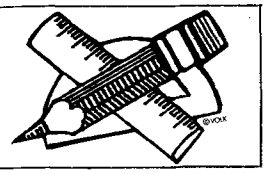
Abstracts



• Fats and Oils

THERMAL DECOMPOSITION OF BUTYL OLEATE HYDROPEROXIDE. II. IN BUTYL OLEATE. H. Parizkova et al. (Inst. Rech. pour la Technologie Alimentaire, CS-150 38 Prague, Czechoslovakia). *Rev. Fr. Corps Gras* 23, 263–70 (1976). Butyl oleate hydroperoxide was heated in butyl oleate (10/90 w/w) in inert gas for 2 hours at 150C. Hydroperoxides were totally decomposed, mainly into a mixture of both saturated and unsaturated aldehydes and aldehydoesters. The amount of monomeric products was significantly lower than in the case of decomposition of hydroperoxide in butyl palmitate. Both nonpolar and polar oligomers were produced. Various hydroxylic derivatives prevailed among the polar oligomers. Oligomers were mainly C–C bonded.

CHEMICAL, NUTRITIONAL, AND METABOLIC STUDIES OF COOKING FATS. I. CHEMICAL ASPECTS. E.G. Perkins (Dept. Food Science, The Burnsides Research Lab., Univ. Illinois at Urbana-Champaign, Urbana, Ill. 61801). *Rev. Fr. Corps Gras* 23, 257–262 (1976). In the first part of this paper, which was the subject of a conference at ITERG in 1975, the chemical changes in cooking fats and the evolution of some physical properties are reviewed by the author. The importance of modern processes for fractionation or identification of volatile products and polymers is shown. The nutritional aspects will be studied in the second part to be published in the June issue.

COMPARISON OF SOME METHODS OF DETERMINATION OF POLYETHYLENE IN TALLOW. F. Mordret et al. (Lab. Institut des Corps Gras (ITERG), Paris). *Rev. Franc. Corps Gras* 23, 213–22 (1976). In industrial tallows, the accidental presence of polyethylene from packaging sometimes causes technological difficulties and defects in the manufactured products (soaps). For five years, this problem has been studied by the authors in the field of analysis, in collaboration with the laboratories of soap and animal fats factories. Three gravimetric methods have been developed. Two collaborative analyses have been carried out; with the observations, a text has been proposed to different organizations (AFNOR. UICPA, ISO). A comparative study has been carried out with several new foreign methods.

SARDINE OIL FROM MOROCCO. J. Graille et al. (Lab. Nat. Matières (ITERG) and Lab. Chimie Corps Gras, Univ. d'Aix-Marseille, 13331 Marseille Cedex 3). *Rev. Fr. Corps Gras* 23, 151–9 (1976). The fatty acid composition of Moroccan sardine oil is very complex: 64 components have been identified. They are even or odd, saturated or unsaturated acids, with 1 to 6 ethylenic bonds and 12 to 22 carbon atoms. The saturated, monoenic, polyenic (4 to 6 double bonds) acids are in majority; the dienoic and trienoic acids are present in small amounts (less than 5% for each one). There are many positional isomers. The glyceride structure shows a very low specificity of internal/external repartition; the polyenic acids are more numerous in internal position than saturated and monoenic acids. The formation of homogeneous (three identical chains) or pseudo-homogeneous (three chains of the same pattern) glycerides is improbable because the oil contains less than 3% of unsaturated glycerides, while 41% of the fatty acids are saturated. The unsaponifiable fraction is a mixture of sterols (80% cholesterol), hydrocarbons (12% aliphatic odd hydrocarbons), and aliphatic alcohols (5%).

RAPID DETERMINATION OF OIL CONTENT BY NMR AFTER DRYING THE SEEDS IN A MICROWAVE OVEN. A. Karleskind et al. (Lab. Wolff, Paris). *Rev. Fr. Corps Gras* 23, 147-50 (1976). Determination of oil content in seeds by NMR has two difficulties: the moisture problem and the variety of seeds (especially for rapeseed). The authors propose solutions for these difficulties: first, the drying of seeds in a microwave oven, and secondly, the determination of fatty acid composition of the oil. An example is given with Major and Primor rapeseed. The determination of oil in seeds requires less than one hour, but the apparatus is expensive.

USE OF PHOTOMETRIC METHOD FOR THE STUDY OF COLOR VARIATIONS OF VEGETABLE OILS DURING STORAGE. M. Czechowska. *Tluszcze jadalone* 19, 215–25 (1975). The color of soybean and rapeseed oils stored in polyvinyl chloride packages, at 10–12C and at room temperature, in diffuse light and in absence of light, become slightly darker. Stored in colorless glass, at room temperature and at scattered light, soybean and rapeseed oil become slowly lighter. In the paper, the photometric method for evaluation of the oil color is proposed. This method gives the results as precise as that from the organoleptic method. (Rev. Fr. Corps Gras)

VARIATION OF ANALYTICAL CHARACTERISTICS OF SOYBEAN OIL DURING INDUSTRIAL HYDROGENATION. E. Kurucz et al. *Olaj Szap. Kozmet.* 24, 105–10 (1975). The following analytical data were determined from the samples taken during the hydrogenation of soybean oil: refraction index, slippage point, fatty acid composition, trans-fatty acid content, and dilatation. Between 130 and 190C, increase of temperature accelerates the saturation of linolenic and linoleic acids, as well as the formation of trans-fatty acids. At 130C, hydrogenation has a non-selective character. (Rev. Fr. Corps Gras)

STUDY OF 1–3 AND 2 FATTY ACIDS OF TRIGLYCERIDES OF HYDROGENATED SUNFLOWERSEED OIL WITH THE AID OF HYDROLYSIS WITH PANCREATIC LIPASE AND GRIGNARD HYDROLYSIS. P. Lukacs et al. *Olaj Szap. Kozmet.* 24, 67–72 (1975). The authors determined the distribution of saturated fatty acids in triglycerides of sunflowerseed oil, fluid and hydrogenated to the given point of fusion. They also examined the distribution of fatty acids of different chain lengths in position 1–3 and 2 in the glyceride molecule. The fatty acids distribution is determined by Grignard hydrolysis and hydrolysis by pancreatic lipase. It was found that of the two examined methods, Grignard hydrolysis is better for this determination than hydrolysis by pancreatic lipase. (Rev. Fr. Corps Gras)

VEGETABLE FATS IN POWDER FORM ON A MILK PROTEIN BASE. M. Kubicki et al. *Prace Inst.* 25, 261–76 (1975). Taking into consideration the published data and the technological studies, done by different authors in the laboratory and by microtechnique, the authors reviewed the possibilities of production and the properties of powdered fat on a milk protein base. An industrial technological process has been elaborated for the power which contains up to 50% of vegetable fats in the dry matter. (Rev. Fr. Corps Gras)

POSITION OF THE CYCLOPROPENOIC ACIDS IN A GLYCERIDE MOLECULE. S.G. Yunusova. *Khim. Prir. Soedin.* 1975(5), 572–3. The hydrolysis of triglycerides isolated from cottonseed, done by pancreatic lipase in alkaline solution, gives three fractions: monoglycerides without cyclopropenoic acid (A), diglycerides which contain 0.17%, and triglycerides with 1.44%. As A diminishes the rate of enzymatic hydrolysis, and as the hydrolysis of the primary alcohol groups is faster than that of the secondary alcohol groups, it can be deduced that A has positions 1 and 3 in the glyceride molecule. (Rev. Fr. Corps Gras)

OBTAINMENT AND PROPERTIES OF THE ESTERS OF SACCHAROSE AND FATTY ACIDS FROM TALL OIL. J. Broniarz. *TSPK-Pollena* 19, 473–9 (1975). The obtained products decrease the surface tension of water to 30 dynes/cm, and the interfacial tension on the limit of phases water-carbon tetrachloride to 6–12 dynes/cm. The optimal properties for decreasing the surface and interfacial tension are obtained when the product contains about 70% of monoesters, obtained with the molar ratio saccharose: methyl esters equal to 3:1. (Rev. Fr. Corps Gras)

EXPERIMENTAL STUDIES IN THE FIELD OF STABILIZATION OF EMULSIONS TYPE W/O. K. Schrader. *TSPK-Pollena* 19, 432–43 (1975). Many emulsions with the diisostearate of triglycerol and of alkanolamides were prepared. The best stability was obtained with the emulsions which contain diisostearate of triglycerol with diethanolamide of mixed fatty acids in ratio

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of 3:2 and the derivatives of lanolin or metallic soaps of special type. The optimal combination of emulsifiers has the commercial name Emulgator GE 2, W/O, no. 01/4010 and is produced by the Creachem Company, Holzminden, West Germany. (Rev. Fr. Corps Gras)

RECTIFICATION OF FATTY ACIDS FROM SOAPSTOCK AND CALCULATION OF A COLUMN FROM A PILOT-PLANT. V.A. Valdman et al. *Pishch. Tekhnol.* **1975**(6), 105–7. By rectification of fatty acids from soapstock, high purity fractions were obtained. The fractional distillation of fatty acids from soapstock can be done in a column for rectification with 19–21 actual plates. (Rev. Fr. Corps Gras)

GAS-LIQUID CHROMATOGRAPHY OF ETHYL ESTER ARTIFACTS FORMED DURING THE PREPARATION OF FATTY ACID METHYL ESTERS. A.R. Johnson, A.C. Fogerty, R.L. Hood, S. Kozuharov and G.L. Ford (CSIRO Div. of Food Res., P.O. Box 52, North Ryde, 2113, N.S.W., Australia) *J. Lipid Res.* 17, 431–2 (1976). Ethanol is typically used as a stabilizer in chloroform. Failure to remove this ethanol from the chloroform used in the extraction of lipids leads subsequently to the formation of ethyl ester artifacts during the preparation of methyl esters by a commonly employed transesterification procedure. Depending on the conditions and phases used during gas-liquid chromatography, the ethyl esters may be resolved from the corresponding methyl esters. The resulting chromatograms contain extraneous peaks and may be incorrectly identified.

ON SOME LIPIDIC COMPONENTS FROM THE ROOT OF PETASITES HYBRIDUS (L.) G. M. SCH. A. Ya. Ismailov, K. Stránský and M. Streibl (Institute of Organic Chemistry and Biochemistry, Czechoslovak Academy of Sciences, 166 10 Prague 6) *Collect. Czech. Chem. Commun.* 40, 3731–3 (1975). In the chloroform extract from the root of *Petasites hybridus* (L.) G. M. SCH. there were detected by means of chromatographic and spectrophotometric methods in addition to compounds of the terpenoid nature the n-alkanes, esters of sterols (mainly of β-sitosterol) with higher aliphatic acids (mainly the $C_{16:0}$, $C_{18:2}$, and $C_{18:3}$ acids), and triglycerides containing the same acids.

MASS SPECTROMETRY AND GAS CHROMATOGRAPHY OF METHYL ESTERS OF HIGHER ALIPHATIC BRANCHED ACIDS AND THEIR α-HYDROXY DERIVATIVES. K. Ubik, K. Stránský and M. Streibl (Institute of Organic Chemistry and Biochemistry, Czechoslovak Academy of Sciences, 166 10 Prague 6) *Collect. Czech. Chem. Commun.* 40, 2826–37 (1975). Mass spectrometer-gas chromatograph was used to measure the mass spectra and retention data of methyl esters of *n*-heptadecanoic acid (*I*), 15-methyl- (iso, *II*), 14-methyl- (anteiso, *III*), 6-methyl- (*IV*), and 2-methylhexadecanoic acid (*V*), their α-hydroxy derivatives (*VI–X*) and trimethylsilyl ethers. The mass spectra of methyl esters of 2-hydroxyheptadecanoic acid (*VI*) and 2-hydroxy-15-methylhexadecanoic acid (*VII*) are very similar and these substances may be identified with the use of gas chromatographic retention data. In spectrum of the methyl ester of 2-hydroxy-14-methylhexadecanoic acid (*VIII*) there is a characteristic peak of $[M-(CH_3OH + C_4H_9)]^+$ ions and the spectrum of 2-hydroxy-6-methylhexadecanoic acid (*IX*) methyl ester exhibits significant peaks of ions formed by cleavage of the aliphatic chain at the branching point. In the case of 2-hydroxy-2-methylhexadecanoic acid (*X*) methyl ester, typical fragments are the α-cleavage product and ions arisen by the β-cleavage under the simultaneous elimination of the methoxycarbonyl group. The spectra of trimethylsilyl derivatives of α-hydroxy acid methyl esters are as similar that the localisation of the carbon chain branching is hardly possible except for the derivative of 2-hydroxy-2-methylhexadecanoic acid (*X*).

ENCAPSULATION PARTICLES. D.S. Alterman and K.W. Chun (Lever Bros. Co.). *U.S. 3,983,254.* The particles contain an oxidizing material having at least one chlorine atom in its molecular structure and selected from the group consisting of potassium dichloroisocyanurate, sodium dichloroisocyanurate, pentaisocyanurate, and trichlorocyanuric acid. The inner coating consists of saturated fatty acid having 12–20 carbon atoms, and the outer coating comprises a sodium salt of the fatty acid. The inner coating is completely encapsulated by the sodium salt.

SEPARATION OF WOOL FATTY ACID. H. Senda, T. Yamamoto, H. Ueno, and K. Nakano (Dai-Ichi Kogyo Seiyaku Co.). *U.S. 3,983,147.* In the method for separating wool fatty acid from wool alcohol by treating a saponified wool wax containing a soap of the wool fatty acid with a heterogeneous solvent system, there is described the improvement comprising treating a saponified wool wax containing the wool alcohol and a binary metal soap of the wool fatty acid with the heterogeneous solvent system. The binary metal soap is formed with an alkali metal and a multivalent metal present in the saponified wool wax.

HIGH DROPPING POINT GREASES. I.D. Campbell, T.O. Brown, and D.W. Murray (Exxon Research and Engineering Co.). *U.S. 3,985,662.* A grease composition comprises a lubricating base oil stock, a lithium soap derived from an epoxy-substituted fatty acid, and a dilithium soap derived from an aliphatic dicarboxylic acid.

SYNERGISTIC ANTIOXIDANT COMPOSITION. W. Cort (Hoffmann-LaRoche, Inc.). *U.S. 3,986,980.* The composition consists of 1–20 parts of ascorbic acid per one part of rac. 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid.

ISOMERIZATION PROCESS. J. Ritz and J. Reese (Hoechst Ag.). *U.S. 3,984,444.* The process of converting an ester of a polyhydric alcohol and a fatty acid having isolated double bonds into an ester with conjugated double bonds comprises reacting the ester at 0–60C in the presence of 0.8% of an alkaline reacting metal alcoholate of a monohydric alcohol and a strongly polar aprotic solvent until at least 90% of the isolated double bonds are conjugated.

