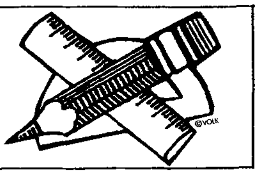
Abstracts



EDITOR: S. KORITALA • ABSTRACTORS: N.E. Bednarcyk, J.C. Harris, M.G. Kokatnur, F.A. Kummerow, B. Matijasevic, K.D. Mukherjee, D.B.S. Min, R.A. Reiners, and P.Y. Vigneron

• Oil Seed Proteins

CRUDE FIBER CONTENT IN DIFFERENT OILMEALS. SIGNIFICANCE OF THE OBTAINED RESULTS. M. Rinaudo and G. Chambat (Centre de Recherches sur les Macromolécules Végétales (CNRS), Grenoble). *Rev. Fr. Corps Gras* 23, 605–8 (1976). The crude fiber content is studied in different oilmeals: rapeseed, coconut, sunflower, and also in soybean teguments and flour. Results obtained by different methods in different laboratories are summarized in a table and are discussed. Results obtained by the methods of Weende and van Soest are always higher. Isolation of the lignin before the Weende test gives values closer to the true contents.

EFFECTS OF THE TECHNOLOGY ON THE NUTRITIONAL VALUE OF OILSEED PROTEINS. P. Besancon *Rev. Fr. Corps Gras* 24, 11–8 (1977). The use of oilseeds proteins needs technological processings: solubilization, purification, decolorisation, sterilisation, thermic treatments. These are able to reduce or to improve the nutritional value. The effects of alkaline treatments depend on pH, temperature and duration. They cause the destruction of a few essential aminoacids and the formation of unusual aminoacids which present inter or intramolecular bonds. These effects of moderate oxidative treatments, severe thermic treatments, condensation and polymerisation reactions are reviewed. Some thermic treatments are beneficial for some oilseeds proteins (soybean, cotton, . . .), because they destroy or inactivate antinutritional or toxic, thermolabile factors (protease inhibitors, hemagglutinins, antivitamins, goitrogens, gossypol, . . .).

NUTRITIONAL VALUE OF THE PROTEIN PRODUCTS CHOSEN AND PROPOSED AS SUBSTITUTES FOR MEAT PROTEIN. H. Kunachowicz et al. *Tluszcze jadalane* 19, 243–51 (1975). In the paper the nutritional value of proteins in milk, soybean, rapeseed, pea, and blood is presented comparatively with that of meat protein. Regarding soybean, the limiting amino acid value (methionine and cystine) varies between 42 and 50 and the EAA value between 67 and 75. The NPU coefficient represents about 63%. As for rapeseed, the proteins are poor in isoleucin (CS = 50), but relatively rich in sulfur amino acids (4.3 g/100 g of protein) and rich in tryptophane (1.6 g/100 g of protein). (Rev. Fr. Corps Gras)

USE OF OILSEED PROTEINS IN COOKED FOODS AND MEAT PRODUCTS. C. Gazan (Société GEO, 94270—Kremlin-Bicêtre). *Rev. Fr. Corps Gras* 23, 331–6 (1976). Oilseed proteins are generally used in two different forms: emulsion with water and fats for protein isolates; rehydration with water or an aromatized and colored liquid for the other products. The particular applications are reviewed: cooked foods, meat products, sauces, garnitures, pastry for pig meat, soups, dog and cat foods, meat analogues.

• Edible Proteins

AQUEOUS PURIFIED SOY PROTEIN AND BEVERAGE. K.C. Goodnight, Jr., G.H. Hartman, Jr. and R.F. Marquardt (Mead Johnson & Co.). *U.S. 3,995,071.* The process for preparing an aqueous purified soy protein solution comprises (a) preparing an aqueous extract of defatted soybean with water at neutral or alkaline pH containing 2.5–20% solids; (b) adjusting the pH to 10.1–14 with a water soluble base; (c) separating insoluble material from the extract to yield a clarified extract containing 1–12% protein, 1–10% carbohydrate, 0.3–3% ash, and 0–1% fat; (d) neutralizing the clarified extract to pH 6–10; and (e) separating carbohydrate and mineral constituents from the clarified extract by ultrafiltration employing a semipermeable membrane which has the capability to retain proteins. There results an aqueous soy protein solution as retentate containing 1–12% protein, a protein coefficient of at least 0.8, and less than 0.1% fat.

ULTRAFILTRATION PROCESS FOR OBTAINING PROTEIN ISOLATES OF VEGETABLE ORIGIN. J.-L.J. Maubois, J. Culioli, A. Chopin, and M.-C. Chopin (Inst. Nat. de la Recherche Agronomique). *U.S. 3,993,636.* A process for obtaining a purified and concentrated isolate of a vegetable source comprises (a) dissolving ground seeds, flour, or meal from sunflower or colza in an alkaline solution; (b) subjecting the solution to ultrafiltration with a semipermeable membrane having a pore diameter of 0.1–30 mμ at 2–30 C to form a retentate having 3–12% protein (N × 6.25); (c) adding to the retentate a volume of wash liquid while continuing the ultrafiltration such that the volume of the permeate is equal to the added volume (The concentration of protein will be 70–85% of the dry matter of the retentate.); (d) adjusting the temperature of the retentate to 20–60 C and continuing the ultrafiltration procedure; and (e) recovering the concentrated and purified retentate.

DEFLAVORING OLEAGINOUS SEED PROTEIN MATERIALS. R.V. Youngquist (Procter & Gamble). *U.S. 3,998,800.* The process comprises the steps of contacting defatted soybean protein material containing 0–16% moisture with a three component, single phase solvent comprising a mixture of 30–90 weight % of a nonpolar saturated hydrocarbon having 5–12 carbon atoms and a boiling point below 200 C, 10–69.9% of an alcohol having 1–12 carbon atoms, and 0.1–10% water at a temperature of 30 C to the boiling point of the solvent system; and desolventizing to obtain a proteinaceous soybean product of enhanced blandness.

DEVELOPMENT OF HIGH PROTEIN BREAD. PART II. MIXABILITY OF SOYA FLOUR WITH DIFFERENT WHEAT VARIETIES. S.K. Sahni, K. Krishnamurthy and G.K. Girish (Indian Grain Storage Inst., Hapur, UP, India) *J. Food Sci. Technol.* 13, 27–9 (1976). By using 1% sodium stearoyl-2-lactylate and the short straight dough method with 100 min fermentation time, 10% soya flour-fortified bread of acceptable quality can be prepared from 'Shera', 'Hira', 'Kalyan Sona' and 'Moti' wheat varieties.

DEVELOPMENT OF HIGH PROTEIN BREAD. PART I. GROUNDNUT FLOUR AND GROUNDNUT PROTEIN ISOLATE UTILIZATION. S.K. Sahni, K. Krishnamurthy and G.K. Girish (Indian Grain Storage Inst., Hapur, UP, India) *J. Food Sci. Technol.* 12, 283–9 (1975). Fortified wheat *(Sharbati sonara)* flour bread with 10% groundnut flour or 7% groundnut protein isolate can be prepared by straight dough method, using short fermentation time. Addition of 0.5–1% sodium stearoyl-2-lactylate increased the mixing tolerance, loaf volume, grain, texture and crumb colour. Addition of potassium bromate (40–60 ppm) improved the properties of groundnut flour-fortified bread but not of groundnut protein isolated-fortified bread.

INCORPORATION OF SUNFLOWER SEED MEAL IN BREAD. N.C. Jain, N.D. Shiralkar and B.Y. Rao (Lakshminarayan Inst. of Technol., Nagpur, India) *J. Food Sci. Technol.* 12, 133–4 (1975). Sunflour meal upto 15% could be incorporated without effecting the bread quality except color.

• Fats and Oils

NATURE OF THE THERMAL PRETRANSITION OF SYNTHETIC PHOSPHOLIPIDS: DIMYRISTOYL- AND DIPALMITOYLLECITHIN. M.J. Janiak, D.M. Small and G.G. Shipley (Biophys. Div., Dept. of Med., Boston Univ. Schl. of Med., Boston, Mass. 02118) *Biochemistry* 15, 4575–80 (1976). The hydrated synthetic lecithins, dimyristoyl- and dipalmitoyllecithins, undergo two thermal transitions, a broad low enthalpy "pretransition" prior to the sharp first-order "chain-melting" transition. Both phospholipids exhibit the same temperature-dependent structural changes associated with the thermal pretransition. At low temperatures, below the pretransition, a one-dimensional lamellar lattice is observed. At the chain-melting transition, the hydrocarbon chains of the phospholipid melt and assume a liquid-like conformation and the lattice reverts to one-dimensional lamellar. These structural changes observed for dimyristoyl- and dipalmitoyllecithins may be a common feature of all synthetic lecithins exhibiting a thermal pretransition. The appearance of the pretransition and accompanying two-dimensional lattice may arise from specific interactions between the choline moiety of the polar head group and the structured water matrix surrounding it.

A SPIN LABEL STUDY OF LIPID OXIDATION CATALYZED BY HEME PROTEINS. L.R. Brown and K. Wuthrich (Inst. fur Molekularbiol. und Biophys., Eidgenossische Tech. Hochschule, 8093 ETH-Honggerberg, Switzerland) *Biochim. Biophys. Acta* **464**, 356–69 (1977). Rapid loss of the electron spin resonance signal from a variety of spin labels is observed when ferricytochrome *c* or metmyogloblin are combined with lipids. Evidence is presented that this loss of signal can be used as a sensitive method to study lipid oxidation catalyzed by heme proteins. Under aerobic conditions and with lipids which bind the heme protein, the kinetics of the oxidation process as observed by the spin label method are identical to the kinetics previously observed by measurements of oxygen uptake. Under anaerobic conditions, reaction of cytochrome *c* with lipid oxidation products appears to produce a relatively long lived (hours) species located in the hydrophobic portion of the membrane, which is capable of subsequent reaction with lipid-soluble spin labels.

