum at position 3 of the acyl chain and then decreasing until they become constant beyond position 6. This frequency dependence is interpreted in terms of the inductive effect of the charge distribution of the acyl chain carboxyl group. In both gel and liquid-crystal phases, the Raman line widths depend on the position of the CD_2 group, being minimum at position 6 and increasing toward both ends of the hydrocarbon chain. The width of the CD stretching bands abruptly increases at the phase transition temperature. The magnitude of the increase depends upon the position of the label, increasing almost linearly up to position 10 and then decreasing for positions 12 and 14. The spectra for the CD_2 group at position 3 and the terminal CD_3 group are almost the same in both phases. These results are interpreted in terms of the effects of hydrocarbon chain organization on the vibrational modes.

SEPARATION AND IDENTIFICATION OF PROSTAGLANDIN A_1 IN ONION. K.A. Attrep, W.P. Bellman, Sr., M. Attrep, Jr., J.B. Lee, W.E. Braselton, Jr. (Dept. of Chem., East Texas St. Univ., Commerce, TX 75428) *Lipids 15*(5), 292-7 (1980). The separation of a fraction corresponding to prostaglandin A_1 from yellow onion (*Allium cepa*) and subsequent purification of that fraction as prostaglandin A_1 has led to the identification of prostaglandins in a plant material for the first time. Kilogram quantities of onions were processed and purified by extraction procedures, column chromatography and thin layer chromatography (TLC). Prostaglandin A_1 was characterized and identified by a combination of comparative TLC, gas chromatography-mass spectrographic analysis and blood pressure lowering properties. The results of these experiments are consistent with standard prostaglandin A_1. It is concluded that prostaglandin A_1 is present in onion.

PHOTOCHEMICAL AND PHOTOPHYSICAL STUDIES OF ORGANIZED ASSEMBLIES. INTERACTION OF OILS, LONG-CHAIN ALCOHOLS, AND SURFACTANTS FORMING MICROEMULSIONS. M. Almgren, F. Grieser, and J.K. Thomas (Dept. of Chem., Univ. of Notre Dame, Notre Dame, IN 46556) *J. Amer. Chem. Soc. 102*(9), 3188-93 (1980). The conditions necessary for forming a microemulsion system with sodium lauryl sulfate, pentanol, dodecane, and water have been established. This system was then used to influence photophysical reactions of molecules solubilized in the microemulsion aggregated. The sizes of the microemulsion aggregates were also determined by a photophysical method and by utilizing a Poisson distribution of reactants in the aggregates. Comments on the nature of the aggregate were obtained from the fluorescence spectra of pyrene carboxaldehyde which resides in the surface and pyrene which resides in microemulsion interior. It was concluded from studies with the latter probe that pyrene samples a large fraction of the microemulsion interior during the measurements. The local oxygen solubility in the microemulsion was much higher than that in water. The results are discussed in terms of the increased utility of microemulsions over micelles with regard to promotion of certain photochemical reactions.

PHYSICO-CHEMICAL PROPERTIES OF MAGNESIUM SOAPS OF LOWER FATTY ACIDS IN ALCOHOLS. R.P. Varma (Department of Chemistry, D.A.V. College, Muzaffarnagar-251 001) *J. Indian Chem. Soc.* Vol. 56, 842 (1979). Besides a few references on the properties of magnesium soaps of higher fatty acids in organic solvents, only a little work on the lower fatty acid soaps is available. The present communication deals with the physical properties of these soaps in alcohols with a view (i) to determine micellar aggregation, dissociation constant, K and molar conductance at infinite dilution, Λ^{∞} and (ii) to find the size and nature of the micelles.

DEVICE FOR SATURATING GAS CHROMATOGRAPHIC CARRIER GAS WITH FORMIC ACID FOR FREE FATTY ACID AND BARBITURATE ANALYSES. A.H. Woo and R.C. Lindsay (Department of Food Science, University of Wisconsin-Madison, WI 53706) *J. Chromatogr. Sci. 18* 273 (1980). A simple device for saturating gas chromatographic carrier gas with formic acid vapor is described. The unit is constructed of readily available glass and stainless steel components and can be safely recharged with formic acid for routine use in free fatty acid and barbiturate analyses.

Drying oils and paints

MICROSCOPIC DISTRIBUTION OF LINSEED OIL AFTER APPLICATION TO WOOD SURFACE. M.H. Sehneider. *J. Coatings Technol. 52*(665), 64-7 (1980). Linseed oil was allowed to move into wood, cured, and then the wood-oil composite was studied with the scanning electron microscope at various distances from the wood surface. The oil in the wood was unevenly distributed at all distances from the surface. Several driving mechanisms are suggested.

EFFECT OF ACETYLATION ON OPTICAL ACTIVITY OF CASTOR OIL AND RICINOLEIC ACID. S.F. Thombre and H.A. Bhakare. *J. Col. Soc. 17*(32/3/4), 13-5 (1978). It was found that temperature and molar ratio of castor oil to acetic anhydride do not affect the total time required for complete acetylation of ricinoleic acid to introduce maximum optical activity. (World Surface Coatings Abs. No. 454)

ALLYL ESTERS OF CRAMBE-DERIVED LONG-CHAIN FATTY ACIDS AND THEIR POLYMERS. S.-P. Chang and T.K. Miwa. *J. Appl. Polym. Sci. 24*, 441-54 (1979). Allyl esters of erucic, brassidic, behenic, oleo-erucic, and stearo-behenic acids, prepared by refluxing benzene solutions of the acids with excess allyl alcohol in the presence of p-toluenesulphonic acid monohydrate, polymerise smoothly in the presence of 5 wt % t-butyl perbenzoate at 120 C for 24 hr. Polymerisation of the unsaturated acid esters involves a large portion (84%) of allylic and a small portion (26%) of ethylenic bonds. The products, saturated and unsaturated, have a degree of

polymerisation between 6 and 10 and are soluble in typical polymer solvents. Crystallinity, judged by thermal analysis, decreased with increased cis unsaturation. The oligomers melted between -30 C and 59 C and started decomposing at 200 C. (World Surface Coatings Abs. No. 454)

REACTION OF MALEIC ANHYDRIDE WITH UNSATURATED FATTY ACIDS. M. Nagakura. *J. Jap. Soc. Col. Mat. 52*, 131-42 (1979). (World Surface Coatings Bas. No. 454)

PROTECTIVE PROPERTIES OF MICROCRYSTALLINE WAX COMPOSITIONS. G.V. Grigor'ev, V.E. Ryazanov and G.I. Yahkrarov. *Lakokras. Mat. 1979*, 30-1. The protective properties of various coatings on agricultural machinery exposed to outdoor weathering demonstrated the superior properties of a water/wax dispersion. (In Russian) (World Surface Coatings Abs. 451)

PUBLICATIONS ABSTRACTED

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The Analyst—Analytical Journal of The Chemical Society, Burlington House, London W1V OBN, England.
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