METHOD OF RECONSTITUTING USED COOKING OIL. F.L. Cooper, R.C. Fatout, and W.S. Hendrickson (C. H. F., Inc.). *U.S. 3,984,447.* The method comprises the steps of (a) treating the oil in a succession of clarifying steps including at least one gravity separation step and passage through a fibrous filter and through a Fuller's Earth filter, to remove suspended solids; (b) mixing the clarified oil with at least 12% activated bleaching clay and heating it to 380–410 F; (c) agitating the mixture at the temperature in an inert atmosphere at subatmospheric pressure for 30 minutes; and (d) partially cooling the mixture and filtering it to remove the bleaching clay. The temperature of the oil is held between 235 and 260 F during the gravity separation step; agitation of the oil and clay mixture is accomplished by both mechanical means and saturated steam at about 3 psi bubbling upwardly through the heated mixture, and the inert atmosphere is maintained under a vacuum of at least 25 inches of mercury.

PASTRY SHORTENING. E.F. Kriz and A.G. Oszlanyi (SCM Corp.). *U.S. 3,985,911.* The untempered shortening is functional in pastry preparation when blended into dough in the temperature range between 50 and 90 F. It is made from a liquified shortening mixture and 0–15% water. The shortening composition has beta prime crystalline stability, a Wiley melting point of 110–10 F, and a relatively flat SFI profile. The process comprises the steps of melting the liquified shortening mixture, passing it through a scraped surface heat exchanger where it is cooled to 62–80 F to develop a beta prime nucleated shortening mixture, passing the nucleated shortening mixture into a kneading and heat exchange zone at 75–60 F where there occurs further development of beta prime crystalline phase with concomitant thickening, and extruding the plastic shortening at 62–77 F directly into user packages as finished shortening.

STUDIES ON THE BREADMAKING PROPERTIES OF WHEAT-FLOUR NONPOLAR LIPIDS. V.A. De Stefanis and J.G. Ponte, Jr., (Research Laboratories, ITT Continental Baking Company, Rye, NY 10580) *Cereal Chem.* 53, 636–42 (1976). Total lipids of a commercial wheat flour were separated into polar and nonpolar fractions. When added at the dough stage, the nonpolar lipids were detrimental in baking. Nonpolar lipids were fractionated into steryl esters, triglycerides, free fatty acids, and diglycerides, each of which was then tested in three dough systems: 1) defatted flour, 2) intact flour, and 3) intact flour with 3% lard. When added to either the defatted or intact flour, the deleterious effects were caused by the free fatty acids. However, in the presence of 3% lard the ill effects were not as evident as in the other two systems. Within the fatty acids class, detrimental effects in bread were directly related to linoleic acid. Complementary studies showed that the free fatty acids both increased the peak viscosity and delayed the peak time of starch during the gelatinization cycle.

A METHOD FOR THE GAS CHROMATOGRAPHIC DETERMINATION OF VITAMIN D AND RELATED STRUCTURES. A.P. De Leenheer and A.A.M. Cruyl (Laboratoria voor Medische Biochemie en voor Klinische Analyse, Faculteit van de Farmaceutische

Wetenschappen, RUG, Academisch Ziekenhuis, 135, De Pintelaan, 900-Gent, Belgium, *J. Chromatogr. Sci.* 14, 434 (1976). A procedure is described for the separation of Vitamin D and related compounds by gas-liquid chromatography using flame ionization detection. The method involves a two-step conversion: isomerization to the corresponding (*all trans*) isotachysterol(s) followed by methyl ether derivatization of the alcohol group(s). The procedure provides a means for identification as well as a possible basis for quantitation of Vitamin D and analogs.

STRUCTURE DETERMINATION OF POLYUNSATURATED FATTY ACIDS BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY—A COMPARISON OF FRAGMENTATION PATTERNS OF VARIOUS DERIVATIVES. V. Dommes, F. Wirtz-Peitz and Wolf-H. Kunan (Institut für Physiologische Chemie der Ruhr-Universität Bochum, D-4630 Bochum-Querenburg, Germany) *J. Chromatogr. Sci.* 14, 360 (1976). GC-MS has been applied to the characterization of mixtures of polyunsaturated fatty acids by way of their isopropylidene, alkylboronate, methyl ether, and trimethylsllyl ether derivatives. In our studies we found a convenient and efficient method for the oxidation of mixtures of polyunsaturated fatty acid methyl esters by osmium tetroxide. The resulting polyhydroxy compounds are easily converted into apolar derivatives for gas chromatographic separation. The mass spectra of these individual compounds were recorded as to their usefulness for complete structure elucidation. Only the trimethylsilyl ethers proved to yield all information necessary for determination of chain length as well as numbers and positions of double bonds of polyunsaturated fatty acids.

CHROMATOGRAPHIC DETERMINATION OF CIS-TRANS MONOETHYLENIC UNSATURATION IN FATS AND OILS—A REVIEW. H.B.S. Conacher (Food Research Division, Food Directorate, Health Protection Branch, Ottawa, Ontario K1A OL2) *J. Chromatogr. Sci.* 14, 405 (1976). Chromatographic procedures for the determination of geometric and positional monoethylenic fatty-acid isomers in fats and oils have been reviewed. For the determination of these isomers, the procedure involving prep GLC isolation of the monoethylenic ester fractions on polar stationary phases, further separation and determination of geometric isomers by prep Ag^+/TLC, and determination of positional isomers by reductive ozonolysis, is considered to be the most suitable for the analysis of a wide range of oils. Although, in this review, emphasis has been placed on monoethylenic isomers, most of the techniques described are also applicable in the study of polyenoic isomers.

OCCURRENCE OF 2- AND 3-HYDROXY FATTY ACIDS IN HIGH CONCENTRATIONS IN THE EXTRACTABLE AND BOUND LIPIDS OF FLAVOBACTERIUM MENINGOSEPTICUM AND FLAVOBACTERIUM IIB. I. Yano, Y. Ohno, M. Masui, K. Kato, E. Yabuuchi and A. Ohyama (Dept. of Bacteriol., Osaka City Univ., Med. School, Abeno, Osaka, Japan) *Lipids* 11, 685–8 (1976). The major hydroxy fatty acids of cellular lipids in *Flavobacterium meningosepticum* and *Flavobacterium* sp. King's group IIb were identified as 2-hydroxy 13-methyltetradecanoic, 3-hydroxy 13-methyltetradecanoic, 3-hydroxy palmitic, and 3-hydroxy 15-methylhexadecanoic acids using gas chromatography-mass spectrometry and GC-mass fragmentography. The concentration of these hydroxy fatty acids comprised up to 30–40% of the total extractable and 20–30% of the bound lipid fatty acids, respectively. From the stability for mild alkaline hydrolysis, 2-hydroxy fatty acids seemed to be attached with ester linkage, and 3-hydroxy fatty acids with amide linkage.

TOTAL FATTY ACID COMPOSITION OF DUCK FATTY TISSUES. A.S. Pereira and W.J. Stadelman. (Animal Sci. Dept., Purdue Univ., West Lafayette, Indiana 47907) *Poult. Sci.* 55, 1464–6 (1976). Total lipids extracted from duck fatty tissues were fractionated on thin layer plates into polar lipids and neutral lipids. Neutral lipids were similarly fractionated into their components. Fatty acid methyl esters from total lipids were fractionated by gas-liquid-chromatography. Results indicated that duck fatty tissues are mostly formed by neutral lipids and that triglycerides comprise the vast majority of neutral lipids. Results also indicated that the major fatty acids in duck lipids are: oleic > palmitic > linoleic > stearic > palmitoleic. About 73% of all fatty acids present belong to the C-18 series. The unsaturation level for duck lipids is about 73%.

• Biochemistry and Nutrition

AFFINITY CHROMATOGRAPHY OF LIPASE WITH HYDROPHOBIC LIGANDS COUPLED TO CYANOGEN BROMIDE-ACTIVATED AGAROSE. Y. Kosugi and H. Suzuki (Fermentation Res. Inst., Inage, Chiba, Japan) *J. Lipid Res.* 17, 307–13 (1976). The behavior of lipase produced by *Pseudomonas mephitica* var. *lipolytica* toward hydrophobic residues coupled to spacer gels that were prepared by coupling a primary amine to CNBr-activated agarose, was studied. The lipase adsorbed on the ligand of a long unbranched aliphatic chain, a benzene ring, or deoxycholic acid was only slightly or not at all eluted at pH 5 or pH 11 by buffers containing 1 M NaCl. The lipase was eluted by liquid containing a surfactant or an organic solvent miscible with water, indicating greater involvement of hydrophobic forces. The adsorption of propane, cyclopentane, cyclohexane, cycloheptane, or chrysene appears to be achieved through electrostatic forces, inasmuch as desorption was caused by buffer containing 1 M NaCl at pH 11. The amount of lipase adsorbed on these hydrophobic ligands was about the same as that adsorbed on the ligands belonging to the first group. Since little lipase was adsorbed on cyclopropane, cyclooctane, pyridine, methane, *n*-pentane, or branched aliphatic chains, these ligands appear to impose steric hindrance on the adsorption of lipase, or they may be too small to fit into the hydrophobic sites of lipase.

CHARACTERIZATION OF BILE ACID METHYL ESTER ACETATE DERIVATIVES USING GAS-LIQUID CHROMATOGRAPHY, ELECTRON IMPACT, AND CHEMICAL IONIZATION MASS SPECTROMETRY. P.A. Szczepanik, D.L. Hachey and P.D. Klein (Div. of Biol. and Med. Res., Argonne Natl. Lab., Argonne, Illinois 60439) *J. Lipid Res.* 17, 314–34 (1976). The gas-liquid chromatographic retention times on 0.5% SP-525 for 48 bile acids and related compounds as their methyl ester acetate derivatives are given. Ion tables for electron impact spectra have been compiled that permit direct access to ion structures for any given ion mass. Chemical ionization yields highly simplified mass spectra with two or three ions predominating for each compound. When the relative retention times of bile acids as their methyl ester acetates are combined with selective ion monitoring techniques in chemical ionization mass spectrometry, the retention time and ion mass number form a coordinate system which can be a powerful tool in the characterization of bile acid mixtures.

COMPOSITION OF THE NEUTRAL LIPIDS OF BOVINE MEIBOMIAN SECRETIONS. C. Baron and H.A. Blough (Div. of Biochem. Virology and Membrane Res., Scheie Eye Inst., Univ. of Pennsylvania Schl. of Med., Philadelphia, Pennsylvania 19104) *J. Lipid Res.* 17, 373–6 (1976). Lipids secreted from the bovine meibomian glands were assigned to the following classes: cholesteryl esters (A) (fatty acyl chain lengths from 15 to 27 carbon atoms), 41%; wax esters, 29%; triacylglycerols, 10%; and cholesteryl esters (B) (fatty acyl chain lengths from 14 to 18 carbons), 15%. The remaining 5% consisted of cholesterol, fatty acids, and highly polar material. Analysis of the lipids showed that only the cholesteryl esters (A) contained fatty acyl chains $\geqslant C_{20:3}$. One-third of the fatty acyl chains of the wax esters and the cholesteryl esters (B) was $iC_{15:0}$. The fatty alcohol moieties of the wax esters were found to be branched chain, $C_{23:0}$–$C_{27:0}$. A computer-based programmable gas-liquid chromatographic procedure using 10% apolar 10C on Gas Chrom Q could be used to distinguish both *iso* and *anteiso* fatty alcohols and esters of fatty acids.

INHIBITION OF ADENOSINE 3′:5′-MONOPHOSPHATE ACCUMULATION IN WHITE FAT CELLS BY SHORT CHAIN FATTY ACIDS, LACTATE, AND β-HYDROXYBUTYRATE. J.N. Fain and R.E. Shepherd (Div. of Biol. and Med. Sci., Brown Univ., Providence, Rhode Island 02912) *J. Lipid Res.* 17, 377–85 (1976). The large increase in cyclic AMP accumulation by rat white fat cells seen in the presence of lipolytic agents plus methylxanthines and adenosine deaminase was markedly inhibited by lactate. However, lipolysis was unaffected by lactate. Octanoate, hexanoate, heptanoate, and β-hydroxybutyrate inhibited both cyclic AMP accumulation and lipolysis by rat fat cells. The mechanism by which these acids inhibit lipolysis differs from that for long chain fatty acids such as oleate. Oleate directly inhibited triglyceride lipase activity of homogenized rat adipose tissue. In contrast, octanoate, β-hydroxybutyrate, and lactate had no effect on triglyceride lipase activity. Hormone-stimulated adenylate cyclase activity of rat fat cell ghosts was inhibited by oleate and 4 mM octanoate but not by 1.6 mM octanoate, heptanoate, hexanoate, β-hydroxybutyrate or lactate. None of the acids affected the soluble protein kinase activity of rat adipose tissue. There was no stimulation by lactate, butyrate, β-hydroxy-butyrate, or octanoate of the soluble or particulate cyclic AMP phosphodiesterase activity of rat fat cell homogenates. The antilipolytic action of a short

chain acid such as octanoate or hexanoate was not accompanied by any drop in total fat cell ATP. The mechanism by which lactate lowers cyclic AMP but not lipolysis remains to be established.

THE PENETRATION OF LOCAL ANESTHETICS INTO PHOSPHATIDYLCHOLINE MONOLAYERS. H.S. Hendrickson (Dept. of Biochem., The State Univ. of Utrecht, Utrecht, The Netherlands) *J. Lipid Res.* 17, 393–8 (1976). The penetration of tetracaine into monolayers of phosphatidylcholine and trioctanoin at different surface pressures, and the penetration of dibucaine, tetracaine, butacaine, lidocaine, and procaine into monolayers of didecanoylphosphatidylcholine at $\Pi = 10$ mN/m was determined by the use of a modified Gibbs adsorption equation. These data were shown to fit a geometric model and compared favorably with data determined by a method based on the geometric model. The penetration of tetracaine into phosphatidylcholine monolayers was pressure dependent. At $\Pi = 10$ mN/m, the local anesthetics penetrate into a phosphatidylcholine monolayer in the order: dibucaine > tetracaine > butacaine > lidocaine > procaine. This correlates with their potencies in blocking nerve conduction and inhibiting phospholipase A_2.