PHASE TRANSITIONS IN PHOSPHOLIPID MONOLAYERS AT THE AIR-WATER INTERFACE: A FLUORESCENCE STUDY. J. Teissié, J.F. Tocanne and A. Baudras (Centre de Res. de Biochem. et de Génétique Cellulaires du C.N.R.S., 118, Route de Narbonne, 31077 Toulouse Cedex, France) *FEBS Letters* **70**, 123–6 (1976). Transitions from liquid-crystal to gel phase of dipalmitoylphosphatidylcholine have been revealed by using the fluorescent probes DPE, DPH and AS. The phase-dependent fluorescence properties observed can be accounted for by environment modifications and/or reorientations of the probes and are discussed with regard to data already inferred from experiments on phospholipid dispersions in water.

FRACTIONATION OF METHYL D-TETRACOSANOATES BY GCMS. R.A. Stein (Lab. of Nuclear Med. and Radiation Biol., Univ. of Calif., Los Angeles, Calif. 90024) *Chem. Phys. Lipids* **17**, 22–7 (1976). 3,3-d_2-, 5,5-d_2- and 3,3,5,5-d_4-tetracosanoic acids were synthesized. 2-d-Tetracosanoic acid was made by reducing an ester of 2-bromotetracosanoic acid with lithium aluminium deuteride (LAD) and oxidizing the resulting 2-d-alcohol to the acid.

SOLUBILITY OF PHOSPHATIDYLCHOLINE IN CHLOROFORM. FORMATION OF HYDROGEN BONDING BETWEEN PHOSTHATIDYLCHOLINE AND CHLOROFORM. M. Okazaki, I. Hara and T. Fujiyama (Lab. of Chem., Dept. of General Education, Tokyo Med. and Dental Univ., Kohnodai, Ichikawashi, Japan) *Chem. Phys. Lipids* **17**, 28–37 (1976). The solubility of phosphatidylcholine (PC) was studied by the spectroscopic analysis and the measurement of the solubility. The qualitative analysis of infrared absorption spectra confirmed the existence of two types of hydrogen bondings between chloroform and PC, one between chloroform and the C = O group of PC and the other between chloroform and the phosphorylcholine group of PC. The quantitative analysis of the C-D stretching vibration bands of the chloroform-d solution of PC showed that the latter hydrogen bonding mainly contributes to the solubility and that PC dissolves in chloroform to form a complex consisting of a few or more molecules of chloroform and one molecule of PC. We discussed in this report about the molecular organization of PC in chloroform solution.

SPECIFIC HEAT AND MULTIPHASE STATES OF EGG LECITHIN-WATER SYSTEMS. A.R. Haly and J.W. Snaith (C.S.I.R.O., Div. of Textile Phys., 338 Blaxland Rd., N.S.W. 2112, Australia) *Chem. Phys. Lipids* **17**, 57–70 (1976). Specific heats of egg lecithin-water mixtures were measured throughout temperature ranges within the limits −20°C to 90°C. By this means, and with supporting evidence from X-ray diffraction, transitions from ordered chain forms to molten chain forms (liquid crystal) were studied. The observed transition temperature decreases with increase of water content, but the most prominent decreases are associated with the presence of different ordered structures at different water contents and not with a reduction in transition temperature of a given structure.

A NEW PROTECTIVE GROUP IN THE SYNTHESIS OF PHOSPHOLIPIDS. J.G. Molotkovsky, L.F. Nikulina and L.D. Bergelson (Shemyakin Inst. of Bioorganic Chem., USSR Aca. of Sci., Vavilova 32, Moscow, USSR) *Chem. Phys. Lipids* **17**, 108–10 (1976). Treatment of *p*-xylyl alcohol obtained by $LiAlH_4$ reduction of *p*-toluic acid methyl ester with phosphorus oxychloride gave tri-*p*-xylylprosphate (I), m.p. 64°C (crystallized from $CHCl_3$-petr. ether), which was monodebenzylated by treatment with sodium iodide in acetone to afford sodium di-*p*-xylylphosphate (II). The latter was transformed into the corresponding silver salt (III), m.p. 196–198°C (decomp.), by the action of silver nitrate in aqueous methanol. Condensation of III with 1-palmitoyl-2-oleoyl-*sn*-glycero-3-iodohydrin (IV) led in 78% yield to the phosphotriester (V) (gum), $[\alpha]_D$-1.9° (c 2.6; dioxane). Upon bubbling of dry hydrogen chloride through a chloroform solution of phosphate (V) for 5 h at 0°C, 1-palmitoyl-2-oleoyl-*sn*-glycero-3-(dihydrogen phosphate) (L-phosphatidic acid) (VI) was obtained in 72% yield. The diammonium salt of VI melted at 192–194°C (from $CHCl_3$-acetone), $[\alpha]_D + 4.5°$ (c 3.0; $CHCl_3$).

ALKYL DERIVATIVES FROM CASTOR OIL. PART II. PHENYLATED METHYL RICINOLEATE. H.N. Arsanious, Z. Sawiris (Chemistry Dept., Ministry of Industry, Cairo, Egypt) and F.G. Baddar (Chemistry Dept., Ain Shams Univ., Cairo, and Kuwait Univ., Kuwait) *J. Indian Chem. Soc.* **53**, 801–7 (1976). The reaction of methyl ricinoleate with benzene in the presence of anhydrous aluminium chloride was studied by column, thin-layer and gas chromatographic methods. The identification of the different components in the reaction mixture was accomplished by gas chromatography—mass spectrometry. Evidence for the presence of diphenyl saturated esters, in addition to unsaturated esters, was obtained. From the mass spectra, the location of branching in the fatty acid chain was studied. Phenylation gave position isomers with substitutions at carbon 5 to carbon 17 in the fatty acid chain.

ARYL DERIVATIVES FROM CASTOR OIL. PART I. METHYL ARYLUNDECANOATE AND PHENYLUNDECANOL. H.N. Arsanious, Z. Sawiris (Chemistry Dept., Ministry of Industry, Cairo, Egypt) and F.G. Baddar (Chemistry Dept., Ain Shams Univ., Cairo, and Kuwait Univ., Kuwait) *J. Indian Chem. Soc.* **53**, 797–800 (1976). Methyl undecanoate was condensed with benzene, toluene, *m*-xylene, anisole and chlorobenzene, and undecenyl alcohol with benzene using anhydrous aluminium chloride. The products were oxidized by chromic acid in glacial acetic acid. The resulting alkyl aryl ketones were analysed by GLC. Six isomers were found with aryl group on carbon 5 to carbon 10 of the paraffinic chain. 5- and 6-phenyl isomers, which were not separable by capillary GLC, were separated as ketones and estimated. Temperature programmed GLC was carried out using an 8′ stainless steel column containing 25% silicone grease on celite 60–100 mesh. Higher percentage of 5-phenyl isomer was obtained with methyl undecenyl alcohol (19%) than with methyl undecenoate (2.4%).

REFINING OF NAGESWAR SEED OIL AND DETOXIFICATION OF OIL-CAKE. J.C. Gupta (H.B. Technol. Inst., Kanpur 2, India) *Oils Oilseeds J.* **29**(1), 35–7 (1976). *Mesua ferrea* (Nageswar, Nahor, Nagkesar, iron weed) seeds contain 27–30% hard shell and kernels contain *Ca.* 70% oil. The oil has 9.5% of free fatty acids, unpleasant odor and color of 50 units (Y + 5R in ¼″ cell of Lovibond) as it contains 1% of a dye (mesuol). Normal aqueous alkali refining did not reduce the color but gave 31–65% refining losses. Treatment of hexane miscella with aqeous solns. or soda ash, caustic soda, sodium silicate, borax or H_2O_2 reduced the refining losses but not color. Alumina column chromatography gave a colorless and odorless oil but in 50% yield only. Extraction of ground meats with 3 vols. of acetone containing 25–30% water removed free fatty acids, colour and odor. There was some loss of neutral oil in aqeous acetone extract, which could be worked up separately for fatty acid manufacture. Hexane extraction after drying of aqeous acetone extracted mare gave an oil having 2.8% free fatty acids and color of 9 units (Y + 5R in ¼″ cell of Lovibond).

CIS-HYDROXYLATION OF OLEFINIC COMPOUNDS WITH SILVER SUCCINATE AND IODINE. K.K. Mathew and P.S. Raman (Maharaja's College, Ernakulam, Cochin 11, India) *Curr. Sci.* **46** 104–5 (1977). *Cis-* and *trans*-octadec-9-enoic and docos-13-enoic acids were hydroxylated by refluxing in dry benzene with silver succinate (0.011 mole) and iodine (0.01 mole). The mixture was filtered, and benzene removed from the filtrate. The residue was refluxed with alc. KOH. The dihydroxy acid was recovered and purified by crystallization. The yields were 65–82%. The melting points were determined. *cis*-Addition of hydroxyl groups occurred, unlike *trans* addition with silver benzoate reported earlier.

STUDIES IN POLAR LIPIDS OF SOYABEANS. H.G.M. Daga (N.H. College, Brarnhapuri, India) *Paintindia* 26(10), 25–7 (1976). Oil was removed from yellow and black soybeans by hexane extraction. Bound lipids were then extracted with chloroform: methanol (2:1) and fractionated on a silica gel column. Total bound lipids and the fractions were examined by thin-layer chromatography. Fatty acid composition of the most polar fraction was compared with that of oil; linolenic acid was present in the latter but not in the former.