LOCAL ANESTHETIC INHIBITION OF PANCREATIC PHOSPHOLIPASE A_2 ACTION ON LECITHIN MONOLAYERS. H.S. Hendrickson and M.C.E. van Dam-Mieras (The Dept. of Biochem., The State Univ. of Utrecht, Utrecht, The Netherlands) *J. Lipid Res.* 17, 399–405 (1976). Using quantitative data previously reported for the penetration of local anesthetics into lecithin monolayers, the effects of surface and subphase concentrations of anesthetics on the inhibition of pancreatic phospholipase A_2 action on didecanoyl phosphatidylcholine monolayers was investigated. Inhibition as a function of subphase concentration of anesthetic was in the order: dibucaine > butacaine > lidocaine = procaine. Inhibition as a function of surface concentration showed no obvious correlation; procaine inhibited at a very low surface concentration, followed by lidocaine at a somewhat higher concentration, and tetracaine, butacaine and dibucaine only at rather high concentrations. Ultraviolet difference spectroscopy indicated an interaction between lidocaine and enzyme in the subphase. Fluorescence studies showed that lidocaine is a competitive inhibitor of enzyme-lipid interface interaction. It is proposed that the more surface-active anesthetics inhibit by surface effects while the less surface-active anesthetics (lidocaine and procaine) inhibit by interaction with the enzyme in the subphase, which prevents enzyme penetration at the monolayer interface.

THE EFFECT OF HIGH SUGAR INTAKE ON THE ESTERIFICATION OF DIHYDROXYACETONE PHOSPHATE BY RAT LIVER MICROSOMES. R.G. Lamb and H.J. Fallon (Depts. of Med. and Pharmacol., The Med. Coll. of Virginia, Virginia Commonwealth Univ., Richmond, Virginia 23298) *J. Lipid Res.* 17, 406–11 (1976). Rat liver microsomes were used as an enzyme source to study dietary-induced changes in the rate of dihydroxyacetone phosphate esterification. Rats were fed 75% glucose or fructose diets for various time intervals, or fed a fructose diet for six days and then a chow diet. Both the glucose and fructose diets produced a 2–3-fold increase in total and neutral glycerolipid formation from dihydroxyacetone phosphate measured in the presence of ATP, palmitate, CoA, and NADH. The increased rate of dihydroxyacetone phosphate esterification and a simultaneous rise in serum triglyceride level in rats fed fructose was rapidly reversed when chow was substituted for the fructose. The results indicate that an increased rate of dihydroxyacetone phosphate esterification may contribute to the acceleration of endogenous glycerolipid biosynthesis noted under these dietary conditions.

QUANTITATIVE ANALYSIS OF BRAIN GALACTOSYLCERAMIDES BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY OF THEIR PERBENZOYL DERIVATIVES. R.H. McCluer and J.E. Evans (Eunice Kennedy Shriver Ctr. for Mental Retardation, W.E. Fernald State Schl., Waltham, Mass. 02154) *J. Lipid Res.* 17, 412–8 (1976). A high performance liquid chromatographic (HPLC) method for analysis of galactosylceramides as their benzoyl derivatives has been devised. Samples containing 10–150 nmoles of monohexosylceramides are benzoylated by heating for 60 min at 60°C in 0.5 ml of 10% (v/v) benzoyl chloride in pyridine. The products are purified by solvent distribution and analyzed by HPLC. The benzoylated cerebrosides with nonhydroxy fatty acids are separated from those with hydroxy fatty acids on a Zipax column with 7% ethyl acetate in hexane as a solvent and UV absorption at 280 nm is recorded. This isocratic procedure can be applied directly to chloroform-methanol extracts of adult brain with a relative standard deviation of 3.0% for cerebrosides with nonhydroxy fatty acids and 4.0% for cerebrosides with hydroxy fatty acids. Sulfatides do not interfere in the assay and can be converted to cerebrosides after desulfation by mild acid methanolysis. Benzoylated glucosyl- and galactosylceramides can be separated on a MicroPak NH_2 column with 1.5% 2-propanol in cyclopentane as the chromatographic solvent.

CHYLOMICRON PROTEIN CONTENT AND THE RATE OF LIPOPROTEIN LIPASE ACTIVITY. C.J. Fielding and P.E. Fielding (Cardiovascular Res. Inst., Univ. of California, San Francisco, California 94143) *J. Lipid Res.* 16, 419–23 (1976). Chylomicrons isolated from rat intestinal lymph were incubated with plasma. Protein transfer to chylomicrons, reaction rate with purified lipoprotein lipase, and content of lipase cofactor were determined. While the overall protein content of chylomicrons was increased 3–4-fold, and the content of lipase cofactor increased 4-fold, reaction velocity of the activated particles with lipoprotein lipase was increased only 1.3-fold. Maximal rate of hydrolysis was achieved in the presence of much smaller quantities of activator than the lipoprotein particles were capable of binding, and chylomicrons were fully activated for triglyceride hydrolysis in the presence of only 10% plasma for triglyceride concentrations of up to 3 mg/ml. Cofactor protein was not rate-limiting for hydrolysis of triglyceride from chylomicrons. These results are discussed in the light of recent concepts of the regulation of lipoprotein lipase activity.

AN IMPROVED TWO DIMENSIONAL THIN-LAYER CHROMATOGRAPHY SYSTEM FOR THE SEPARATION OF PHOSPHATIDYLGLYCEROL AND ITS DERIVATIVES. B.J.H.M. Poorthuis, P.J. Yazaki and K.Y. Hostetler (Dept. of Med, Div. of Metabolic Disease, Univ. of California, San Diego, California) *J. Lipid Res.* 17, 433–7 (1976). A two dimensional thin-layer chromatography system has been devised for the improved separation of phosphatidylglycerol and its derivatives, cardiolipin and bis (monoacylglyceryl) phosphate, from the other phospholipid components of tissue total lipid extracts. The system employs silica gel G plates prepared with 0.4 M boric acid. Linear recovery of added phosphatidylglycerol was found, and phosphatidylglycerol did not cochromatograph with N,N-dimethylphosphatidylethanolamine in this system. The phospholipid class composition of various rat tissues and a Morris 7777 hepatoma has been determined and compared with values from the literature.

PHYSICOCHEMICAL CHARACTERIZATION OF BARLEY LIPOXYGENASE. E.C. Lulai and C.W. Baker (North Dakota State University, Fargo, ND 58102) *Cereal Chem.* 53, 777–86 (1976). Linoleic acid was used as the substrate for optimizing the assay of barley lipoxygenase in the cultivar Larker. Maximal activity was observed at a linoleic acid concentration of 5.47×10^{-5} *M*. The following parameters were determined: a) pH optimum, 6.0; b) temperature optimum, 47°C; c) average apparent K_m, 2.57×10^{-6} *M*; d) average V_{max}, 1.95×10^{-2} μmol/min; and e) activation energy, 2.2 kcal/mol to oxidize linoleic acid between 25° to 45°C. The enzyme was thermally stable up to 50°C and inactivated totally at 65°C. Compared to the activity produced by 5.47×10^{-3} *M* linoleic acid at pH 6.0, linolenic acid and trilinolein were less reactive. Barley lipoxygenase was not inhibited by iron binding compounds. Inhibition by *p*-chloromercuribenzoate was irreversible. No activation was observed with Ca^{2+} or Mg^{2+}. The presence of one lipoxygenase-active electrophoretic band was detected by a lipoxygenase-specific staining procedure. At least 92% of the lipoxygenase activity is localized in the germ.

A STRUCTURAL STUDY ON A MACRO-GLYCOLIPID CONTAINING 22 SUGARS ISOLATED FROM HUMAN ERYTHROCYTES. A. Gardas (Lister Institute of Preventive Medicine, London) *Eur. J. Biochem.* 68, 177–83 (1976). A sphingoglycolipid possessing 22 sugars has been isolated from human erythrocytes. A structure of this glycolipid is proposed based on methylation studies, Smith degradation and isolation of oligosaccharides derived from this glycolipid.

LIPID-PROTEIN RELATIONSHIPS IN ERYTHROCYTE MEMBRANES REVEALED BY PARAMAGNETIC QUENCHING OF PROTEIN FLUORESCENCE. V.G. Bieri and D.F.H. Wallach (Tufts New England Med. Ctr., Div. of Radiobiol., 171 Harrison Ave., Boston, Mass. 02111) *Biochim. Biophys. Acta* 443, 198–205 (1976). Paramagnetic quenching of erythrocyte membrane protein fluorescence by nitroxide-labelled lipid analogues has been studied as a function of temperature and quencher concentration, as well as after cross-linking of membrane proteins by glutaralde-

hyde. Quenching due to nitroxide stearates reveals a static component, due to binding of quencher molecules to protein, superimposed upon a diffusion-limited component. Static quenching decreases progressively above 35°C, a temperature region where a thermotropic discontinuity is known to occur. Diffusion-limited quenching becomes progressively more prominent as the temperature is raised above 15°C. Exposure of membranes to varying concentrations of glutaraldehyde indicates that membrane proteins relatively poorly accessible to cross-linking are those responsible for the membrane thermotropism above 35°C. Protein fluorophores accessible to androstane nitroxide are saturated at a low quencher/protein ratio. This ratio is stable below 35°C but increases by 50% between 35 and 55°C.

MODEL MEMBRANE STUDIES OF SPIN-LABEL PROBES. PART 1. MIXED MONOLAYERS OF 12-NITROXIDE STEARIC ACID AND MYRISTIC ACID. D.A. Cadenhead and F. Muller-Landau (Depts. of Chem. and Biochem., State Univ. of New York at Buffalo, Buffalo, N.Y. 14214) *Biochim. Biophys. Acta* **443**, 10–8 (1976). Pure and mixed monomolecular films of a cell membrane spin label probe, 12-nitroxide stearic acid have been studied where myristic acid was selected as the host lipid. The behavior of 12-nitroxide stearic acid at the air water interface is understood in terms of two molecular configurations: erect (with only the carboxyl group in the interface) and bent (with both the carboxyl group and the oxazolidine ring in the interface). In mixed films both of these conformations play a role at high surface pressures. At low probe concentrations, 12-nitroxide stearic acid is primarily in an erect conformation, while at high probe concentrations the reverse is true. This particular host lipid appears capable of erecting the probe molecule with only small concentrations of myristic acid. In a condensed host lipid, the probe is partially immiscible, and segregates to form a heterogeneous film from which it is readily collapsed. The probe is seen to perturb the molecular packing in this mixed system and the perturbation to be dependent on both the molecular shape and nature of the probe.

SYNTHESIS AND PROPERTIES OF ^{35}S, ^{14}C AND ^{3}H LABELED S-ALKYL GLYCEROL ETHERS AND DERIVATIVES. W.J. Ferrell, A. Garces and E.A. Desmyter (Depts. of Pathology and Biol. Chem., Univ. of Michigan, Ann Arbor, Mich. 48104) *Chem. Phys. Lipids* **16**, 276–84 (1976). Radioactive S-alkyl glycerol ethers have been synthesized with ^{35}S, ^{14}C and ^{3}H labels as well as $^{3}H/^{35}S$ double labels. The synthesized compounds were converted to various derivatives which can serve to characterize the S-alkyl glycerol ethers. These included the isopropylidene derivative, oxidation with periodate to the aldehyde followed by reduction with $LiAlH_4$ to the alcohol, and the reaction of the alcohol with acetic anhydride to form the acetate derivative. Chemical analysis, IR, NMR, zonal TLC profile scans and GLC showed all the products to be $>99\%$ pure. The GLC behavior of the aldehyde and acetate derivatives of both S-alkyl glycerol ethers and O-alkyl glycerol ethers on EGSS-X was compared.

OUTSIDE-INSIDE DISTRIBUTIONS AND SIZES OF MIXED PHOSPHATIDYLCHOLINE-CHOLESTEROL VESICLES. B. De Kruijff, P.R. Cullis and G.K. Radda (Dept. of Biochem., South Parks Rd., Oxford, U.K.) *Biochim. Biophys. Acta* **436**, 729–40 (1976). The outside-inside ratio of both saturated and unsaturated phosphatidylcholine species was not much affected by the incorporation of up to 30 mol% cholesterol. Above 30 mol% cholesterol the outside-inside ratio strongly increased for phosphatidylcholines with *cis* unsaturated fatty acid chains. In contrast the outside-inside ratio of *trans* unsaturated and fully saturated phosphatidylcholine species was either not affected or decreased by the incorporation of more than 30 mol% cholesterol. It is found that incorporation of 0–30 mol% cholesterol does not significantly affect the size of the vesicle whereas above 30 mol% cholesterol the size of all phosphatidylcholine vesicles sharply increases. The increase in size is the largest for the more saturated phosphatidylcholine species. Below 30 mol% cholesterol the composition of outer and inner layer is nearly identical. Above 30 mol% cholesterol the distribution of lipid across the bilayer of all vesicles becomes asymmetric with a disproportionately larger amount of cholesterol present in the inside monolayer.

BINDING OF SQUALENE, LANOSTEROL, DESMOSTEROL, AND CHOLESTEROL TO PROTEINS IN BRAIN AND LIVER 105,000 G SUPERNATANT FRACTIONS: EVIDENCE FOR SPECIFIC BINDING SITES. R.C. Johnson and S.N. Shah (Univ. of Calif., San Francisco, Langley Porter Neuropsychiatric Inst., Brain-Behavior Res. Center at Sonoma State Hosp., Eldridge, Calif. 95431) *Lipids* **11**, 645–51 (1976). The binding of squalene, lanosterol, desmosterol, and cholesterol to proteins in 105,000 g supernatant fraction (S_{105}) from brain and liver of rats was investigated. The S_{105} fractions from both tissues contain specific binding sites for sterols, which are sensitive to trypsin. The dissociation constants for squalene and sterol protein complexes were in the range of 10^{-6} M and were not appreciably different for proteins in brain and liver S_{105}. Competition studies revealed that both brain and liver S_{105} contain one receptor protein which binds lanosterol and is specific for methyl sterols, and a second receptor which binds both desmosterol and cholesterol. The brain S_{105} from suckling rats contained fewer binding sites for desmosterol and cholesterol than the brain S_{105} from weaned rats. However, the concentration of lanosterol binding sites in brain S_{105} did not show an age-dependent change. The receptor proteins in brain and liver appear to be identical.