CHANGES IN OIL AND FATTY ACID COMPOSITION OF LINES (LINUM USITATISIMUM L.) UNDER VARYING PHOTOPERIODS. R.K. Sriram and G. C. Srivastava (Div. Plant Physiology, Indian Agric. Res. Inst., New Delhi 110012, India) *Curr. Sci.* 46, 115 (1977). Linseed (var. SH-1) plants were grown under three photoperiod conditions, 8 hr, normal day and 24 hr. Long photoperiodic treatment hastened flower bud emergence whereas short period delayed it. Seed wt. per plant was maximum under the normal period. Oil content and degree of unsaturation were practically the same for normal and long periods but low for short period. Oleic and linoleic acids increased and linolenic acid decreased under the short photoperiod.

A PROCESS FOR PURIFICATION OF RICE BRAN OIL. Indian patent 137,128 (1975) (Hindustan Lever Limited, Bombay). Rice bran oil is treated with a mineral acid under anhydrous conditions and the treated oil bleached with a mixture of ClO_2/Cl_2 gas.

A SIMPLE METHYLENE BLUE REDUCTION TEST TO DISTINGUISH COTTON-TRACT BUFFALO GHEE FROM NORMAL GHEE. O.P. Singhal, N.C. Ganguli (National Dairy Res. Inst., Karnal, India) and Noshir N. Dastur (Southern Regional Station, National Dairy Res. Inst., Bangalore, India) *J. Food Sci. Technol.* 13(5), 255–8 (1976). A simple and quick test is described for differentiating cotton-tract buffalo ghee from normal ghee as well as body fats of buffalo, goat, pig and sheep. Methylene blue is instantaneously decolorized by cotton-tract buffalo ghee, whereas normal buffalo or cow ghee or body fats showed no such decolorizing effect. The fat sample (5 ml) is gently mixed with 0.1 ml of dye solution (1% in chloroform:methanol, 1:1). The component responsible for such reduction was tentatively identified as the cyclopropene fatty acids present in cotton-tract ghee on the basis of the Halphen test and spectral analysis.

USE OF THE GAS-LIQUID CHROMATOGRAPHY FOR THE DETERMINATION OF WATER AND GLYCEROL IN THE TOILET SOAPS. A Monseigny et al. (Lesieur-Cotelle et Associés, 59210 Coudekerque-Branche). *Rev. Fr. Corps Gras* 23, 599–604 (1976). Classical methods for determining water and glycerol in the toilet soaps are deficient in presence of additives. Gas-liquid chromatography is used for these determinations with a good precision. This method is suitable for application on soap lyes.

THERMAL DEGRADATION OF β-CAROTENE IN PALM OIL. STUDY OF VOLATILE PRODUCTS. H. Hinnekens et al. (Oléofina, Bruxelles, Belgium). *Rev. Fr. Corps Gras* 23, 609–16 (1976). Thermal degradation of β-carotene in palm oil has been studied. A few volatile products of the unsaponifiable matter have been identified. Toluene, m-xylene, ionene, and some cyclohexenyl components have been detected, but no 2,6-dimethylnaphtalene. Reactions of degradation of β-carotene are given. The thermal degradation of β-carotene in palm oil is not the same as the degradation that occurs in a solution of organic solvents or by the heating of pure β-carotene.

A SOLUTION OF THE ENVIRONMENT PROBLEM IN THE INDUSTRY OF THE FATTY ACIDS. H.J. Heinz (Henkel, Düsseldorf, West Germany). *Rev. Fr. Corps Gras* 23, 657–63 (1976). Suppression of odors from the manufacture of fatty acids, especially from tallow and fish oils preoccupies greatly the industry and the residential population near the factories. An experiment in a full scale plant during the last years is discussed; the origin of odors, their chemical identities, the methods of their removal are reviewed: bacterial filter, ozonation, absorption, direct and catalytic combustion. The efficiency and the cost of these processes are discussed.

THERMAL DESULFONATION OF SULFATED AND SULFONATED OILS. J. Pore and C Chasseboeuf (Société des Produits Houghton, Puteaux 92). *Rev. Fr. Corps Gras* 23, 665–9 (1976). The sulfated or sulfonated oils used in the manufacture of leathers, textiles, papers and so on, increase their hydrophillic properties which are undesirable. The condition and the kinetics of the loss of SO_3 combined to sulfonated and sulfated glycerides and cerids by effect of heat, from 100 to 140 C, are studied. These thermal effects are applied to various carriers.

COMPOSITION OF BULGARIAN MINK OIL. D. Chobaniv et al. (Organic Chemistry Institute, Bulgarian Sciences Academy, 113, Sofia 13, Bulgaria). *Rev. Fr. Corps Gras* 23, 671–3 (1976). The characteristics and the fatty acid composition of two samples of Bulgarian mink oil are given. They correspond to those reported for other mink oils. The quantities of the triglyceride groups were determined by argentation thin-layer chromatography, and six triglyceride groups were found. After this study, the authors concluded that refining of this oil is not necessary. Regarding the composition and the high biological activity, Bulgarian mink oil is a high quality oil for cosmetic and pharmaceutic industries.

GC-MS ANALYSIS OF FATTY ACIDS FROM FLUE-CURED TOBACCO. J.J. Ellington, P.G. Fisher, H.C. Higman and A.I. Scheparaz, (Tobacco Laboratory, Agricultural Research Service, United States Department of Agricuture, P.O. Box 5677, Athens, Georgia 30604). *J. Chromatogr. Sci.* 14, 570 (1976). Fatty acids obtained by saponification of a hexane-soluble fraction of flue-cured tobacco were converted to their methyl esters. The esters were purified by TLC and identified by GC-MS. Qualitative and quantitative results are reported for acids of chain lengths C_{12}–C_{34}. The results of this investigation were two-fold. They represented the first direct GC-MS analysis of tobacco fatty acids over the complete chain length range from C_{12}–C_{34}. Also, the identification of fatty acids, in general, was extended from the previously reported C_{24}–C_{34}.

INFRARED STUDIES OF ADSORPTION AT LIQUID/SOLID INTERFACE. K. Marshall and G.H. Rochester. *Far. Disc.* 1975(59), 117–26. The adsorption of cyclohexanone, propan-1-ol, decan-1-ol and linolenic acid from carbon tetrachloride soln. on to the surface of silica has been studied by IR spectroscopy. Cyclohexanone and the two alcohols absorb via hydrogen-bonding interactions between surface silanol groups and the adsorbate molecules. For linoleic acid and primary adsorptive interaction involves hydrogen bonding between surface silanol groups and the polar carboxylic acid groups. Evidence that the alkene bonds within the alkyl chain of linoleic acid undergo cis to trans isomerisation when adsorption occurs suggests that, at low coverages, the acid molecules are oriented such that the alkene groups are close to the oxide surface. Adsorption of acid dimers also probably occurs. (World Surface Coatings Abs. No. 412)

IN SITU EPOXIDATION OF LINSEED OIL IN PRESENCE OF ION-EXCHANGE RESINS. B.M. Badran, F.M. El-Mehelmg and N.A. Ghanem. *J. Oil Colour Chem. Assoc.* 59, 291–4 (1976). Linseed oil has been epoxidised in situ with hydrogen peroxide and acetic acid in the presence of ion-exchange resins as catalysts. Alkali-refined oil was used. The parameters studied were time, temp, the amount of catalyst, and the hydrogen peroxide and acetic acid concns. (World Surface Coatings Abs. No. 414)

LIQUID CRYSTALS IN SYSTEMS OF ROSIN AND FATTY ACIDS: IMPLICATIONS FOR TALL OIL RECOVERY. K. Roberts, R. Osterlund and C. Axberg. *Tappi* 59, 156–9 (1976). Phase diagrams for tall oil and water in presence of sodium hydroxide have been determined at 60 C. and two liquid crystalline phases demonstrated. The results are of significance in tall oil recovery. (World Surface Coatings Abs. No. 414)

MODIFIED VEGETABLE OILS. B.M. Rudenko, V.P. Georgievskii, S.I. Kostenko, & N.S. Arsenova. *Lakokras Mat.* 1976(2), 18–9. The mechanism of the modification reactions was investigated by studying the reaction of cyclopentadiene and methyl linoleate. The nature of the reaction products was elucidated by thin-layer chromatography and UV spectroscopy. (World Surface Coatings Abs. No. 412)

METHOD OF POLYMERIZING CHLOROPRENE USING CONJUGATED LONG CHAIN FATTY ACIDS AS EMULSIFIERS. M.S. Edmondson (Petro-Tex Chemical Corp.). *U.S. 4,007,145.* An emulsifier useful in the process of aqueous emulsion polymerization of chloroprene comprises a conjugated fatty acid having 10–30 carbon atoms and selected from 9,11-octadecadienoic acid; 9,11,13-octadecatrienoic acid; or 9,11,13,15-octadecatetraenoic acid.

PROCESS FOR MANUFACTURING A FATTY CONCENTRATE. M.I. Goryaev, A.D. Ulyanova, R.G. Maier, and V.N. Nikolaevich. *U.S. 4,007,284.* The process comprises heating an animal and/or vegetable fat to 20–40 C, emulsifying the fat in a medium containing an adsorbent, and drying the resulting emulsion. The adsorbent is selected from the group consisting of protein such as whole animal blood, defibrinated animal blood, and meat broth and carbohydrate such as meal. It forms a protective coating on the particles of fat being emulsified.