DIFFERENTIAL REACTION OF CELL MEMBRANE PHOSPHOLIPIDS AND PROTEINS WITH CHEMICAL PROBES. G.V. Marinetti and R. Love (Dept. of Biochem., Univ. of Rochester School of Med. and Dentristry, Rochester, N.Y. 14642) *Chem. Phys. Lipids* **16**, 239–54 (1976). The major aims of this study were to determine the degree of phospholipid asymmetry and the neighbor analysis of phospholipids in different types of cell membranes. For this study a penetrating probe (FDNB), a nonpenetrating probe (TNBS) and a cross-linking probe (DFDNB) were used. Suberimidate is more effective than DFNB in protecting erythrocytes from osmotic lysis. In bicarbonate buffer erythrocytes are rendered refractory to hemolysis by suberimidate at a much lower pH as compared to phosphate buffer. DFDNB is more effective in protecting cells from hemolysis in phosphate buffer than in bicarbonate buffer. A major goal in using chemical probes was to provide insight into the topology of phospholipids in cell membranes. This topology includes the aysmmetric arrangement of phospholipids, which phospholipids are clustered about proteins and information on phospholipid neighbors. With the erythrocyte and Acholeplasma which contain only one type of membrane, the results are more definitive. However with *E. coli* and yeast cells which have several types of membranes, studies with whole cells are difficult to interpret and may be complicated by the presence of lipases. With these latter cells, the different types of membranes can be isolated and studied individually.

STUDY OF THE LIPID BINDING CHARACTERISTICS OF THE APOLIPOPROTEINS FROM HUMAN HIGH DENSITY LIPOPROTEIN. I. ELECTRON MICROSCOPIC AND GEL FILTRATION STUDIES WITH SYNTHETIC PHOSPHATIDYLCHOLINES. G. Middlehoff, M. Rosseneu, H. Peeters and W.V. Brown (Dept. of Med., School of Med., Univ. of Calif., San Diego, La Jolla, Calif. 92093) *Biochim. Biophys. Acta* **441**, 57–67 (1976). The characteristics of the lipid · protein complex produced by the addition of the major apolipoproteins (apo AI and apo AII) of human high-density lipoprotein to synthetic phospholipids has been studied. Under the in vitro conditions utilized, apo AI binds to 1,2-dimyristoyl-*sn*-glycerophosphocholine and 1,2-dipalmitoyl-*sn*-glycerophosphocholine liposomes, but does not alter their morphologic characteristics. This binding occurs at temperatures above or below that of the transition (T_t) of the lipid bilayer. In contrast, apo AII spontaneously generates small, homogeneous disc-shaped lipid-protein complexes (50 × 100 Å) from large phospholipid globules or from liposomes prepared with these lipids. This type of complex was only formed when the lipid/apo AII mixtures were warmed above the transition temperatures. The incorporation of apo AI into this small complex with apo AII may be greatly facilitated or inhibited depending on the sequence of addition of the various components. Under optimal circumstances, a maximum of 1 molecule of apo AI is incorporated with each molecule of apo AII into complexes with these two synthetic phospholipids.

DOUBLE BOND POSITION AFFECTS METABOLISM OF CIS-OCTADECENOATES. T.L. Mounts (North. Reg. Res. Ctr., ARS, USDA, Peoria, Ill. 61604) *Lipids* **11**, 676–9 (1976). The metabolic fate of *cis*-positional isomers of octadecenoates has been compared to that of naturally occurring oleic acid (*cis*-Δ9). Radioactive mixtures of tritium-labeled positional octadecenoate isomer and oleic acid-10-^{14}C were administered to laying hens, and their eggs were analyzed for the isotopic ratios ($^{3}H/^{14}C$) incorporated into total egg lipid, triglycerides, and phospholipids. Variations in the isotopic ratios indicated the comparative metabolic utilization of *cis*-positional isomers Δ8 through Δ12. Incorporation into egg lipid fractions is as

follows: triglycerides: $\Delta 9 > \Delta 8$, $\Delta 9 > \Delta 10$, $\Delta 9 > \Delta 11$, $\Delta 9 > \Delta 12$; phospholipid: $\Delta 9 > \Delta 8$, $\Delta 9 > \Delta 10$, $\Delta 9 < \Delta 11$, $\Delta 9 < \Delta 12$.

COMPARATIVE HISTOLOGICAL AND MORPHOMETRICAL STUDIES INTO THE RELEVANCE OF INTIMAL THICKENING TO CORONARY SCLEROSIS. J. Massmann and S. Oestreich (Inst. of Path., Karl Marx Univ., Leipzig, GDR) *Atheroselerosis* 24, 451–6 (1976). It was found by comparative histological and morphometrical studies, carried out on 125 human hearts of different age (20–90 years) and sex, that there exist critical limiting ranges of intima thickness and the intima/media relationship (IMR) for diffuse intimal thickening and the preatheroma phase of arteriosclerosis. Since furthermore a maximum and a minimum intima thickness as relating to diffuse intimal thickening could be determined, it is assumed that the location and formation of arteriosclerotic plaques is determined by the degree of so-called diffuse intimal thickening. It follows from these findings that postnatal intimal proliferation represents a potential prearteriosclerotic lesion of the intima, and that progressive intimal thickening supports the arteriosclerotic alteration of the intima, leading, through an extensive necrosis of the intima, to the atheroma phase.

INTERACTION OF STREPTOLYSIN O WITH STEROLS. D. Prigent and J.E. Alouf (Service des Anaerobies, Inst. Pasteur, 25, rue du Docteur Roux, 75015-Paris, France) *Biochim. Biophys. Acta* 443, 288–300 (1976). A quantitative study of the specific inhibitory power of cholesterol and other sterols on the hemolytic properties of streptolysin O is reported. This streptococcal exocellular protein is a cytolytic toxin which disrupts cytoplasmic membranes of eukaryote cells. The structural characteristics, particularly the stereochemical ones required for a steroid molecule to inhibit the cytolytic activity of streptolysin O, have been investigated in detail. By immunodiffusion techniques, in agar gel plates or tubes containing sterols, the formation of hydrophobic complexes between streptolysin O and inhibitory steroids, but non-inhibitory steroids except lanosterol, is shown. Upon interaction with inhibitory steroids streptolysin O loses its immunoreactive properties towards neutralizing and precipitating homologous antibodies. An interpretation of the mechanism of biomembrane disorganization by streptolysin O is discussed in the light of its steroid binding properties.

STRUCTURE OF HIGH DENSITY LIPOPROTEIN. THE IMMUNOLOGIC REACTIVITIES OF THE COOH- AND NH_2-TERMINAL REGIONS OF APOLIPOPROTEIN A-I. G. Schonfeld, R.A. Bradshaw, and J.-S. Chen (Lipid Res. Ctr., Depts. of Preventive Med., Med. and Biol. Chem., Washington Univ. Schl. of Med., St. Louis, Mo. 63110) *J. Biol. Chem.* 251, 3921–6 (1976). CNBr fragments of ApoA-I were produced by the method of Baker *et al.* and iodinated with lactoperoxidase. Double-antibody radioimmunoassays were set up using anti ApoA-I antisera and ^{125}I-CNBr I (COOH-terminal region) or ^{125}I-CNBr II (NH_2-terminal). Both labels were bound by the antisera. Affinity columns were prepared by binding CNBr I or CNBr II to Sepharose 4B. Antibodies specific against CNBr I or CNBr II were isolated by means of these columns, suggesting that ApoA-I had at least two antigenic sites. The findings suggest that the two terminal regions of ApoA-I are immunologically distinct, that the two regions can be assayed independently of each other in intact HDL_2, and that the COOH-terminal region is more reactive immunologically than is the NH_2-terminal. The results are compatible with a more "exposed" position for the COOH-terminal region on the surface of HDL_2.

SPREADING OF MEMBRANES AT THE AIR/WATER INTERFACE. R. Verger and F. Pattus (Centre de Biochim. et de Biol. Moleculaire 31, Chemin Joseph Aiguier 13274 Marseille cedex 2, France) *Chem. Phys. Lipids* 16, 285–91 (1976). This article presents an original technique for spreading membranes at the air/water interface. We have characterized enzymatically lipoprotein films derived from intestinal brush border membranes. The changes in architecture of membranes during spreading can provide a very simple method to study the influence of the lipid packing on the catalytic activity of membrane bound enzymes.

IN VIVO MODIFICATION OF PLANT MEMBRANE PHOSPHOLIPID COMPOSITION. A.J. Waring, R.W. Breidenbach and J.M. Lyons (Plant Growth Lab., Dept. of Vegetable Crops, Univ. of Calif., Davis, Calif. 95616) *Biochim. Biophys. Acta* 443, 157–68 (1976). Tomato seedlings treated with ethanolamine showed altered phospholipid composition. The changes included altered acyl chain composition as well as changes in the relative amounts of the phospholipid classes. Specifically, there was an increase in phosphatidylethanolamine and phosphatidylserine with a concomitant decrease in phosphatidylcholine and no overall increase in phospholipids. Treatment with ethanolamine increased the relative amount of C_{18} acyl chains (especially 18:2) in phosphatidylethanolamine and phosphatidylcholine at the expense of 16:0 and 16:1. Acyl composition of other phospholipid classes were unchanged. Labeled ethanolamine was incorporated mostly into phosphatidylethanolamine and phosphatidylcholine. Ethanolamine-stimulated incorporation of labeled oleate was entirely into acyl chains and appeared only as 18:1 and 18:2. There was greater incorporation, but less conversion of 18:1 to 18:2 with choline. Stearate was incorporated but not desaturated.

MOLECULAR AGGREGATION OF THE SLOW REACTING HEMOLYTIC LYSOLECITHIN ANALOG 1-OCTADECYL-2-BENZYL-GLYCERO-3-PHOSPHORYLCHOLINE IN AQUEOUS SOLUTION. H.U. Weltzien, B. Arnold, A. Blume and H.G. Kalkoff (Max-Planck-Inst. fur Immunbiol. and Inst. fur Physik. Chemie II der Univ., Freiburg, GFR) *Chem. Phys. Lipids* 16, 267–75 (1976). An attempt has been made to relate the retarded adsorption to red cells of the slow reacting hemolytic phosphatide Rac. 1-octadecyl-2-benzyl-glycero-3-phosphorylcholine (benzyl-lysolecithin) to its aggregation status in aqueous solution. Light scattering measurements indicate a critical micelle concentration at 37° of less than 2×10^{-6}M. The micellar weight as determined by angle dependent light scattering is 6×10^7 with about 97,000 molecules per micelle. The aggregates, which according to electron-microscopic observations are more similar to lecithin-liposomes than to usual lysolecithin-micelles, undergo a phase transition at 14° from a tightly packed liquid-crystalline state to the more loose structure of a gel phase with increased mobility of the aliphatic chains. The enthalpy of transition is 4.2 kcal/mole. These changes of the micellar structure are reflected in the binding kinetics of benzyl-lysolecithin to red cells in that the binding rate is rather constant below, but strongly increasing above the transition temperature. It is concluded that the unusual micellar structure is responsible for the retarded adsorption of this lysolecithin analog to red cells and that the rate of adsorption is probably determined by the rate of escape of single lysophosphatide molecules from the micelles.

THE MECHANISM FOR NONSPECIFIC LIPASE FROM RAT PANCREAS. P.W. Albro, B.J. Corbett and J.R. Hass (Nat'l. Inst. of Environ. Health Sci., Environ. Biol. and Chem. Branch, P.O. Box 12233, Res. Triangle Park, N.C. 27709) *Biochim. Biophys. Acta* 431, 493–506 (1976). Purified nonspecific lipase from rat pancreas appears to mediate the following reaction sequence: $HE + {}_nB \rightleftharpoons HEB_n$; $HEB_n + S \rightleftharpoons HEB_nS$; $HEB_nS \rightleftharpoons EB_nS' + ROH$; $EB_nS' + H_2O \rightarrow HEB_n + R'COO^- + H^+$, where E = enzyme, B = bile salt, and S = R'COOR. Evidence is presented for the occurrence, sequence and reversibility or irreversibility of the above four reactions. Also discussed are the activation energies for both a "good" and a "poor" substrate, the correlation between V and substituent function (σ) for a series of substituted benzoic acid esters, and the effects of steric hindrance. Studies of the incorporation of label from $H_2{}^{18}O$ further detail the hydrolytic mechanism, and the effects of the physical state in which substrate is presented to the enzyme (micelles, emulsion, crude bulk phase, etc.) are discussed.

EFFECT OF PORTACAVAL ANASTOMOSIS ON THE ACTIVITIES OF HEPATIC ENZYMES RELATED TO CHOLESTEROL AND BILE ACID METABOLISM IN RATS. S. Balasubramaniam, C.M. Press, K.A. Mitropoulos, A.A. Magide and N.B. Myant (Med. Res. Council Lipid Metab. Unit., Hammersmith Hosp., London, W12 OHS, U.K.) *Biochim. Biophys. Acta* 441, 308–15 (1976). The effect of a portacaval anastomosis on the activities of hepatic enzymes related to cholesterol metabolism was investigated in rats. Portacaval anastomosis led to a fall in body weight and liver weight/body weight ratio, and to a rise in the activities of hydroxymethylglutaryl-CoA reductase and cholesterol 7α-hydroxylase per g of liver. The net effect was to maintain a normal activity of both enzymes per 100 g of rat. Diurnal rhythm in the activities of both enzymes was maintained after portacaval anastomosis. The rate of excretion of total bile acids, per 100 g of rat, in bile fistula rats was not significantly decreased by portacaval anastomosis.

SIDE CHAIN HYDROXYLATIONS IN BIOSYNTHESIS OF CHOLIC ACID. 25- AND 26-HYDROXYLATION OF 5β-CHOLESTANE-3α,7α,12α-TRIOL BY RECONSTITUTED SYSTEMS FROM RAT LIVER MICROSOMES. I. Bjorkhem, H. Danielsson and K. Wikvall (Dept. of Clin. Chem., Huddinge Hosp., Huddinge, Sweden) *J. Biol. Chem.* 251, 3495–9 (1976). Cytochrome P-450 was prepared either by sodium cholate treatment and ammonium sulfate fractionation

or by subtilisin and sodium deoxycholate treatment followed by DEAE-cellulose chromatography. Centrifugation of the cytochrome P-450 preparation at 100,000 × *g* for 1 hour just before incubation increased markedly lipid dependency. A significant difference between 25- and 26-hydroxylation was observed with respect to substrate saturation. The stimulatory effect of phenobarbital treatment on 25-hydroxylation and the inhibitory effect of this treatment on 26-hydroxylation were associated with the cytochrome P-450 fraction. The use of increasing amounts of sodium cholate in the solubilization of cytochrome P-450 resulted in a gradual decrease of 25-hydroxylase activity and a gradual increase of 26-hydroxylase activity. 25- and 26-Hydroxylase activities were separated partially by chromatography of subtilisin-treated cytochrome P-450 fraction on DEAE-cellulose.