SOLVENT EXTRACTION OF OIL FROM OILSEEDS. B.C. Steele, D.R. Barr, C.T. Hunt, and J.L. Ayres (Gold Kist, Inc.). *U.S. 4,008,210.* A method for the direct solvent extraction of oil from peanuts to produce a low fat proteinaceous material comprises wet conditioning peanuts at 160–240 F to a moisture content of 6–12%, flaking the peanuts, drying them to 1.9–6% moisture, and treating them with a solvent selected from alcohols, ketones, hydrocarbons, and halogenated hydrocarbons to remove the oil.

PREPARATION OF CONFECTIONERS' FAT. C.M. Gooding (CPC International Inc.). *U.S. 4,006,264.* A process for preparing a liquid fraction confectioners' fat comprises randomizing by interesterification a mixture of hydrogenated lauric fat and hydrogenated nonlauric fat containing at least 30% palmitic acid; crystallizing the randomized mixture at 90–110 F; and recovering the liquid fraction. In the liquid fraction, the stearic acid content is reduced by 7.7–24% and the lauric acid content is increased by 4.9–10.3% over the starting mixture.

SOYA STEROLS: FUNCTIONAL PLANT-DERIVED INGREDIENTS FOR TOILETRIES. PART II. L. Lundmark, H. Chun and A. Melby (General Mills Chemicals, Inc.). Soap, Cosmet. Chem. Spec. **53**(1), 33–6, 66 (1977). In cosmetic and toiletry formulations, soya sterol and PEG soya sterols show promise in emulsions where they serve as primary and auxiliary emulsifiers, appearance and consistency modifiers, viscosity control agents, emollients, and microemulsifiers. The more hydrophilic ethoxylates can function as deflocculating agents in pigment dispersions and may also be used as solubilizers. The more hydrophobic ethoxylates (e.g., PEG 5 and PEG 10 soya sterol) may function as shampoo conditioning additives. A number of formulations are given in this article to illustrate the utilization of soya sterols as ingredients in personal care products. Tests have shown that PEG soya sterols are not toxic orally and not irritating to the skin and to the eye.

INDUSTTIAL FRACTIONATION OF FATS BY CONTROLLED CRYSTALLIZATION, TIRTIAUX PROCESS. F. Tirtiaux. *Oléagineux* **31**, 279–85 (1976). The principle of directed crystallization is the basis of edible oils and fats fractionation without solvent or detergent. The Tirtiaux process, described here, is based on the growth, in edible oils and fats, of crystals of a certain type followed by their separation on a patented continuous filter using a steel perforated belt. Tirtiaux fractionation process has large industrial applications in the fields of palm oil, beef tallow, butter oil, hydrogenated fish and soybean oils.

H. L. S. PROCESS FOR THE FULL CONVERSION OF PALM OIL INTO LIQUID OIL. L. Koslowsky (I.C.S.-H.L.S. Ltd., Industrial Engineering Cy, Petah-Tikva, Israel). *Oléagineux* **31**, 443–6 (1976). The existing physical or chemical fractionation techniques of palm oil produce large quantities of solid fats which the market cannot absorb completely, while the liquid fractions obtained do not fulfill the principal requirement for salad oil, namely, good stability at a relatively low temperature. The full conversion of palm oil into unsaturated liquid oil is realized by the creation of double bonds in the chain of palmitic acid isolated from the oil as alkylester, and the reintroduction of the palmitoleic acid formed in the oil by the reaction of transesterification. The liquid oil product obtained has a good stability at 8C and an iodine value of about 80.

POSSIBILITIES OF IMPROVING THE FATTY ACID COMPOSITION OF PALM OIL. RESULTS AND PROSPECTS. J.M. Noiret and W. Wuidart (I.R.H.O., Paris). *Oléagineux* **31**, 465–74 (1976). The study of the variability of the fatty acid composition within origins and hybrids shows that it is possible to obtain an improvement of the unsaturated fatty acid content rapidly. The correlations between fatty acids, the relationships between fatty acids and the oil yield components, and the estimation of the heritability of the different fatty acids provide the bases for a selection program for seed production and long-term improvement. The I.R.H.O. is already in a position in 1976 to supply a limited quantity of planting material producing oil with a mean unsaturated fatty acid content of 54–56%.

APPLICATION OF HIGH PERFORMANCE LIQUID CHROMATOGRAPHY TO THE QUANTITATIVE ANALYSIS OF AFLATOXINS AND MYCOTOXINS IN PRESS-CAKES AND BY-PRODUCTS. M. Blanc et al. (Labs. Wolff, 198, rue Sigmund Freud, 75019 Paris). *Oléagineux* **31**, 495–9 (1976). High performance liquid chromatography on silica microparticles gives a good resolution of the aflatoxins in the order B_1, B_2, G_1, G_2. It was possible to work out a simple, rapid method of analyzing aflatoxins in the press-cake, operating directly on the chloroform extract without prior purification. This method enables a sensitivity of 1 ng to be achieved, with very good repeatability. The analysis of aflatoxins by high performance liquid chromatography and spectrophotometric detection in the ultraviolet range seems to be more sensitive and accurate than the current methods using thin-layer chromatography. This method can also be applied to the analysis of other mycotoxins (ochratoxin, zearalenone, patulin).

• Drying Oils and Paints

STUDIES ON CHEMICAL MODIFICATION OF OILS FOR SURFACE COATINGS. V. Chand, M.S. Saxena and A.K. Vasishtha (Dept. of Oils & Paints Technol., H.B. Technol. Inst., Kanpur 208002, India) *Paintindia* **26**(11), 11–5 (1976). Niger and linseed oils and mixtures of these with tung, dehydrated castor oil and stand oil were copolymerised with styrene with or without catalyst. Copolymerised oils gave better paint films with respect to drying time, resistance to water, acid and alkali and yellowing than did the uncopolymerised oils.

DIRECTED INTERESTERIFICATION AND SOLVENT FRACTIONATION OF ORANGE SEED OIL. S.K. Srinivasan and B.B. Gogte (Laxminarayan Inst. of Technol., Nagpur Univ., Nagpur, India) *Paintindia* **26**(12), 19–22 (1976). Orange seed oil (I. No. 102) was stirred for 10 min with 10 vols. of a mixture of hexane: acetone (3:97) in the presence of 0.6% sodium methoxide and kept at 0 C for 24 hr. The soluble (yield ca. 50%) and insoluble fractions had I. V. 136 and 69 respectively. The soluble fraction gave bodying properties similar to linseed oil and can be used in non-yellowing coatings. The insoluble fraction can be used in soap making. The effect of variations in solvent to oil ratios and catalyst concentration on yield and I. no. of the fractions was studied before arriving at the optimum conditions. Without catalyst, the yield of soluble fraction was higher (76%) but the I. no. was lower (114).

ANALYSIS AND MEASUREMENT OF FOAMING PHENOMENA IN WATER-BASED COATINGS SYSTEMS. P.D. Berger and J.A. Gast (Witco Chem. Corp., Houston, Tex. 77045). *J. Coatings Technol.* **48**(621), 55–9 (1976). Studies were conducted to establish scientific principles for the analysis of foaming phenomena in trade sales and industrial coatings. The fundamental thermodynamics that produce foam were considered. Five factors were found to stabilize foaming phenomena in water-based coatings. They were surface potential, surface transport, surface state, surface viscosity, and bulk viscosity. Theoretical formulas were established and measurement technics were devised to evaluate these conditions and to develop defoamers that could counteract foaming phenomena. These principles make it possible for defoamer specialists to develop effective control agents without a knowledge of the exact product formulation under study. This information can be extended to coating technologists so they may minimize foaming tendencies in their formulations by choosing surface active ingredients wisely.

AQUEOUS COATING COMPOSITION. A. Tetsuo, W. Tadashi, N. Yasuharau, Y. Yoshio, and T. Isao (Kansai Paint Co.). *U.S 3,988,273.* The composition comprises an aqueous medium and a binder resin dispersed therein as neutralized with a base. The binder resin is a copolymer of (a) a monomer prepared by reacting a glycidyl ester of acrylic acid and methacrylic acid with a fatty acid of a drying oil and/or a semi-drying oil; (b) an α,β-ethylenically unsaturated acid; and (c) an unsaturated monomer containing no carboxyl group and having a Q value of at least 0.1.

INEDIBLE OILS USED IN SURFACE COATING. S.B. Dabhade, P.K. Matai and G.C. Patil. *Paintindia* **25**(10), 18–20 (1975). The properties were examined of white interior paints having, as vehicle, resins prepared from epoxidised rubberseed oil, neem, castor, linseed and chaulmoogra oils. It is stated that the incorporation at 20% of these resins with 80% boiled linseed oil gave paints of improved properties. (World Surface Coatings Abs. No. 410).

TALL OIL: CHEMICALS FROM A NATURAL, RENEWABLE SOURCE. B.F. Ward, Jr. *Appl. Polym. Symposia* **1975**, No. 28, 329–34. The utilisation of tall oil products is discussed. Two rapidly growing areas are for conversion to polybasic acids, viz. 36 C acids as intermediates for polyamides, polyesters and ester plasticisers, and 21 C acids obtained by condensing tall oil fatty acids with acrylic acid for similar uses, and also as surfactants. (World Surface Coatings Abs. No. 410)

CONDENSATION REACTIONS OF DRYING AND SEMI-DRYING OILS WITH CINNAMIC ACID, ETHYL CINNAMATE AND VINYL ACETATE. S.N. Behere and B.B. Gogte. *Paintindia* 25(10), 11–7 (1975). The reactions of unsatd. fatty materials, e.g. linseed oil or safflower oil, with enoic compounds, e.g. ethyl cinnamate, cinnamic acid and vinyl acetate, were studied under different conditions of temp. and pressure, using iodine value as a measure of the progress of the reaction. It was shown that the fatty acid chain undergoes modification only when heated above 200–250 deg. C. and that a reaction occurs only where some degree of conjugation is present in the fatty acid chain. (World Surface Coatings Abs. No. 410)

STUDY ON DIHYDRIC ALCOHOL CONTAINING ETHER LINKAGE. IV. TRIESTERS AS PLASTICIZERS FOR POLYVINYL CHLORIDE. K. Kawada and S. Watanabe (Dept. of Chemistry, Faculty of Hygienic Sciences, Kitasato University, Sagamiharashi), *Yukagaku* 25(7), 414–8 (1976). Triesters containing two ether linkages were prepared by the acylation of dihydric alcohol, which were synthesized by the reaction of diethylene glycol with epichlorohydrin. Also, diesters were synthesized by the reaction of dichloride obtained from ethylene chlorohydrin and epichlorohydrin with some fatty acid salts, and they were acetylated to yield triesters. These triesters were evaluated as plasticizers for polyvinyl chloride by comparison with dioctyl phthalate (DOP) in the same manner as the previous paper. They were superior to DOP in low temperaure flexibility, but inferior in compatibility.

CORROSION TEST OF DERIVATIVES OF AROMATIC CARBOXYLIC ACIDS AND DIBASIC ACIDS. K. Suga and S. Watanabe (Dept. of Applied Chemistry, Faculty of Engineering, Chiba University, Chiba), *Yukagaku* 25, No. 7, 429–431, 1976. Various alkyl benzoic acids and half esters of dibasic acids were prepared. Corrosion test for cutting fluids characterization of these compounds were examined. Triethanol amine salts of mono oleil phthalate and acids alkyl (methyl, butyl, pentyl, hexyl and octyl) benzoic acids have excellent properties.

ADDITION REACTION OF LINOLEIC ACID AND ACRYLIC ACID IN THE PRESENCE OF 1, 1-DITHIO-DI-2-NAPHTOL. M. Ishigami and Y. Inoue (Harima Chemicals, Inc. Kakogawa), *Yukagaku* **25**, No. 7, 432–434, 1976. Addition reaction of linoleic acid and acrylic acid was studied in the presence of 1,1′-dithiodi-2-naphtol (DTDN). Equimolecular acrylic acid was added dropwise to linoleic acid in the presence of 1 wt% DTDN for 4 hr at 250° C. Adduct of linoleic acid and acrylic acid was obtained in 72.6% yield. The adduct was isolated and identified by NMR and mass spectroscopy.

THE POLLUTION OF NATURAL WATERS BY SYNTHETIC DETERGENTS. X. BIODEGRADATION OF NON-IONIC SURFACE AGENTS IN RIVER WATER. J.R. Cruz and M.C.D. Garcia (Instituto de la Grasa y sus Derivados, Sevilla) *Grasas Aceites (Seville) 27*, 323–7 (1976). The present paper is concerned with the reproducibility of the river test method for non-ionic surfact agents, necessary to assess the significance of differences in biodegradation by this test. This technique was also studied in different points of one river, in the same river point at different times and in geographically different rivers.

DIBASIC ACIDS CONTAINING ETHER LINKAGES. VI. DETERGENCY BUILDING ACTION. IV. COMPARISON WITH TRIBASIC AND TETRABASIC ACIDS CONTAINING ETHER LINKAGES. Y. Abe, S. Matsumura, T. Miura and A. Mochizuki (Faculty of Engineering, Keio University, Yokohama-shi), *Yukagaku* 25(9), 541–5 (1976). Several new polycarboxylic acids containing ether linkages were prepared and their building performances were compared with those of disodium oxadiacetate, disodium tartronate, disodium aminomethyltartronate, disodium (methylamino)methyltartronate and sodium tripolyphosphate (STPP) using alkylbenzene sulfonate (LAS). The detergency tests were carried out on naturally soiled cotton fabrics and the detergency powers were evaluated by Scheffe's method. The results indicate that trisodium salt of 1,1,1-tris (carboxymethoxymethyl) ethane shows a building performance slightly superior to that of STPP, but the corresponding tripropionate does not show the good building power. In the case of the tribasic acids, triacetic acids are much more active than tripropionic acids. And the washing efficiency of tetrapropionic acid is about the same as that of tripropionic acids. It seems that their weak building powers are dependent upon their relatively weak abilities to catch calcium ions.

SURFACTANTS DERIVED FROM AMINO ACIDS. IV. ACYLATION OF AMINO ACIDS BY LONG CHAIN FATTY ACID SULFONIC ACID MIXED ANHYDRIDE. R. Yoshida and T. Shishido (The Central Research Laboratories, Ajinomoto Co., Inc., Kawasaki-shi), *Yukagaku* 25(9), 546–8 (1976). Long chain N-acyl amino acids have good surface activities and the application of these surfactants have been expanded. Long chain N-acyl amino acids were usually prepared by the Schotten-Baumann method but this method was not suitable enough for an industrial detergent production. This paper discussed the acylation of amino acids by long chain fatty acid-sulfonic acid mixed anhydride (FSA). FSA obtained from long chain fatty acid and sulfur trioxide was unstable and the acylation of amino acids by this FSA resulted in low yields. However, the triethylamine salt of long chain fatty acid-sulfonic acid mixed anhydride (FSAT) obtained by the reaction of long chain fatty acid with sulfur trioxide in the presence of triethylamine was more stable than FSA, and the FSAT was a good acylation reagent. The structure of FSAT was also investigated.

DISPROPORTIONATION REACTION OF ROSIN AND TALL OIL WITH METAL IODIDES. M. Ishigami, K. Yamane, Y. Inoue, Y. Ohshiro and T. Agawa (Harima Kasei Kogyo Co., Ltd, Kakogawa), *Yukagaku* 25(8), 463–9 (1976). The disproportionation reaction of rosin and tall oil with various kinds of metal iodides has been studied and iron (II) iodide was found to be an effective catalyst for the reaction. Compared with the reaction using iodine as the catalyst, the reaction rate of abietic acid was higher, other reactions than disproportionation were depressed, and dehydroabietic acid was obtained in a higher yield. The products obtained showed higher softening points.

BIODEGRADATION OF NONIONIC SURFACTANTS BY BACTERIA ISOLATED FROM SOIL. H. Tanaka and K. Konishi (Industrial Research Laboratories, Kao Soap Co, Ltd., Wakayama), *Yukagaku* 25(8), 470–5 (1976). Polyoxyethylene (POE) alkylether-assimilating bacteria were isolated from soils by enrichment culture technique. Four isolated strains were all identified as genus PSEUDOMONAS and their substrate specificities for some compounds related to nonionics were discussed. Moreover, assimilating ability of other species of standard genus PSEUDOMONAS were also studied. The biodegradability of nonionic surfactants by these isolated and standard strains decreased in the following order, POE acyl ester, POE sorbitan fatty acid ester, POE alkyl ether and POE alkyl phenyl ether. Ester-type nonionics were first hydrolyzed at ester linkage in a relatively short time and fatty acid parts were gradually degraded. Polyether parts, however, were found to be hardly degraded within several days.

URETHANE COATINGS FROM GLYCERINATED RICE BRAN OIL AND COFFEE MEAL OIL. I.S. Gupta, Manjit Singh, Paramjit Singh and Kulwant Singh (Dept. of Chem. Engg. & Technology, Punjab Univ., Chandigarh, India). *Res. Ind.* 20, 63–5 (1975). The possibility of utilizing rice bran oil and coffee meal oil for the formation of urethane coatings by reacting 2,4-toluene diisocyanate with their glycerinated products containing mono- and diglycerides, under different conditions, has been investigated. On the basis of a study of their characteristics, it is inferred that they can be used to partially substitute the more costly soyabean and linseed oil.

CHLORINATED CASHEWNUT SHELL LIQUID FOR PLYWOODS. C.P. Dhamaney *Paintindia* 26, 18 (1976). Cashewnut shell liquid was chlorinated at room temp, till it absorbed Cl_2 to the extent of 17.5% by wt. Chlorinated oil (100 parts) was refluxed with 100 ml formalin (40%) for 3 hr at 60–70 C in the presence of 2.5 ml of liquor ammonia. Reaction product was dissolved in trichloroethylene and used as adhesive for bonding wood to wood.

CHLORINATED RUBBER—ITS PRODUCTION AND UTILIZATION. R.C. Grover (Shri Ram Inst. for Industrial Res., Delhi, India) *Paintindia* 26(3), 9–12 (1976). History, mechanism of halogenation, preparative method and properties of chlorinated rubber are described. Applications of chlorinated rubber in various types of paints, electrical wires, textiles, printing ink are discussed.

MODIFIED EPOXY ESTERS. S. Chandra and M. Karamchandani (H.B. Technol. Inst., Kanpur 2, India) *Paintindia* 26(8), 15-19 (1976). Epoxy esters were modified with styrene and rosin and the film properties of the modified epoxy esters studied. Styrenated epoxy esters showed increased chemical resistance and the scratch hardness. The extent of styrene used to get the maximum scratch hardness was about 30% on the weight of epoxy resin. Rosin-modified epoxy esters were inferior to pure epoxy esters in water and alkali resistance and scratch hardness.

MODEL EXPERIMENTS ON CURING WATER-THINNABLE POLYESTER MELAMINE STOVING ENAMELS. J. Dorfel and U. Biethan (Chem. Werke Hüls AG., Marl). *Farbe + Lack* 82(11), 1017-25 (1976). Water-soluble vehicles currently in use consist mainly in COOH-ending resins in the form of their amine salts in combination with water-soluble or water-dispersible aminoplasts. Reported is the curing behavior of such OH- and COOH-ending model polyesters and hexakis(methoxy methyl) melamine (HMM). In acid-catalyzed vehicles applied from organic and aqueous (polyester amine salt) solutions the reaction rates of polyester OH- and COOH-end groups and of *methoxy methyl* groups of *HMM* were determined by *IR* spectrometrical means and related to the measured film properties. The differences between the mechanical film properties of one and the same vehicle from xylolic solution or from water after neutralization are caused by different network structures resulting from the blocking of the p-toluolsulfonic acid catalyst by the amine in the aqueous system.