PLASMA LIPIDS, KETONE BODIES, AND GLUCOSE CONCENTRATIONS IN CALVES FED HIGH- AND LOW-FAT MILK REPLACERS. R.C. Brazin and G.J. Brisson (Centre de Recherches en Nutr. et Dept. de Zootechnie, Univ. Laval, Quebec, Canada G1K 7P4) *J. Dairy Sci.* **59**, 1301–5 (1976). Twenty-four 5-day-old male calves were fed twice daily milk replacers containing either 5% (low-fat) or 25% (high-fat) lard. Plasma lipids, blood glucose, and ketone bodies were determined in jugular blood before feeding and every hour during 8 hr after feeding. The high-fat diet caused in the 1st h after feeding a sharp increase of triglycerides and phospholipids followed by a sharp decrease; these two increased slowly during the following 5 h. Within the first 2 h after feeding, there was an increase of cholesterol esters, free cholesterol, and nonesterified fatty acids. With the low-fat diet, triglycerides and cholesterol esters showed a small increase during the 4 h following meal whereas phospholipids, free cholesterol, and nonesterified fatty acids were not affected significantly. With both diets, blood glucose reached a maximum of 110 mg/100 ml 1 h after feeding; ketone bodies were not altered significantly. With the high-fat diet, lipid digestion would occur in two phases: firstly, part of the fat would be lipolyzed quickly by pregastric esterase before clot formation in the abomasum; secondly, the rest of the lipids, slowly released by progressive lysis of the coagulum would be digested under the action of gastric and pancreatic lipases. The first phase did not occur with the low-fat diet.

EARLY CHANGES IN THE ARTERIAL WALL OF CHICKENS FED A CHOLESTEROL DIET. M. Chvapil, P.L. Stith, L.M. Tillema, E.C. Carlson, J.B. Campbell and C.D. Eskelson (Depts. of Surgery and Anatomy, Arizona Med. Ctr. Univ. of Arizona, Tucson, Ariz.) *Atherosclerosis* **24**, 393–405 (1976). A total of 160 1–2 day old chickens were fed a 2% cholesterol diet for a period of 8 to 42 days and compared with an equal number of controls. Aortas were analyzed for various indexes of reactivity of connective tissue, cholesterol content and scanning electron microscopy (SEM) characteristics of the endothelial lining. Cholesterol feeding for a period up to 6 weeks resulted in doubling the level of serum cholesterol. It was, however, without effect on the activity of prolyl hydroxylase, lysyl oxidase, collagenase and collagen content in the aortic wall. As early as 3 weeks of feeding significant changes occurred in total and esterified cholesterol content. At the same time endothelial cells were characteristically contracted with several long cytoplasmic elongations and protrusions. A significant decrease of activity of the above enzymes was found in aortic tissue with increased age of the chicken. Collagen content in aortas increased with age of chickens. It is concluded that cholesterol as an atherogenic agent induces marked changes in endothelial cells and lipids of chicken aorta at earlier periods, prior to the activation of connective tissue.

EXCHANGE OF PHOSPHOLIPIDS BETWEEN MITOCHONDRIA AND MICROSOMES IN VITRO STIMULATED BY YEAST CELL CYTOSOL. G.S. Cobon, P.D. Crowfoot, M. Murphy and A.W. Linnane (Dept. of Biochem., Monash Univ., Clayton, Victoria, 3168, Australia) *Biochim. Biophys. Acta* **441**, 255–9 (1976). Yeast cell cytosol stimulated the exchange of phospholipids between yeast mitochondria and microsomes in vitro, and also between organelles isolated from rat liver. The major phospholipids exchanged in both cases were phosphatidylinositol and phosphatidylcholine, together with smaller amounts of phosphatidylethanolamine. Evidence was also obtained that interconversion of phospholipids occurred during the incubation, probably via base exchange mechanisms.

EFFECTS OF PROTECTED CYCLOPROPENE FATTY ACIDS ON THE COMPOSITION OF RUMINANT MILK FAT. L.J. Cook, T.W. Scott, S.C. Mills, A.C. Fogerty and A.R. Johnson (CSIRO Div. of Animal Production, P.O. Box 239, Blacktown, NSW 2148, Australia) *Lipids* **11**, 705–11 (1976). Unsaturated fatty acids can be protected from ruminal hydrogenation, and, when fed to lactating ruminants, the constituent acids are incorporated into milk triacylglycerols. By this means, it has been possible to reduce the melting point of milk triglycerides and to make softer butter fat. This report shows that, by feeding small amounts of protected cyclopropene fatty acids, one is also able to make harder butter fat. The effect of feeding protected cyclopropene fatty acids on the stearic:oleic ratio in milk fat is probably due to cycloprone-mediated inhibition of the mammary desaturase enzymes.

CYTIDINE-5′-MONOPHOSPHO-*N*-ACETYLNEURAMINIC ACID GALACTOSYL-*N*-ACETYLGALACTOSAMINYL-(*N*-ACETYLNEURAMINYL)-GALACTOSYL-GLUCOSYLCERAMIDE SIALYLTRANSFERASE IN THE NEUROHYPOPHYSIS OF THE RABBIT. J.T.R. Clarke and M.R. Mulcahey (Depts. of Pediatrics and Biochem., Dalhousie Univ. and the Atlantic Res. Centre for Metal Retardation, Halifax, Nova Scotia B3H 4H7, Canada) *Biochim. Biophys. Acta* **441**, 146–54 (1976). Cytidine-5′-monophospho-*N*-acetylneuraminic acid: (galactosyl-*N*-acetylgalactosaminyl-(*N*-acetylneuraminyl)-galactosyl-glucosylceramide sialytransferase (CMP-NAcNeu:monosialoganglioside (G_{M1}) sialytransferase) activity was demonstrated in the neurohypophysis of the rabbit. Optimum activity occurred at pH 6.5 and required the presence of exogenous galactosyl-*N*-acetylgalactosaminyl-(*N*-acetylneuraminyl)-galactosyl-glucosylceramide (G_{M1} ganglioside), detergent (Triton X-100), and divalent cation (Mn^{2+}, Mg^{2+} or Ca^{2+}). The product of the reaction was characterized as *N*-acetylneuraminyl-galactosyl-*N*-acetylgalactosaminyl-(*N*-acetylneuraminyl)-galactosyl-glucosylceramide (G_{D1a}) by ascending thin-layer chromatography. Physiological stimulation of vasopressin secretion, by the substitution of 2.2% NaCl for drinking water for 14 days, had no effect on the enzyme activity or the ganglioside content of the tissue.

UPTAKE OF RADIOLABELED GALACTOSYL-(α1→4)-GALACTOSYL-(β1→4)-GLUCOSYLCERAMIDE BY HUMAN SERUM LIPOPROTEINS IN VITRO. J.T.R. Clarke and J.M. Stolz (Depts. of Pediatrics and Biochem., Dalhousie Univ., and The Atlantic Res. Ctr. for Mental Retardation, Halifax, Nova Scotia B3H 4H7, Canada) *Biochim. Biophys. Acta* **441**, 165–9 (1976). Human serum was exposed to various amounts of [6-^{3}H]galactosyl-(α1→4)-galactosyl-(β1→4)-glucosylceramide under standardized conditions in vitro, and the uptake of the lipid by serum lipoproteins was determined. Of the bound glycolipid, 2% was isolated with very low density, 24% with low density-, 47% with high density lipoproteins and 27% with the ultracentrifugal residue. The distribution was different from the distribution of endogenous galactosyl-galactosylglucosylceramide, indicating that the glycolipid is probably an integral part of the lipoprotein complexes in vivo.

STUDIES ON LYSOPHOSPHOLIPASES. VIII. IMMUNOCHEMICAL DIFFERENCES BETWEEN TWO LYSOPHOSPHOLIPASES FROM BEEF LIVER. J.G.N. De Jong, A.M.H.P. Van Den Besselaar and H. Van Den Bosch (Lab. of Biochem., State Univ. of Utrecht, Transitorium 3, De Uithof, Padualaan 8, Utrecht, The Netherlands) *Biochim. Biophys. Acta* **441**, 221–30 (1976). Two distinct lysophospholipases have previously been obtained in homogeneous form from beef liver. In this paper, we demonstrate that ageing of a beef liver homogenate does not result in a change in the ratio of the two enzymatic activities, indicating that no interconversion of the lysophospholipases took place. Possible partial structural relationships between the two enzymes were explored by immunochemical techniques. Rabbit antisera raised against each individual lysophospholipase showed no cross-reactivity with the other enzyme. This was concluded from immuno double-diffusion experiments and from the results of immunoprecipitation of enzymatic activities in solution. Lysophospholipase and esterase activity in the purified preparation of lysophospholipase II from beef liver were concomitantly precipitated by antiserum against lysophopholipase II. This is further proof that both enzymatic activities reside in a single polypeptide chain, in agreement with previous results of isoelectric focusing experiments.

BIOSYNTHESIS OF POLYUNSATURATED FATTY ACIDS IN THE DEVELOPING BRAIN: II. METABOLIC TRANSFORMATIONS OF INTRACRANIALLY ADMINISTERED [3-^{14}C] EICOSATRIENOIC ACID, EVIDENCE FOR LACK OF Δ^8 DESATURASE. G.A. Dhopeshwarkar and C. Subramanian (Lab. of Nuclear Med. and Radiation Biol., Univ. of Calif., and Div. of Environ. and Nutr. Sci., UCLA School of Public Health, Los Angeles, Calif. 90024) *Lipids* **11**, 689–92 (1976). [^{14}C] Eicosatrienoic acid (Δ11, 14, 17) chemically synthesized from [1-^{14}C] linolenic acid was injected intra-

cranially into 14-day old rats and sacrificed 8 hr later. The analysis of brain fatty acids by radio-gas liquid chromatography before and after ozonolysis showed that the tetraene fraction consisted of a desaturated product, Δ5, 11, 17-20:4, and its elongated product, Δ7, 13, 16, 19-22:4. Both of these products, with a combined total of 61% of the total radioactivity recovered in the tetraene fraction, contain a nonmethylene interrupted double bond system and, therefore, are unsuitable for further desaturation. The other two components, Δ6, 9, 12, 15-18:4 and Δ8, 11, 14, 17-20:4, must have been formed from Δ9, 12, 15-18:3, formed by retroconversion of the starting material 20:3, followed by desaturation and elongation. These results suggest a lack of Δ^8 desaturase in the developing brain, leading to formation of Δ5, 11, 14, 17-20:4 rather than Δ8, 11, 14, 17-20:4. However, the nonmethylene interrupted double bond isomer does not restrict chain elongation.

METABOLISM OF 8,11,14-EICOSATRIENOIC ACID IN HUMAN PLATELETS. P. Falardeau, M. Hamberg and B. Samuelsson (Dept. of Chem., Karolinska Inst., S-104 01 Stockholm, Sweden) *Biochim. Biophys. Acta* 441, 193-200 (1976). The following labeled compounds were isolated and identified after incubation of 8,11,14-eicosatrien [1-^{14}C] oic acid with human platelets: 12-L-hydroxy-8,10,14-eicosatrienoic acid, 8,11,12-trihydroxy-9,14-eicosadienoic acid, 8,9,12-trihydroxy-10,14-eicosadienoic acid, 12-L-hydroxy-8,10-heptadecadienoic acid, prostaglandin E_1, prostaglandin D_1, and 8-(1-hydroxy-3-oxopropyl)-9,12-dihydroxy-10-heptadecenoic acid (thromboxane B_1).

ESSENTIAL FATTY ACID DEFICIENCY IN ADULTS RECEIVING TOTAL PARENTERAL NUTRITION. C.R. Fleming, L.M. Smith and R.E. Hodges (Depts. of Internal Med. and Food Sci. and Tech., Univ. of Calif., Davis, Calif. 95616) *Am. J. Clin. Nutr.* 29, 976-83 (1976). In seven adult patients receiving fat-free total parenteral nutrition (TPN) for 4 to 8 weeks, weekly determinations of plasma fatty acids and total plasma tocopherols were made. Four patients were deficient in essential fatty acids, as defined by triene:tetraene ratio > 0.4, at the end of the second week of TPN. Six patients were deficient by the end of the third week and all seven were deficient by the end of the fifth week of TPN treatment. One patient who was deficient in both essential fatty acids and zinc developed a scaling, eczemoid dermatitis that disappeared within 3 weeks after cessation of TPN and resumption of oral feedings containing both fat and zinc. After resumption of oral feedings by three patients, the triene:tetraene ratio returned to normal within 2 weeks. The mean of total plasma tocopherols fell over a period of 7 weeks and in three individuals, reached levels generally associated with deficiency. There were not any obvious clinical manifestations of vitamin E deficiency.

ACYL-CoA SYNTHETASES IN GUINEA-PIG LIVER MITOCHONDRIA. PURIFICATION AND CHARACTERIZATION OF A DISTINCT PROPIONYL-CoA SYNTHETASE. P.H.E. Groot (Dept. of Biochem. I., Faculty of Med., Erasmus Univ. Rotterdam, P.O. Box 1738, Rotterdam, The Netherlands) *Biochim. Biophys. Acta* 441, 260-7 (1976). Guinea-pig liver mitochondria contain three soluble ATP-dependent acyl-CoA synthetases: a medium-chain acyl-CoA synthetase, a salicylate activating enzyme, and a propionyl-CoA synthetase. A complete separation of these enzymes has been accomplished and the resulting preparation of propionyl-CoA synthetase (Spec. act. 4 units/mg protein) accepts acetate, propionate and butyrate as substrates with a high preference for propionate.

COMPARATIVE STUDIES ON THE EFFECT OF CHOLESTEROL FEEDING ON BILIARY COMPOSITION. K.-J. Ho (Dept. of Path., Univ. of Alabama in Birmingham, Med. Ctr., Birmingham, Ala. 35294) *Am. J. Clin. Nutr.* 29, 698-704 (1976). The gallbladder or hepatic bile from six species of animals had a uniformly low cholesterol content far below its maximum solubility. Cholesterol feeding for more than 1 month had little effect on the biliary composition in chickens, rabbits, and rats, but selectively doubled the absolute and relative concentration of cholesterol in the biles of hamsters, and increased the cholesterol concentration to a level of its maximum solubility in gallbladder bile of ground squirrels and hepatic bile of prairie dogs. The gallbladder bile of prairie dogs reached the boundary of metastable supersaturation of cholesterol and subsequently developed cholesterol crystals and gallstones. A circadian change of the relative concentration of bile acid, cholesterol, and phospholipid in the hepatic bile of the rats with chronic biliary drainage was also observed as a consequence of cholesterol feeding.