ACRYLIC RESINS CONTAINING CARBOXYLIC GROUPS FOR STOVING LACQUERS WITH REDUCED SOLVENT CONTENT. H. Sander and R. Kroker (BASF AG, Ludwigshafen). *Farbe + Lack* 82(12), 1105-11 (1976). Acidic acrylic resins may be processed in combination with epoxy resins to give stoving lacquers with reduced solvent content and with good mechanical properties and chemical and corrosion resistance. The viscosity of the solutions caused by hydrogen bonding may be influenced by the polarity of the solvent. By using suitable solvents a good processability of the lacquer on vertical surfaces is reached. With catalysts the stoving temperature may be reduced to 95 C which, however, influences also the storage stability. Properties and uses of the lacquers are described.

LINSEED OIL-METAL ACETYLACETONATE SYSTEMS. III. INFRARED SPECTROSCOPIC OBSERVATIONS ON THE DRYING FILM. N.S. Baer and N. Indictor (N.Y. Univ. and City Univ. of New York). *J. Coatings Technol.* 48(623), 58-62 (1976). Changes in infrared spectra of linseed oil over the range 2.5 μm (4,000 cm^{-1}) to 25 μm (400 cm^{-1}) with six added metal acetylacetonates were observed during drying at 23 and 100 C. Relative absorbance in the 2.9 μm (3,450 cm^{-1}) region is reported. Details of the spectra are discussed.

DEVELOPMENT OF WATER-SOLUBLE ALKYD COATINGS. M.A. Lerman (Amoco Chems. Corp). *J. Coatings Technol.* 48(623), 37-42 (1976). Design and production of water-soluble alkyd coatings that at least equal the performance of conventional organic-solvent-based coatings is now possible. The use of special processing, compounding, or application equipment is unnecessary in the production or implementation of water-soluble coatings; however, the raw materials must be carefully selected to ensure optimum performance. Particular attention must be given to the selection of polyols and fatty acids. The hard resin modification of the short-oil-length alkyd is especially helpful in improving performance and should have definite merits as a starting point for general purpose top coats in industrial air drying or forced curing applications.

UNSATURATED POLYESTER RESIN COMPOSITION. A. Ogino, Y. Nakai, T. Nakayama, and K. Miyamura (Takeda Chemical Industries). *U.S. 4,001,153.* An air-drying unsaturated polyester resin composition for powder coating application comprises (1) a solid unsaturated polyester resin made up of (a) a polyol component containing not less than 30 mole % of a glycol having cycloalkylene or phenylene groups and (b) an unsaturated polycarboxylic acid component containing (i) a drying oil fatty acid or (ii) tetrahydrophthalic acid and a drying oil fatty acid, (2) a solid vinyl or allyl compound, and (3) a catalyst.

SECONDARY ALKANESULFONATES—PROPERTIES AND APPLICATIONS IN COSMETIC PREPARATIONS. J.M. Quack and A.K. Reng (Hoechst AG, 623 Frankfurt(M)-Hoechst, Germany) Fette, Seifen, Anstrichm. 78, 200-6 (1976). Large amounts of secondary alkanesulfonate are used since several years in the production of cleansing and washing agents. Laboratory and practical tests have shown that this new surfactant, produced commercially, can be used in cosmetic preparations as well. Secondary alkanesulfonate in combination with other surfactants such as alkylethersulfates, exhibit special properties when used for the production of cleansing agents for hair and skin. Further interesting effects are achieved by incorporating secondary alkanesulfonate into soaps and emulsifier mixtures. The commercial production of secondary alkane-sulfonate by a continuous process is described briefly. A prognosis on the future market for cosmetic body cleansing agents is given.

IMPROVEMENT OF THE QUALITY OF POWDER COATINGS IN ALUMINIUM CONSTRUCTIONS. K. Weigel (Kloetzlmuellerstr. 52, 8300 Landshut, Germany) *Fette, Seifen, Anstrichm.* 78, 161-8 (1976). Polyester powder coatings have been fully accepted in constructions for their desirable processing and quality characteristics, however, certain doubts exist concerning their use compared to materials used so far, such as anodized aluminium, polyurethane coatings and other powder coatings. Following tests were used for comparison: Abrasion, shooting with steel shots, and action of alkali and organic acid. Considering all the properties, it can be concluded the current use of definite types of polyester powder coatings in the coating of building elements and windows should indeed be considered as a technical progress.

PAINT SYSTEMS SAFE TO THE ENVIRONMENT. W. Raudenbusch (Koninklijke/Shell—Laboratorium, Amsterdam-N, The Netherlands) *Fette, Seifen, Anstrichm.* 78, 77-82 (1976). This review covers paint systems and painting processes safe to the environment which are used industrially on a large scale. Characteristic for these paints is that they contain little or no organic solvent and thus cause little environmental pollution. Aqueous coating systems, powder coatings, nonaqueous dispersions and low-solvent or solvent-free paints are described. Environmental safety is a major objective, which has led to new developments in the field of paints. Moreover, paint systems safe to environment offer significant practical and economic advantages owing to new coating and drying techniques, such as electro-immersion painting and hardening by radiation.

• Detergents

SYNTHETIC DETERGENT BAR. L.M. Prince (Lever Bros. Co.). *U.S. 3,997,125.* A toilet detergent tablet comprises 30-60% water soluble alkali metal detergent salts of esters of isethionic acid with mixed aliphatic fatty acids, 2-10% of a suds-boosting detergent salt, 1-9% water, 2.5-25% higher fatty acid soap having 12-25 carbon atoms as a binder and plasticizer, and 10-20% sodium alkane sulfonate as an anti-mushing agent. The tablet has improved hardness and firmness recovery characteristics, is free from efflorescence, and has a pH of 6 to 8.

LAUNDERING AID. J.P. Jones (Procter & Gamble). *U.S. 4,006,092.* A dye transfer inhibiting composition consists of (a) 2-75% of a peroxygen compound selected from monopersulfates, monoperphosphates, organic peroxyacids, and salts of the peroxyacids; (b) 0.2-40% of an activator producing a Relative Oxidation Constant of 0.25 or greater; (c) 5-40% of a polyvinyl compound; and (d) 1-85% of a buffering compound capable of maintaining the pH of an aqueous solution of the composition at 7-12. The composition is free of anionic surfactants.

DETERGENT COMPOSITION FOR DISPERSING OIL SPILLS. P.M. Blanchard and D.G. Meeks (British Petroleum Co.). *U.S. 3,998,733.* An oil and water miscible composition suitable for dispersing oil spilled on water or beaches consists of 25-50% of an ester of a polyethylene glycol and a C_{10}–C_{24} fatty acid, 5-45% of organic sulfate and/or organic sulfonate detergents, and 5-65% of an alkylene oxide condensate of an alkanol having molecular weight of 90-250.

LIQUID DETERGENT COMPOSITION. N.S. Payne and R.L. Bailey (Procter & Gamble). *U.S. 3,998,750.* A homogeneous, single phase, heavy duty liquid detergent composition comprises 10-40% of an anionic detersive surfactant, sufficient magnesium ion and/or calcium ion to neutralize the anionic surfactant, 10-50% of an ethoxylated nonionic detersive surfactant, an effective amount of a water soluble bis(styrylsulfonate) biphenyl brightener, and the balance liquid carrier comprising water or mixtures of water and water soluble solvents.

SOFTENER DISPERSION. H.E. Wixon (Colgate-Palmolive Co.).

U.S. 3,997,453. A stable, cold water dispersible fabric softening composition comprises 60–20% of a cationic quaternary ammonium softener as the sole fabric softening agent and an organic, anionic sulfonate selected from the group consisting of unsubstituted benzene or naphthalene sulfonate, mono-substituted benzene or naphthalene sulfonate, polyalkyl substituted aromatic sulfonate, and olefin and paraffin sulfonates containing 8–20 carbon atoms.

Liquid abrasive cleaner. G.F. Sirine, I.A.J. Day, and S.J. Kahn (The Clorox Co.). *U.S. 3,997,460.* A surface-adherent liquid disinfectant cleaner with an abrasive stabley and homogeneously dispersed throughout consists of 2–30% of a mineral acid, a suspending agent comprising 0.5–5% hydrophilic silica, 0.05–5% nonionic poly(oxyalkylene) alcohol surfactant, 2–40% 40–400 mesh abrasive agent, and the remainder water.

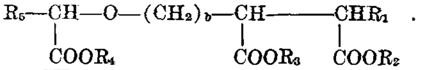
Detergents containing 1,2-diamino-cyclohexane-N,N,N',N'-tetraacetic acids. B.-D. Cheng (Colgate-Palmolive Co.). *U.S. 3,997,481.* A liquid cleaning composition free of phosphates and nitrilotriacetic acid builders consists of 31.0% mixed C_{12-15} alcohol triethenoxy sulfate, sodium salt; 10.3% C_{14-15} alkyl polyethenoxy nonionic containing 11 moles of ethylene oxide; 22.0% 1,2-diaminocyclohexane tetraacetic acid; 10.3% linear tridecyl benzene sulfonate, sodium salt; 8.6% isopropyl alcohol; and the balance water.

Bleaching method for sulfonic acid. T. Ogoshi and Y. Kusumi (Lion Fat & Oil Co.). *U.S. 3,997,575.* A method for bleaching sulfofatty acid material consists of admixing 0.5–20% of a primary or secondary aliphatic alcohol, 0.5–10% peroxide bleaching agent, and 0.1–10% water and maintaining the mixture at 40–90 C for a period of time to effect the bleaching. All percentages are based on the weight of sulfofatty acid material.

Method for preparation of α-sulfofatty acid ester. T. Ogoshi and Y. Kusumi (Lion Fat & Oil Co.). *U.S. 3,997,576.* The method comprises reacting a saturated fatty acid with 8–20 carbon atoms with an inert gas containing 1.2–4 moles of SO_3 per mole of fatty acid in the presence of 1–2.2 moles of aliphatic alcohol per mole of fatty acid.

Basic detergent for liquid lyes. P. Fussey. *U.S. 3,996,148.* A process for manufacturing the detergent comprises reacting a molar excess of a carboxylic C_6–C_8 hydrocarbon diacid without heating with a nitrogen compound selected from the group consisting of C_1–C_4 hydrocarbon amines and hydroxy amines and neutralizing the resulting reaction product with ammonia to bring the pH to 7 to 7.5.

Ester compounds. V. Lamberti (Lever Bros. Co.). *U.S. 3,996,150.* A detergent composition comprises 5–50% surfactant, 10–75% builder, and as a detergent solvent 1–35% of a compound of the formula:



$$R_5{-}\underset{\displaystyle COOR_4}{\underset{|}{CH}}{-}O{-}(CH_2)_b{-}\underset{\displaystyle COOR_3}{\underset{|}{CH}}{-\!\!-\!\!-}\underset{\displaystyle COOR_2}{\underset{|}{CHR_1}}\ .$$

R_1 is $-H$ or $-CH_3$; R_2, R_3, and R_4 are selected from the group consisting of straight and branched chain alkyl groups with 1–12 carbon atoms, benzyl, and cyclohexyl. R_5 is $-H$, $-CH_3$, or $-C_2H_5$, and *b* is 0 or 1.

Nonaqueous, low foaming liquid nonionic detergent composition. C.H. van der Loo, W.J. Rootsaert, and N.E. Jones (Shell Oil Co.). *U.S. 3,994,818.* A liquid detergent suitable for use in automatic dishwashers and containing less than 5% water comprises 60–90% alcohol ethoxylate, 10–30% C_7–C_{13} alcohol, 2–9% C_1–C_6 alcohol, and 0.05–2% of a poly(alkyl) siloxane type defoamer.

Softening additive and detergent composition. R.A. Gloss (Procter & Gamble). *U.S. 3,993,573.* The detergent comprises (a) 2–30% of a detergent compound; (b) 0–60% of an organic or inorganic detergent builder salt; (c) 1–50% of a smectite-type clay softening agent; (d) 0.5–15% of a water insoluble quaternary ammonium antistatic agent; and (e) 0.5–15% of a component selected from the group consisting of fatty acids having 8–30 carbon atoms and/or benzene mono-, di-, and tricarboxylic acid containing 0–2 hydroxyl functions.

Hard surface acid cleaner and brightener. J. Howanitz and I. Greenberg (Fine Organics, Inc.). *U.S. 3,993,575.* A cleaner concentrate comprises an aqueous solution of 5–30% of a dicarboxylic acid of the formula HOOC-R-COOH, where R is a direct bond or straight or branched chain alkylene of 1–4 carbon atoms and 3–15% of an amine of the formula:

$$\begin{array}{c} R_1 \\ | \\ R_2{-}N{-}R_3 \end{array}\ .$$

R_1 and R_2 are independently selected from hydrogen, lower alkyl, or hydroxy lower alkyl and R_3 lower alkyl, lower cycloalkyl, or hydroxy lower alkyl. The amount of the amine is sufficient to provide the solution with a pH of 1–2.5. In addition, the concentrate may contain 2–6.5% of a hydroxycarboxylic acid, 1–4% of an acid stable wetting agent, and 44.5–90% water.

Foam-inhibited cleaning and rinsing agents for dishes and utensils. S. Scholz-Weigl and F. von Praun (Chemische Werke Huls Ag.). *U.S. 3,993,605.* The composition consists of (a) 5–35% of anionic detergents, 0–20% of nonionic detergents, 5–70% of builders; and (b) 20–70%, based on the anionic and nonionic detergents, of a vicinal alkanediol monoester and/or diester as the foam controlling agent.

Process for making variegated soap bars. T.A. Borcher and J.R. Knochel (Procter & Gamble). *U.S. 3,993,722.* The process comprises plodding and extruding two soap masses of different colors to form one stream of small diameter noodles of 1/8 inch diameter or less and another at least twice as large, introducing both streams into a vacuum chamber and mixing them therein, introducing the commingled noodles into a final plodder where they are formed into a variegated soap log, and forming the log into bars. The weight rate of the smaller stream is 2 to 6 times that of the larger one.

Aqueous coating composition. T. Aihara, T. Watanabe, Y. Nakayama, Y. Yamashita, and I. Toyomoto (Kansai Paint Co.). *U.S. 3,993,612.* An aqueous coating composition comprises a vinyl polymer emulsion prepared by subjecting a vinyl monomer to emulsion polymerization in an aqueous medium in the presence of maleinized polybutadiene used as a dispersion stabilizer and another copolymer. This other copolymer is composed of (a) a monomer prepared by reacting one glycidyl ester of acrylic acid and methacrylic acid with a fatty acid of drying oil fatty acid and semi-drying oil fatty acid, (b) an α,β-ethylenically unsaturated acid, and (c) one unsaturated monomer containing no carboxyl group and having a Q value of at least 0.1 as determined by Q-e theory.

Granular or powdery detergent composition. M. Murata, M. Yamanaka, F. Sai, and T. Fujino (Kao Soap Co.). *U.S. 3,998,762.* The composition consists of (1.) 1–50% of a first surfactant having a tendency to cake and selected from the group consisting of alkylethoxy sulfates, alkylphenylethoxy sulfates, branched alkyl sulfates, alkane sulfonates, sulfonic acid salts of olefins, and ethylene oxide nonionic surface active agents; (2) 0.4–40% of an anticaking agent consisting of 0.2–39.8% of polyethylene glycol and 0.2–39.8% of a substance selected from the group consisting of sulfosuccinic acid, maleic acid, succinic acid, and their alkali and alkaline earth metal salts; (3) 0–35% of a second surfactant selected from the group consisting of alkylbenzene sulfonates, linear alkyl sulfates, and alpha olefin sulfonates; and (4) the balance water soluble builders.

Detergents via a new process. J.L.A. Briggs (Anhydro, Inc., Attleboro Falls, Mass.). *Soap, Cosm. Chem. Spec.* 52(11), 44–8 (November, 1976). A continuous process for the manufacture of synthetic detergents and soap-based cleaners, combining a high degree of efficiency and low energy requirements, is described. Powdered raw materials and minor ingredients are metered into the Fluid Mix unit. Liquid raw materials are metered through spray nozzles into the Fluid Mix unit which is composed of three air chambers within which differential fluidization takes place. The atomized liquid makes contact with the fluidized layer of powder, and intimate mixing, reaction, and cooling take place within the unit in such a way that a homogeneous, free flowing finished detergent powder, ready for packing, leaves the unit. Fine particles of powder are separated from the cyclone system, pass to the front of the Fluid Mix unit, are rewetted by the sprays, and agglomerated onto the particles of powder. As a result, the finished powder is virtually dust-free. This plant can handle formulations covering the entire detergent spectrum in composition and densities from 0.38 g/cc to 0.95 g/cc with density variations in normal operation of + 0.01 g/cc.

On the appreciation of some practical properties of soaps. I: Measure of swelling ability. E. Sambuc, L. Scamaroni and M. Naudet *Rev. Fr. Corps Gras* 24(1), 35–40 (1977). A test of swelling has been developed by means of a simple apparatus. The content of water in the gel, anhydrous soap contained in the gel (by unit of contact surface water/soap) and the increasing content of water next to the contact surface of unswelled soap are determinated. Repeatibility of measures is satisfactory the effect of main parameters is discussed.

EQUILIBRIUM SURFACE TENSION OF AQUEOUS SURFACTANT SOLUTIONS. T. Gilanyi, Chr. Stergiopoulos and E. Wolfram (Dept. Colloid Sci. Lorana Eotvos Univ., Budapest, Hungary). *Colloid Polym. Sci.* 254(11), 1018–23 (1976). The applicability of the drop weight method for determining time dependent surface tension of surfactant solutions was experimentally proved. Presence of CO_2 and traces of lauryl alcohol and long chain homologs lower the surface tension of sodium dodecyl sulfate solutions in a measurable extent. Chemical purification of materials and recrystalizations are unsatisfactory to obtain sufficient purity; the cleaning of the surface itself is needed, by foaming for example. As a criterion of surface purity the time dependence of surface tension and the average life-time of thin liquid film is suggested.

NEW LANOLIN ACID QUATERNARY SALTS FOR USE IN HAIR TREATMENT PREPARATIONS. J.P. McCarthy, L.R. Mores, and M.L. Schlossman (Malmstrom Chem., Emery Ind., Inc., Linden, N.J. 07036.) *J. Soc. Cosmet. Chem.* 27(11), 559–70 (1976). The action of quaternary ammonium surfactants on hair has been studied for many years. Several of the characteristics, which are important in formulating with these salts are dependent upon their molecular configuration. In this paper, lanolin compounds which essentially comprise quaternary derivatives consisting essentially of the reaction product of a lanolin acid and a specific diamine followed by quaternization is outlined. The chemical and physical properties of quats are their chemistry and processing highlighted. Each of the salts was incorporated into hair conditioning preparations and evaluated on human hair.