MECHANISM AND SITE OF SMALL INTESTINAL UPTAKE OF VITAMIN D_3 IN PHARMACOLOGICAL CONCENTRATIONS. D. Hollander and T.C. Truscott (Div. of Gastroenterology, Wayne State Univ., and Harper Hos., Detroit, Mich., and Albany Med. College, Albany, N.Y.) *Am. J. Clin. Nutr.* 29, 970-5 (1976). The site and mechanism of initial uptake of 1,2-^{3}H vitamin D_3 in pharmacological concentrations was investigated using everted rat small bowel sacs incubated in a micellar medium. The mean ± SE uptake rates of the vitamin at 300 μM incubation concentration by proximal, medial, and distal small bowel segments were 6.7 ± 0.26, 7.8 ± 0.54, and 3.3 ± 0.20 nmole/min/100 mg tissue, respectively. Incubation with the addition of 10^{-3} M 2,4-dinitrophenol, or 10^{-3} M KCN, or under nitrogen atmosphere did not change ($P > 0.05$) the above rates of absorption. Incremental increases in the concentration of vitamin D in the incubation medium up to 1,200 μM resulted in a linear increase in the uptake rate indicating lack of saturation kinetics. In all the above experiments, greater rate of uptake of the vitamin occurred in the proximal and medial small bowel than the distal small bowel ($P < 0.01$). The above experiments indicate that vitamin D_3 in this range of concentrations is taken up by the enterocytes by a nonsaturable passive diffusion mechanism showing no evidence for carrier mediation. The rate of intestinal uptake is highest in the proximal and medial segments of the small bowel.

IN VITRO BIOSYNTHESIS OF PROSTAGLANDIN E_2 BY KIDNEY MEDULLA OF ESSENTIAL FATTY ACID DEFICIENT RATS. E. Kaa (Dept. of Biochem., Royal Danish School of Pharmacy, 2 Universitetsparken, DK-2100 Copenhagen ø, Denmark) *Lipids* 11, 693-6 (1976). Weanling rats were fed either a semi-synthetic diet with no fat, with 28% by wt partially hydrogenated fish oil, or with 28% by wt arachis oil (control diet) for 6 or 7½ months. The in vitro conversion of arachidonic acid to prostaglandin E_2 by homogenates of the rat kidney medulla was measured by gas chromatography with electron capture detection. The kidney medulla of essential fatty acid deficient animals showed increased activity for the in vitro conversion of exogenous arachidonic acid to prostaglandin E_2 when compared to the controls. The change of the enzymatic activity in the essential fatty acid deficient animals was reversible, as shown by refeeding. Inhibition of the prostaglandin synthetase was found at exogenous substrate concentrations higher than 50-100 μM.

EFFECTS OF RAPESEED OIL ON FATTY ACID OXIDATION AND LIPID LEVELS IN RAT HEART AND LIVER. M. Galli Kienle, G. Cighetti, C. Spagnuolo and C. Galli (Inst. di Chimica, Facolta di Med. e Chirurgia, Univ. di Milano, 20133 Milano, Italy) *Lipids* 11, 670-5 (1976). The comparative rates of oxidation of erucic and oleic acids and of their CoA esters were studied in heart and liver mitochondria of rats fed a standard diet or semi-synthetic diets containing 25% of the calories as either rapeseed oil (46.6% erucic and 10.4% eicosenoic acid) or olive oil, for a period of 5 months. The long exposure to the diet containing 25% rapesced oil did not alter the oxidative activity of mitochondria and did not induce morphological changes in the heart. It is confirmed that erucic acid is oxidized in mitochondria at lower rates than other long chain fatty acids and that its activation as CoA derivative may be one of the rate limiting steps of the overall oxidation process. Total lipids and triglycerides do not significantly change in the heart whereas they increase in the liver of rats fed the diet containing rapeseed oil.

LOCALIZATION OF APOLIPOPROTEIN B IN INTESTINAL EPITHELIAL CELLS. R.M. Glickman, J. Khorana and A. Kilgore (Gastroent. Unit, Beth Israel Hosp., 330 Brookline Ave., Boston, Mass. 02215) *Science* 193, 1254-5 (1976). Indirect immunofluorescence techniques were employed to determine the distribution within intestinal epithelial cells of apolipoprotein B, a protein essential for the normal transport of fat. Isolated intestinal cells were prepared from rats either during active lipid absorption or after biliary diversion. Specific immunofluorescence from an antiserum to apolipoprotein B was detected in the apical portion of epithelial cells from bile-diverted animals, demonstrating that a pool of apolipoprotein B is present in the nonabsorptive epithelial cell and may be a component of intestinal cell membranes. During lipid absorption in normal rats, an early and sustained increase in immunofluorescence was demonstrated, consistent with an increased synthesis of apolipoprotein B during absorption. This study demonstrates the presence of apolipoprotein B within intestinal epithelium and provides evidence for the participation of this apoprotein in intestinal lipid transport.

ISOLATION AND CHARACTERIZATION OF THE LIPONUCLEOTIDES OF SACCHAROMYCES CEREVISIAE. E. Gayle Schneider and E.P. Kennedy (Dept. of Biol. Chem., Harvard Med. School, Boston, Mass. 02115) *Biochim. Biophys. Acta* **441**, 294–301 (1976). The liponucleotide fraction of *Saccharomyces cerevisiae* was isolated from cells grown on tritiated uracil and identified as CDPdiacylglycerol on the basis of its behavior as a single compound upon DEAE-cellulose and thin-layer chromatography; its extreme lability to mild alkaline methanolysis; and its hydrolysis by the CDPdiacylglycerol hydrolase of *Escherichia coli* to yield tritiated 5′-CMP. At most, only about 5% of yeast liponucleotide could be dCDPdiacylglycerol, in contrast to the presence of nearly equimolar amounts of CDP- and dCDPdiacylglycerols in *E. coli*. Although no CDPceramide could be detected in the liponucleotide fraction of this organism, the possibility still exists that it may be an intermediate in the biosynthesis of sphingolipids in systems yet to be examined.

MONOACYL-SN-GLYCEROL 3-PHOSPHATE ACYLTRANSFERASE SPECIFICITY IN BOVINE MAMMARY MICROSOMES. J.E. Kinsella (College of Agric. and Life Sci., Dept. of Food Sci., Cornell Univ., Ithaca, New York 14853) *Lipids* **11**, 680–4 (1976). The acyl-CoA: acyl-*sn*-glycerol 3-phosphate acyltransferases located in the microsomal fraction of lactating bovine mammary tissue show a preference for palmityl-CoA particularly above the apparent Km values of the acyl acceptors. Using saturating levels of monopalmityl-*sn*-glycerol 3-phosphate, the order of acylation was palmityl- > myristyl- > oleyl- > stearyl- > linoleyl-CoA. Apparent Km values for monopalmityl- and monooleyl-*sn*-glycerol 3-phosphate with palmityl-CoA as donor were 16 and 13 μM, respectively, while the Km values for palmityl-CoA with these two acyl acceptors were 5 and 5.2 μM, respectively. The apparent Vmax values for the palmityl acceptor and donor were 25 and 30 nmol/min/mg protein. Phosphatidic acid was the principal product. The inclusion of magnesium in the assay depressed activity while the addition of ethylenediaminetetraacetate doubled the rate of acylation.

SERUM LIPID PROFILES IN PATIENTS OF MYOCARDIAL INFARCTION IN THE CHANDIGARH AREA (NORTHERN INDIA). M. Kumar, R.N. Chakravarti, A. Singh and P.L. Wahi (Depts. of Exp. Med. and Cardiology, Post-grad. Inst. of Med. Ed. and Res., Chandigarh, India) *Atherosclerosis* **24**, 355–61 (1976). To study the incidence of hyperlipoproteinaemia in patients with myocardial infarction (MI) in the Chandigarh area, estimations of various lipids have been carried out in 83 patients. A serial study has been carried out in 31 patients. Serum lipoproteins and uric acid were also estimated. Results show an incidence of only 18% hypercholesterolaemia in patients with MI and 15% in normal subjects. Age-wise distribution of hypercholesterolaemia was slightly higher in 41–60 years old patients when compared with other age groups. No other abnormality in lipid profile was observed. Hyperuricaemia was not observed. These results, therefore, differ markedly from those of similar studies published from the western world.

DISTRIBUTION OF LIPIDS IN CYTOPLASMIC AND OUTER MEMBRANES OF ESCHERICHIA COLI K12. E.J.J. Lugtenberg and R. Peters (Dept. of Mole. Cell Biol., Section Microbiol. and Inst. for Mole. Biol., State Univ., Transitorium 3, Padualaan 8, Utrecht, The Netherlands) *Biochim. Biophys. Acta* **441**, 38–47 (1976). The lipid composition of cytoplasmic and outer membranes of *Escherichia coli* K12 was studied. Compared with the cytoplasmic membrane, the outer membrane is enriched in both saturated fatty acids and phosphatidylethanolamine. This is also the case when the fatty acid composition of the phospholipids is changed, either by varying the growth temperature or by using mutants with alterations in their fatty acid metabolism. Phosphatidylethanolamine of the outer membrane contains relatively more saturated fatty acids than phosphatidylethanolamine of the cytoplasmic membrane.

A STUDY OF THE EFFECTS OF 25 HYDROXYCHOLECALCIFEROL AND CALCIUM SOURCE ON EGG SHELL QUALITY. C.P. McLoughlin and J.H. Soares, Jr. (Dept. of Poultry Sci., Univ. of Maryland, College Park, Maryland 20742) *Poult. Sci.* **55**, 1400–10 (1976). To determine the effects of various forms and levels of calcium and vitamin D_3 on egg shell quality, a series of experiments was conducted using White Leghorn hens varying in age from 42–74 weeks. Results indicate that 600 I.U. of 25 HCC per kg. in combination with 3.5% calcium had a nonsignificant beneficial effect on shell quality as measured by specific gravity. A final experiment using 74-week old hens indicated that 25 HCC with either oyster shell or limestone had a significant beneficial effect on egg specific gravity and thickness with the oyster shell-25 HCC combination being the most effective.

THE EFFECT OF PORTACAVAL ANASTOMOSIS ON PLASMA LIPOPROTEIN METABOLISM IN RATS. A.A. Magide, C.M. Press, N.B. Myant, K.A. Mitropoulos and S. Balasubramaniam (Med. Res. Council Lipid Metab. Unit, Hammersmith Hosp., London, W12 OHS, U.K.) *Biochim. Biophys. Acta* **441**, 302–7 (1976). The effect of portacaval anastomosis on the metabolism of plasma lipoproteins was investigated in rats. When compared with sham-operated pair-fed controls, plasma high density lipoprotein cholesterol concentration was decreased, plasma low density lipoprotein cholesterol concentration was increased and plasma total cholesterol concentration was unchanged in the portacaval anastomosis rats. Maximal incorporation of [^{14}C]leucine into the total circulating mass of protein was decreased in the very low density lipoprotein and high density lipoprotein fractions and, possibly, in the low density lipoprotein fraction, but there was no change in maximal incorporation into albumin. It is concluded that portacaval anastomosis diminishes the rate of synthesis of high density lipoprotein and very low density lipoprotein proteins and, possibly, of low density lipoprotein proteins.

EFFECT OF BRAN AND CHOLESTYRAMINE ON PLASMA LIPIDS IN MONKEYS. M.R. Malinow, P. McLaughlin, L. Papworth, H.K. Naito and Lena A. Lewis (Oregon Regional Primate Res. Center, Beaverton, Ore. 97005) *Am. J. Clin. Nutr.* **29**, 905–11 (1976). Semipurified diets whose cholesterol content varied from 34 to 120 mg/100 kcal were given to adult female cynomolgus monkeys (*Macaca fascicularis*) for 9 months. The intake of dietary fiber was increased through the addition of wheat, rice, or soya bran; 5% cholestyramine was given to one group of monkeys. None of the brans reduced plasma levels of cholesterol, whereas cholestyramine produced marked hypocholesterolemic effects. Triglyceride levels increased with higher cholesterol intake, but no additional changes were induced by any of the experimental diets. Plasma phospholipids were reduced by cholestyramine.

EFFECT OF DIETARY FAT ON HEPATIC METABOLISM OF ^{14}C-OLEIC ACID AND VERY LOW DENSITY LIPOPROTEIN TRIGLYCERIDE IN THE GERBIL. R.J. Nicolosi, M.G. Herrera, M. El Lozy and K.C. Hayes (Dept. of Nutr., Harvard School of Public Health, Boston, Mass. 02115) *J. Nutr.* **106**, 1279–85 (1976). In order to compare in vitro and in vivo aspects of lipid metabolism and lipoprotein secretion associated with the hyperlipemia of saturated fat feeding, gerbils were fed a diet containing 15% coconut oil or safflower oil for 6 weeks. In vitro incorporation of fatty acid was determined by measuring ^{14}C-oleic acid incorporation into hepatic lipids in liver slices, whereas in vivo secretion of hepatic lipoprotein was determined in fasting gerbils following Triton WR1339 injection. The plasma lipoprotein profile was assessed by agarose electrophoresis. Our interpretation of the data is that dietary polyunsaturated fat favors incorporation of fatty acids into phospholipid, enhances both triglyceride secretion and the plasma transport and clearance of triglyceride and cholesterol and that the hyperlipemia of coconut oil feeding reflects a reduced metabolic clearance of circulating lipid associated with that dietary fat.

ISOLATION OF CHICK RENAL MITOCHONDRIAL FERREDOXIN ACTIVE IN THE 25-HYDROXYVITAMIN D_3-1α-HYDROXYLASE SYSTEM. J.I. Pedersen, J.G. Ghazarian, N.R. Orme-Johnson, and H.F. DeLuca (Dept. of Biochem., College of Agric. and Life Sci., Univ. of Wisconsin at Madison, Madison, Wis. 53706) *J. Biol. Chem.* **251**, 3933–41 (1976). An iron-sulfur protein has been isolated from chick kidney mitochondria and purified (200-fold as determined enzymatically by its NADPH-cytochrome *c* reductase activity in the presence of adrenodoxin reductase) on DEAE-cellulose and gel filtration on Sephadex G-100. The purified protein showed an absorption peak at 411 nm with a shoulder at 460 nm. The electron paramagnetic resonance spectrum was typical of a ferredoxin-type iron-sulfur protein with g values: $g_x = g_y = 1.94$ and $g_z = 2.02$. The molecular weight was estimated by gel filtration to be 12,500. When tested against anti-adrenodoxin γ-globulin, the protein showed a precipitin line that fused completely with that of adrenodoxin. Based on these findings it is concluded that this protein is an iron-sulfur protein quite similar to adrenal ferredoxin. In the presence of adrenoxodin reductase, NADPH, and carbon monoxide, the purified renal ferredoxin was found to be active in the reduction of cytochrome P-450 solubilized from chick kidney mitochondria. These results strongly support a previous conclusion that the kidney mitochondrial 25-hydroxy-vitamin D_3-1α-hydroxylation system consists of a renal ferredoxin reductase (presumably a flavo-protein), renal ferredoxin, and cytochrome P-450.

EFFECTS OF CLOFIBRATE TREATMENT ON PLASMA TRIGLYCERIDE CONCENTRATION, PLASMA POST-HEPARIN CLEARING FACTOR LIPASE (LIPOPROTEIN LIPASE) ACTIVITY AND SERUM CLEARING FACTOR LIPASE ACTIVATING ABILITY IN MATURITY-ONSET DIABETES. M. Perenna Rogers, D. Barnett and D.S. Robinson (Dept. of Biochem., and Leeds Univ. (St. James's) Hosp., Univ. of Leeds, Leeds, Great Britain) *Atherosclerosis* 24, 565–73 (1976). The effects of clofibrate on plasma triglyceride concentration, plasma post-heparin clearing factor lipase activity and serum clearing factor lipase activating ability were studied in a group of maturity-onset diabetic patients. Significant falls in both triglyceride concentration and in activating ability occurred within 2 weeks of beginning clofibrate treatment and, when treatment was stopped after 4 weeks, these changes were reversed within a further 4 weeks. Plasma post-heparin clearing factor lipase activity, on the other hand, was significantly increased during clofibrate administration and fell again when the treatment was stopped. The possible interrelationships of these findings are discussed.

TREATMENT OF TYPE II HYPERLIPOPROTEINEMIA WITH D-THYROXINE. A.D. Rakow, H.U. Klor, E. Kuter, H.H. Ditschuneit and H. Ditschuneit (Dept. of Med., Div. of Metabolism and Nutr., Univ. of Ulm, Ulm, West-Germany) *Atherosclerosis* 24, 369–80 (1976). The effectiveness of a new, almost v-thyroxine free preparation of *d*-thyroxine (Dynothel) was tested in 15 patients with Type IIa and 4 patients with Type IIb hyperlipoproteinemia. Eleven patients with Type IIa and 3 with Type IIb were responsive to treatment and showed an average 26% decrease in plasma TC. This decrement in plasma TC was mirrored in a significant reduction of LDL cholesterol in Type IIa and IIb. While VLDL cholesterol slightly decreased in Type IIb, it remained the same in Type IIa and so did the HDL cholesterol in both types. As neither VLDL nor LDL or HDL triglyceride levels changed very much in either type, the total plasma triglycerides remained the same. The plasma phospholipids were higher in Type IIa and lower in Type IIb on therapy. Thus, Dynothel seems to be a potent *d*-thyroxine preparation for lowering plasma cholesterol, this decrease being brought about by reduction of LDL cholesterol levels. The effect of the drug on plasma TG and PL is less certain.

EFFECT OF DIETARY RESTRICTION ON PLASMA CHOLESTEROL AND CHOLESTEROL EXCRETION IN THE WHITE CARNEAU PIGEON. M.T. Ravi Subbiah and P.W. Connelly (Mayo Clinic and Mayo Found., Rochester, Minn. 55901) *Atherosclerosis* 24, 509–13 (1976). The effect of short-term dietary restriction on plasma cholesterol and cholesterol balance was examined in young White Carneau pigeons. Dietary restriction of 1 month increased plasma cholesterol significantly and subsequently decreased to initial levels at 3 months. The fecal excretion of neutral sterols was significantly reduced ($P < 0.001$) at both 1 and 3 months following dietary restriction, while the fecal excretion of bile acids showed no significant changes.

THE INABILITY OF THE LION, PANTHERA LEO, L. TO DESATURATE LINOLEIC ACID. J.P.W. Rivers, A.G. Hassam, M.A. Crawford and M.R. Brambell (Nuffield Inst. of Comparative Med., and Curator of Mammals Zool. Soc. of London, Regent's Park, London NW1 4RY, England) *FEBS Letters* 67, 269–70 (1976). The lion lacks the Δ6 and Δ8 desaturases necessary for the desaturation of linoleic acid and is unable, therefore, to convert a dietary source of 18:2ω6 into its physiologically essential metabolites 20:3ω6 and 20:4ω6. It will therefore require a dietary source of preformed 20:3ω6 and perhaps 20:4ω6, as prostaglandin precursors; in practice the animal will exhibit a specific requirement for polyunsaturated lipid of animal origin.

HEPATIC CHOLESTEROL-7α-HYDROXYLASE ACTIVITY IN NEUROGENIC HYPERCHOLESTEROLEMIA. S. St. George, M. Friedman, S.O. Byers and R. Neuman (Harold Brunn Inst., Mount Zion Hosp. and Med. Ctr., P.O. Box 7921, San Francisco, Calif. 94120) *Atherosclerosis* 24, 387–92 (1976). The cholesterol-7α-hydroxylase activity of hepatic microsomal preparations of hypothalamic hypercholesterolemic rats and normal rats was assayed in rats fed diets high and low in cholesterol, and in rats killed at the supposed height and at the nadir of the diurnal cycle of enzyme activity. The activity of this enzyme system appeared to be unimpaired in the hypothalamic hypercholesterolemic rat.

LATERAL DIFFUSION, ORDER PARAMETER AND PHASE TRANSITION IN PHOSPHOLIPID BILAYER MEMBRANES CONTAINING TOCOPHERYL ACETATE. D. Schmidt, H. Steffen and C. Von Planta (Physics Dept., F. Hoffmann-La Roche and Co. Ltd. Basle, Switzerland) *Biochim. Biophys. Acta* 443, 1–9 (1976). Lateral diffusion coefficient and order parameter measurements were made with pyrene excimer optical probes and fatty acid spin label probes respectively in pure dipalmitoyl phosphatidylcholine membranes and in membranes doped with tocopheryl acetate. The investigation shows, that the lateral diffusion coefficient for pyrene in dipalmitoyl phosphatidylcholine membranes is decreased whereas the order parameter of the fatty acid chains is slightly increased in the inner part of the membranes by the addition of tocopheryl acetate. The fluid-solid equilibrium phase diagram of dipalmitoyl phosphatidylcholine/tocopheryl acetate mixed membranes has been constructed from the measurements of the partition of (2,2,6,6-tetramethylpiperdine-1-oxyl) TEMPO spin labels between lipid and aqueous regions as function of temperature. In the membranes tocopheryl acetate induces a strong broadening of the temperature range of the phase transition. At low tocopheryl acetate concentrations dipalmitoyl phosphatidylcholine and tocopheryl acetate seem to be completely miscible in the solid and in the liquid crystalline state.

EFFECT OF ETHANOL INGESTION ON CHOLINE PHOSPHOTRANSFERASE AND PHOSPHATIDYL ETHANOLAMINE METHYLTRANSFERASE ACTIVITIES IN LIVER MICROSOMES. E.O. Uthus, D.N. Skurdal and W.E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of North Dakota School of Med., Grand Forks, N.D. 58202) *Lipids* 11, 641–4 (1976). The effect of ethanol ingestion on choline phosphotransferase and phosphatidyl ethanolamine methyltransferase activities, the two enzymes involved in phosphatidyl choline biosynthesis in liver microsomes, has been investigated. Female rats were fed a 5% ethanol-liquid diet containing amino acids, minerals, vitamins, with and without choline, for 2, 6, and 10 weeks. Control animals were pair-fed the same isocaloric diet with 5% sucrose with and without choline. Ethanol administration with or without dietary choline stimulated significantly ($P < 0.001$) the specific activities of phosphatidyl ethanolamine methyltransferase in liver microsomes in the animals fed 5% ethanol for 2, 6, and 10 weeks, when compared to those control animals pair-fed the isocaloric diet with or without choline.

EFFECT OF DIETARY FATS ON OVINE ADIPOSE TISSUE METABOLISM. R.G. Vernon (The Hannah Res. Inst., Ayr, Scotland KA6 5HL) *Lipids* 11, 662–9 (1976). The effects of different dietary fats on ovine adipose tissue metabolism have been investigated. Six-month old sheep were fed for 6 weeks a control diet or diets supplemented with either tallow or a mixture of sunflower seed oil and soybean oil, treated to protect the fats from hydrolysis and hydrogenation in the rumen, or with maize oil. The rates of fatty acid, glyceride glycerol, and CO_2 formation were measured in perirenal and subcutaneous adipose tissue slices by following the incorporation of either ^{14}C from labeled acetate or glucose, or ^{3}H from tritiated water into the appropriate product. Feeding protected tallow or maize oil but not protected sunflower seed oil plus soybean oil resulted in reduced rates of fatty acid biosynthesis in both perirenal and subcutaneous adipose tissue slices and CO_2 formation in perirenal adipose tissue. Feeding the fat-supplemented diets had no effect on the rate of glyceride glycerol formation. The fat-supplemented diets also resulted in reduced activities of various enzymes, thought to be involved in lipogenesis, measured in 105,000 × g supernatant fractions from adipose tissue homogenates. The results suggested that ovine adipose tissue lipogenesis is sensitive to both the amount and the nature of dietary fat.

LIPID ABSORPTION IN THE YOUNG OF PROTEIN-DEFICIENT RATS. F.J. Zeman and M.L. Fratzke (Dept. of Nutr., Univ. of Calif., Davis, Calif. 95616) *Lipids* 11, 652–61 (1976). The effect of reduced protein in the diet during pregnancy on the subsequent absorption of triolein and of oleic acid which were infused into the intestine of the young was studied. Pregnant rats were fed diets containing either 24% or 4% casein as the sole source of protein. Control and prenatally protein-deprived (PPD) young were studied at birth, before and after suckling, and at 4, 8, and 12 days. Both body weight and the weight and length of intestine were reduced in PPD young. Blood lipid levels were increased markedly between 0 and 4 days and tended to decrease to newborn levels by 12 days in both diet groups. Oleic acid absorption in newborn and 12-day PPD pups were reduced in total, per g body weight and per cm of gut. The individual enterocytes were shown to be equally capable of absorption and transfer of triolein and oleic acid. Differences in absorption are related primarily to the numbers of absorptive cells.

• Edible Proteins

EVOLUTION OF LYSINE, METHIONINE, AND CYSTINE IN A PEANUT MEAL AFTER TREATMENT BY AMMONIA. J. Adrian (C.N.R.S., Centre de recherche sur la nutrition, 92190 Bellevue). *Rev. Fr. Corps Gras* 23, 209–12 (1976). A treatment by ammonia under pressure changes the amino acids of a peanut meal: lysine is not altered; cystine is widely broken up, while methionine or a similar component, increases significantly. The digestibility of amino acids measured in vitro is largely improved by a more important proportion of dissolved and free amino acids. In spite of the broken-up cystine, this detoxification process is favorable in respect to the protein efficiency of a peanut meal.

NUTRITIONAL VALUE AND ACCEPTABILITY OF VEGETABLE TEXTURED PROTEINS BY MAN. C. Sautier and M.C. Camus (Unité de Rech. Nutrition humaine, Hôpital Bichat, 75018 Paris). *Rev. Fr. Corps Gras* 23, 203–8 (1976). Three kinds of studies have been done: 1.—Kinetic studies of proteolysis in vitro by pepsin and trypsin for comparing the affinity of enzymes for different textured proteins; the immediate digestibility is evaluated with regard to the human digestive feelings. 2.—Nitrogen, sodium, potassium balances for underfed subjects in re-feeding for determining the nutritional value and biological tolerance. 3.—Acceptability studies for evaluating the acceptancy for raw textured proteins or for those used as food ingredients.

INFLUENCE OF THE SYSTEM OF OBTAINMENT OF OIL FROM SUNFLOWERSEED ON THE YIELD AND QUALITY OF PROTEIN MATERIALS. V.G. Shcherbakov et al. *Pishch. Tekhnol.* 1976(2), 45–7. During the obtainment of oil, not only a decrease of solubility of amino acids, but also its partial destruction occurs. To obtain an edible complex protein of good quality, it is important to use a meal from extraction of sunflower poor in hulls, obtained under controlled conditions of extraction. Direct extraction of oil from kernel with a low hull content allows the obtainment of a higher yield and of proteins of high quality. (Rev. Fr. Corps Gras)

QUALITATIVE INDICES OF THE SUNFLOWERSEED PROTEIN. V.G. Shcherbakov et al. *Pishch. Tekhnol.* 1976(1), 154–5. After describing their method of extraction of the protein from sunflowerseed meal, the authors established preliminary specifications for the proteins, which are: moisture—max. 8.0%; lipids on dry matter—max. 1.5%; soluble proteins, % in relation to total % of protein—not less than 80%; metallic impurities—max. 0.0003%; other foreign impurities—naught; raw cellulose on dry matter—max. 3.0%; raw ashes in relation to the dry matter—max. 3.0%; pH of a 10% water suspension—6.0–7.0; raw protein on dry matter—min. 85%. (Rev. Fr. Corps Gras)

USE OF VEGETABLE PROTEINS IN BREAD AND BAKERY PRODUCTS. R. Calvel (Ecole française de Meunerie, Paris). *Rev. Fr. Corps Gras* 23, 275–83 (1976). The soy flour is taking a greater importance in some bakery products. It is a high protein component and a preservative of freshness. It is also interesting in some dietetic products. The soy flour is used in the ordinary panification; besides, it increases the protein content. It can be used in the manufacture of compound builders, used in raised-sugared doughs and especially in the surgelated products.

USE OF VEGETABLE PROTEINS IN MEAT PRODUCTS IN FRANCE. A. Frouin (Soc. Olida et Caby ass., 92300 Levallois-Perret). *Rev. Fr. Corps Gras* 23, 271–4 (1976). The different soybean proteins or extracts can be interesting technologically or as bringing of proteins into different food products. The future of soybean in human nutrition seems, at a short term, to be either as an additive with technological value (competition with milk proteins) or in the sectors where the rate of nutritional value/price has priority. Soybean combined with meats or other vegetable proteins allows interesting combinations.

• Drying Oils and Paints

YELLOWING AND OTHER FILM PROPERTIES OF LINSEED-DERIVED PAINTS INFLUENCED BY LINOLENATE CONTENT. H. Rakoff, F.L. Thomas and L.E. Gast (North. Reg. Res. Ctr., Agricultural Res. Service, Peoria, Ill. 61604). *J. Coatings Technol.* 48(619), 55–7 (1976). Extent of yellowing on storage in the dark (measured spectrophotometrically), drying time, and hardness were determined on four experimental paints prepared with linseed oil (ARLSO), a decolorized linseed oil (DLSO), pure trilinolenin (Ln_3), or a bleached hydrogenated linseed oil (BHLSO). These oils ranged in linolenate content from 0 to 100%. The Ln_3 paint dried the fastest and yellowed the most. ARLSO paint yellowed just a little more than did the DLSO paint. The BHLSO paint dried slowly, did not yellow perceptibly, and reached about one-half the Sward Rocker Hardness of the other three paints.

BREAK RESISTANCE OF EPOXIDE RESIN ADHESIVES. A.G. Epprecht (Basserdorf, Switzerland). *Farbe+Lack* 82(8), 685–9 (1976). The cohesive strength of adhesives has to surpass the adhesion of lacquers to their substrates when the latter is tested. Is shown that the modulus of elasticity and the cohesive strength of the commonly used epoxide resin adhesive decrease if the ratio of hardener to resin is increased. Simultaneously the transition range shifts to lower temperatures. Longer hardening times caused by lower hardener concentration is recommended to obtain higher adhesive strength.

STABILITIES OF AQUEOUS INORGANIC PIGMENT SUSPENSIONS. N. Moriyama (Ind. Res. Labs, Kao Soap Co., Wakayama-shi, Japan). *Colloid Polym. Sci.* 254(8), 726–35 (1976). The effects of various types of anionic surfactants and inorganic phosphates on the stabilities of aqueous inorganic pigment suspensions have been examined. The stabilities were evaluated from sedimentation velocity data. At low concentrations stabilities increase with increases in concentrations of surfactants and inorganic phosphates, whereas at high concentra-

tions they decrease remarkably with increase in the concentrations above a certain value which varies with the chemical composition and molecular weight of surfactants and inorganic phosphates, and also varies with the sort of inorganic pigments. The stability data at low concentrations are closely related with zeta potential data or adsorption data, whereas the stability data at high concentrations are not related with zeta potential data or adsorption data. The stability data in the systems of 1–1 type surfactants such as sodium dodecyl sulfate and sodium dodecylbenzene sulfonate, in which the stabilities are little influenced by pH changes accompanied with increase in concentrations, can be explained by the application of the D. I. V. O. theory qualitatively. The stabilities are pH-influenced when pH values of the systems are considerably changed.

• Detergents

ADSORPTION OF NONIONIC SURFACTANTS AT THE OIL-WATER INTERFACE AND EMULSION INVERSION POINT. L. Marszall (Pharmacy No. 62, Nowe k/Swiecia (Poland). *Colloid Polym. Sci.* 254, 674–5 (1976). Phase inversion titration and determination of the so-called emulsion inversion point (EIP) was found satisfactory for evaluation of the required HLB for oil-in-water emulsion. The EIP is the point at which the emulsion composed of an oil; emulsifier and water changes from a water-in-oil to an oil-in-water system. A general tendency was found for the EIP value to decrease with an increasing HLB of the emulsifiers. This tendency is disturbed by the existing minimum of EIP which occurs for a single emulsifier having an optimum of HLB which is in general consistent with a required HLB of oil.

SOME REMARKS ON FLOCCULATION OF CALCIUM CARBONATE IN AQUEOUS SUSPENSION WITH A NONIONIC FLOCCULANT AND ELECTRICAL SURFACE CHARGE ON FLOCCULATED PARTICLES. J. Szczypa, Al Monies and R. Sprycha (Inst. Chem. Maria Curie-Sklodowska Univ., Lublin, Poland). *Colloid Polym. Sci.* 254(6), 606–7 (1976). Flocculation process carried out with nonionic agent is not directly controlled by electrical surface charge of the flocculated particles. Adsorption of nonionic macromolecules on $CaCO_3$/water interface did not control the parameters of electrical double layer at the interface.

A COMPARATIVE STUDY OF THERMOTROPIC AND LYOTROPIC MESOPHASES FORMED BY AMMONIUM DODECANOATE. B. Tamamushi, Y. Kodaira and M. Matsumura. *Colloid Polym. Sci.* 254(6), 571–6 (1976). The phase diagrams for the ternary system; ammonium laurate + water + *n*-octanol are obtained at temperatures of 20, 30, and 50 C. With samples taken from the homogeneous liquid crystalline phase in the phase diagram whose structure is lamellar, the flow properties are measured and shear rate vs. shear stress relation and apparent viscosity vs. shear rate relation, at different temperatures, are obtained. These results are compared with similar relations previously obtained with the thermotropic mesophase of anhydrous ammonium laurate. Both lyotropic and thermotropic mesophases are common in showing Bingham type plastic flows with large yield values and large viscosity values. However they are different in the dependence of viscosity on temperature, the values of the activation energy for viscous flow for the hermotropic mesophase being found more than 10 times greater than those for the lyotropic mesophase. The similarities and differences between the two kinds of mesophases are discussed from the viewpoint of molecular theory. The problem of the analogy between mesophases and colloidal systems is briefly criticized.

STUDY OF THE INFLUENCE OF THE CHAIN LENGTH ON SOME ASPECTS OF SOAP/WATER DIAGRAMS. C. Madelmont and R. Perron. *Colloid Polym. Sci.* 254(6), 581–95 (1976). Four sodium soaps (laurate, myristate, palmitate and stearate) were examined for comparison by DTA, in the anhydrous state and in presence of water. With anhydrous soaps, was shown that the existence of a single subwaxy phase and the disappearance of the discs phase are realized when the chain length is as long as C_{16}. For aqueous systems, it was found that drewings of Ti curves in the high temperature region, and of Tc curves, depend on the chain length, and equally the characteristics of the polymorphic varieties of hemihydrates, the complex coagel—mesomorphous phases transition, and the crystallization curves of water.

INFLUENCE OF ADSORPTION OF SURFACE ACTIVE AGENTS ON THE ELECTRICAL PROPTERIES AND THE STABILITY OF KAOLIN SUSPENSIONS. I. Petkantschin and R. Brückner (Tech. Univ., Berlin). *Colloid Polym. Sci.* 254(6), 596–600 (1976). Aqueous suspensions of kaolinite form Zettlitz with additions of a surfactant (cetylpyridinium chloride—CPC) were investigated by the electrooptical method to determine the induced electrical moment (electrical polarizability). Furthermore the electrokinetic potential was determined from the electrophoretical velocity by the microphoretic method. The relaxation of the birefringence after switching off the electrical field and the intensity of the alternating component of the birefringence was used to obtain information on the stability of the suspensions. The electrical parameters of the particles change with increasing CPC concentration. The stability of the suspensions changes simultaneously. The lowest stability coincides with the smallest value of the polarizability, but no coincidence with the isoelectrical point.

A MICROCALORIMETRIC METHOD OF DETERMINATION OF CRITICAL MICELLAR CONCENTRATION AND ENTHALPY OF MICELLIZATION. S. Paredes, M. Tribout, J. Ferreira and J. Leonis (Univ. Bruxelles, Belgium). *Colloid Polym. Sci.* 254, 637–42 (1976). A method is proposed for the analysis of dilution heats of micellar systems. Simultaneous determination of critical micellar concentration and of micellization enthalpy can be derived from measurements performed at a single temperature. This method, when applied to ionic and nonionic detergents, supplies results in good agreement with those published for detergents in aqueous solutions at 25 C. Determination of these two parameters should be possible for any type of solvent; further measurements were extended to detergents in solutions 0.001, 0.01 and 0.1 M in NaCl.

NOVEL 2-(ALKYLSULFINYL)ETHYL SULFATES. V. Lamberti and W.F. Pease (Lever Bros. Co.). *U.S. 3,986,986.* A detergent composition comprises a surfactant compound having the structure $R—\overset{\overset{O}{|}}{S}—CH_2—CH_2OSO_3M$ and a water soluble organic or inorganic alkaline detergency builder salt. In the surfactant, R is a straight chain saturated alkyl having 10–20 carbon atoms, and M is an alkali metal or ammonium cation.

LIGHT DENSITY, LOW PHOSPHATE PUFFED BORAX-CONTAINING DETERGENT COMPOSITIONS. G.B. D'Souza (Canada Packers Ltd.). *U.S. 3,986,987.* The composition consists of 10–80% of a cold spray-mix agglomeration of puffed borax with a solid builder salt and 5–25% organic liquid surfactant. The phosphate content of the composition is less than 5% based on P_2O_5.

SULFOSUCCINATE DERIVATIVES AS DETERGENT BUILDERS. V. Lamberti (Lever Bros. Co.). *U.S. 3,987,043.* The derivatives consist of α-hydroxyalkylthio-β-sulfosuccinic acid and its alkali metal, ammonium, or substituted ammonium salts.

SULFOSUCCINATE DERIVATIVES AS DETERGENT BUILDERS. V. Lamberti (Lever Bros. Co.). *U.S. 3,984,408.* The derivatives consist of α-hydroxyalkoxy-β-sulfosuccinic acid and its alkali metal, ammonium, or substituted ammonium salts in which the hydroxyalkoxy group is derived from a group of polyhydric alcohols.

DETERGENT COMPOSITIONS. H.K. Krummel and T.W. Gault (Procter & Gamble). *U.S. 3,985,669.* A spray dried granular detergent composition capable of rapidly reducing the free polyvalent metal ion content of an aqueous solution comprises 5–92% of a water insoluble aluminosilicate ion exchange material, 5–92% of a water soluble organic surface active agent, and 0.5–3% of an alkali metal silicate. The aluminosilicate ion exchange material has a calcium ion exchange capacity of at least 200 mg eq $CaCO_3$/g and a calcium ion exchange rate, expressed as $CaCO_3$, of at least 2 grains/gallon/minute/gram.

COMPOSITIONS FOR SOURING AND SOFTENING LAUNDERED TEXTILE MATERIALS. J.D. Ciko and J.J. Cramer (BASF Corp.). *U.S. 3,984,335.* The composition comprises (a) 0.5–25% of a softening agent selected from the group consisting of quaternized fatty amides and amines, an aqueous emulsion of partially oxidized emulsifiable polyethylene, and fatty amphoteric compounds; (b) 7.5–75% of an acidic souring agent consisting of a water soluble organic carboxylic acid; and (c) 0–92% water.

LIQUID LAUNDRY DETERGENT AND SOFTENER. L. Graham (Morton-Norwich Products, Inc.). *U.S. 3,984,356.* The composition consists of 29% water, 31% disodium salt of 8-(4-hexyl-5-carboxycyclohex-2,3-en-1-yl) octanoic acid, 25%

linear primary C_{12}–C_{15} alcohol ethoxylate containing 9 ethylene oxide units per mole, and 15% diethanolamine.

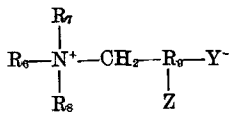
LIQUID DETERGENT COMPOSITIONS OF CONTROLLED VISCOSITIES. J.T. Inamorato and W. Chirash (Colgate-Palmolive Co.). *U.S. 3,985,687.* A liquid detergent comprises 10–40% of a nonionic synthetic organic detergent which is a polyethoxylated higher alkanol, 3–15% of a water soluble synthetic organic anionic detergent selected from polyethoxy higher alkanol sulfates and higher linear alkyl benzene sulfonates, 4–10% of a lower alkanol, 2–12% of a mixture of sodium chloride and sodium nitrate, and 13–81% water. Viscosity of the composition is 40–120 centipoises at 24 C.

DETERGENT COMPOSITIONS CONTAINING ENZYMES. C. Barrat (Procter & Gamble). *U.S. 3,985,686.* The composition consists of 0.001–5% of a proteolytic enzyme selected from the group of enzymes produced by bacillus alcalophilus NCIB8772 and bacterium strain NCIB10147, 20–80% of a cationic surfactant such as monoammonium di-long-alkyl di-short-alkyl and mono-long-alkyl tri-short alkyl salts, and 80–20% of an anionic surfactant.

ACTIVATED PEROXY BLEACH COMPOSITION. F.W. Gray (Colgate-Palmolive Co.). *U.S. 3,982,892.* The composition comprises a peroxy bleaching compound and a mixture of activators. One activator is selected from the group consisting of di-lower alkanoyl di-lower alkyl glyoxime, tetra-lower alkanoyl glycouril, and mixtures of these two. Another activator is selected from the group consisting of 2-(di(2-hydroxy-lower alkyl)amino)-4,6-dihalo-s-triazine, 2,4-di-lower alkoxy-6-halo-s-triazine, and mixtures of these two. The ratio of the first activator to the second is in the range of 1:5 to 5:1.

OIL REMOVAL DETERGENT COMPOSITIONS. J.H. Collins (Procter & Gamble). *U.S. 3,983,078.* A spray dried granular detergent contains (a) 20% of a sodium alkyl benzene sulfonate; (b) 5% of a mixture of an ethoxylated primary oxo alcohol and an ethoxylated secondary alcohol; (c) 33% sodium tripolyphosphate; (d) 2% sodium toluene sulfonate; (e) 0.6% sodium carboxymethyl cellulose; (f) 21.9% sodium sulfate; (g) 2.5% bentonite clay; (h) 5.4% sodium silicate having an SiO_2:Na_2O ratio of 2; and (i) the balance water.

DISHWASHING COMPOSITION. G.L. Spadini and E.M.A.A. Demesse-Maekers (Procter & Gamble). *U.S. 3,983,079.* A dishwashing composition especially adapted for washing and imparting shine to glassware, china, and articles with vitreous surfaces comprises (a) 1–5% of a water soluble quaternary ammonium compound; (b) 4–20% of a nonionic surface active polypropylene oxide-polyethylene oxide condensation product; and (c) 5–20% of a water soluble compound of the general formula:



R_6 is a radical selected from the group consisting of alkyl radicals having 12–16 carbon atoms. R_7 and R_8 are each radicals selected from the group consisting of methyl, ethyl, and hydroxyethyl. Y^- is $-SO_3$ and R_9—Z is a —CH(OH)—CH_2— radical.

ANIONIC SURFACE ACTIVE COMPOSITIONS. G. Vanlerberghe and H. Sebag (L'Oreal). *U.S. 3,983,171.* An anionic compound having surface active properties has the formula RX—$(AO)_m$—$(A'O)_n$—A"—X'—CHR'—COOH. R is alkyl or alkenyl having 8–22 carbon atoms; X is oxygen; X' is oxygen, sulfur, or sulfoxide; A is ethylene, propylene, or butylene; A' is $-C_2H_3(CH_2OH)$— or —CH_2—CHOH—CH_2—; A" is —CH_2CHOH—CH_2—, —$CH_2CH_2CH_2$—, or —$CH_2CH(CH_3)$—; *m* and *n* represent numbers having a statistical average value between 0 and 10 inclusive; and R' is hydrogen or lower alkyl having 1–2 carbon atoms. When *m* and *n* are both equal to zero, X' is sulfoxide.

BLEACHING AND DETERGENT COMPOSITIONS. L.T. Murray (Colgate-Palmolive Co.). *U.S. 3,982,891.* The compositions consist of a water soluble peroxygen bleaching compound and a water soluble imide having the formula R_1—COOR. R represents a C_1 to C_4 alkyl or phenyl, and R_1 represents an acyclic imide radical in which an imide nitrogen atom is bonded directly to the —COOR moiety. ●