ON THE USE OF NA-AL-SILICATES IN DETERGENTS. M.J. Schwuger, H.G. Smolka and C.P. Kurzendorfer (Dusseldorf). *Tenside Deterg.* 13(6), 305–12 (1976). The ion exchange of heavy metal ions with Ca-charged Na-Al silicates in the range of low ionic concentrations, as they are found in the environment, has been investigated both theoretically and experimentally as a function of various parameters. This produced the following range of selectivity: $Pb^{++} > Ag^{+} > Cu^{++} \gg Cd^{++} > Zn^{++} \gg Co^{++}, Ni^{++}, Mn^{++}$. The ion exchange increases with decreasing hardness of water, increasing temperature, increasing pH value of the solution, increasing concentration of heavy metal ions. The row of selectivity for the exchange largely corresponds to that of desorption. The desorption kinetics is considerably slower as compared with the exchange kinetics.

REORIENTATION OF THE ADSORPTION LAYERS OF NA-N-AKLYL-SULFATES ON THE INTERFACE MERCURY/ELECTROLYTE IN DEPENDENCE OF THE POTENTIAL AND THE ALKYL CHAIN LENGTH. H.-D. Dorfler and E. Muller (Martin-Luther-Univ. Halle-Wittenberg). *Tenside Deterg.* 13(6), 322–5 (1976). By registering the concentration dependence of the a.c. polarographic capacity-potential and capacity-time curves the adsorption isotherms of homologous alkyl sulfates $R\text{-}SO_4Na$ ($R = C_5H_{11}$; C_6H_{13}; C_7H_{15}; C_9H_{19}; $C_{10}H_{23}$) were obtained. The adsorption isotherms were evaluated to get the adsorption parameters. The capacity-potential curves show from n-heptyl sulfate in the positive branch of the electrocapillary curve from $E = 0.0$ V to $E = -0.5$ V additional capacity maxima at the concentration of the adsorption saturation. The capacity maxima show an unusual concentration dependence. These maxima do not exceed the curve of the pure supporting electrolyte in the absolute high. From this behavior it could be concluded that the capacity maxima appeared due to the reorientation of the adsorption layer. In the potential branch from $E = 0.0$ V to $E = -0.4$ V we can assume a bilayer structure.

7TH INTERNATIONAL CONGRESS FOR SURFACTANT MATERIALS, MOSCOW, 12–18, SEPT. (1976). Anonymons *Tenside Deterg.* 13(6), 326–32 (1976). Abstracts of papers, generally in English: Structural effect of the hydrophobe on the surface active properties of polyglycol monoalkyl ethers. New knowledge in the field of the olefin sulfonates. Perfluoralkylphosphon-phosphinic acids, preparation and practical application. Synthesis of alkyl-N-(sulfoalkyl)- and N-(carboxyalkyl)-aminoacetates. Synthesis and properties of aqueous solutions of acetals formed from aliphatic aldehydes and monoalkylethers of ethylene glycols. Surfactants from N,N-(2-hydroxy-3-alkoxypropyl)-ethanolamines, structure and properties. On the preparation and reactions of various substituted homologous trialkylphosphineoxides. On the preparation of definite oxylates. Synthesis and reactions of some surfactants with hetrero-atoms. Influence on the activity of surfactants of alkylated aminopolycarbonic acids through variation in structure. Sulfonation of unsaturated fatty alcohols. Surface active alkoxymethyl derivatives of glucose. Preparation and properties of surface active derivatives of gluconic acid. Synthesis of new cationic surfactants on the basis of chloromethylalkyl thioethers. Synthesis of new surfactants as salts of esters of Si- and F-containing sulfo-carboxylic acids. New oxyalkylation catalysts. Preparation and study of surface active derivatives of alkyl phosphonic acids. Mechanism of sulfonation of fatty acids with sulfur trioxide and properties of α-sulfo fatty acid esters. Reactions of fatty acids with ethylene oxide. New applications of SO_3-sulfonation processes. The mechanism and kinetics of alkylbenzene sulfonation. New surfactants—derivatives of sulfo- and phosphosuccinic acids, synthesis and properties. Nonionic surface active organic phosphates. Study of esterification of phosphoric acid by some fatty alcohols. On the reaction of propylene oxide with ethylenediamine. Sulfonamide-like tensides and their characteristic reactions. On the use of by-products of the alkylbenzene synthesis. Specific synthesis of polyethylene glycol esters of fatty acids. Synthesis of salts of alkyl-aminopropionic acid, ampholytic surfactants. Synthesis and properties of naphthenyl pyrazols. Organo-metallic surfactants. Modern analytical methods for ethoxylated surfactants. High temperature and high resolution mass-spectrometry as applied to investigation of surfactants. Determination of components from mixed sulfonation of dodecylbenzene and fatty acids. The magnetic ring resonance in the identification of the structure of surfactants. The structure and analysis of the by-products of the alkylbenzene synthesis. Thinlayer and liquid chromatography of the resin acids of rosin. Fixation of nonionic surfactants and distinction of their constituents of carboxyl resins. Research on α-olefin sulfonates through pyrolytic chromatography. Potentiometric titration of ionic surfactants.

AUTOMATIC DISHWASHING DETERGENT COMPOSITION. E.J. Maguire, Jr. (Procter & Gamble). *U.S. 4,001,132.* The granular composition consists of (a) 4–20% of an alkoxylated nonionic surface active agent; (b) 5–20% of a sulfonated aromatic compatibilizing agent having a critical micelle concentration greater than 1% at 25 C, the ratio of surface active agent to compatibilizing agent being 2:5–5:3; (c) 15–60% of a mixture of (1) an alkali metal, ammonium, or substituted ammonium sulfite and (2) an alkali metal, ammonium, or substituted ammonium sulfate in ratios of 1:4–2:1, respectively. The composition is free of a chlorine bleach component.

DETERGENT COMPOSITION. H. Mizutani, F. Tokiwa, T. Imamura, and T. Sakurada (Kao Soap Co.). *U.S. 4,002,579.* The composition consists of 5–50 parts of a surfactant component comprised of 5–95% of a polyoxyethylene sorbitan monoester of fatty acid and the balance fatty acid alkylolamide, and 1–50 parts of an organic acid salt with chelating ability. The salt is selected from the group consisting of alkali metal and ammonium salts of gluconic acid, citric acid, malic acid, tartaric acid, and lactic acid.

ORGANOSILANE-CONTAINING DETERGENT COMPOSITION. D.C. Heckert and D.M. Watt, Jr. (Procter & Gamble). *U.S. 4,005,028.* A detergent composition capable of imparting soil release benefits to metallic and vitreous surfaces on which it is used consists of an organosilane as described in *U.S. 4,005,024* and an organic detergent selected from the group consisting of nonionic, zwitterionic, and ampholytic detergents.

ORGANOSILANE-CONTAINING ANIONIC DETERGENT COMPOSITION. G.C. Kinstedt (Procter & Gamble). *U.S. 4,005,025.* A detergent composition capable of imparting soil release benefits to metallic and vitreous surfaces on which it is used consists of an organosilane as described in *U.S. 4,005,024*, an organic detergent, and a source of alkalinity in an amount such that the pH of a 0.2% aqueous solution of the composition lies between 8.5 and 10.5.

LOW PHOSPHATE CONTENT DETERGENT COMPOSITION. G. Bartolotia, W.A. Prinsen, and J.-P. Frenay (Procter & Gamble).

U.S. 4,000,080. A spray dried detergent composition consists of (a) 10–18% of phosphate builder salt; (b) at least 3% of a condensation product of an alcohol having 8–18 carbon atoms with 3–15 moles of ethylene oxide per mole of alcohol; (c) 1–2% ethylene oxide condensation product having an average molecular weight of 2,500–20,000; (d) 1–2% maleic anhydride-methyl ether copolymer having a molecular weight of 10,000–350,000; (e) linear alkyl benzene sulfonate; (f) 1–15% sodium silicate; (g) 5–40% sodium sulfate; and (h) 5–30% peroxy bleach. The total level of linear alkyl benzene sulfonate and condensation product of alcohol and ethylene oxide is less than 30% and the ratio of linear alkyl benzene sulfonate to the condensation product is 3:1 to 1:1.

Coated stabilized bleach activators. K. Hachmann, R. Puchta, and G. Sperling (Henkel & Cie). *U.S. 4,003,841.* A bleaching assistant suitable for use in pulverulent washing and bleaching compositions comprises drop-shaped to globular-shaped particles at least 70% of which have a diameter of 0.1–1 mm. The particles comprise 10–70% of an activator for active oxygen derived from compounds yielding H_2O_2 in aqueous solution surrounded by 30–90% of a mixture of (a) 2–10 parts of 12–24 carbon saturated and/or saturated hydroxy fatty acids, (b) 1 part of 10–20 carbon saturated hydrocarbon monohydric alcohols and/or their ethoxylated and propoxylated products, and (c) 5–25% of alcohol sulfates selected from 8–18 carbon saturated hydrocarbon monohydric alcohols and/or their ethoxylated and propoxylated products. The activators may be N-acyl compounds, O-acyl compounds, carbonic acid esters, and/or pyrocarbonic acid esters.

Laundering adjunct. J.P. Jones (Procter & Gamble). *U.S. 4,005,029.* A dye transfer inhibiting composition consists of (a) 2–75% of a peroxygen compound selected from the group consisting of monopersulfates, monoperphosphates, organix peroxyacids, salts of the peroxyacids, and mixtures of these compounds; (b) 0.2–40% of an activator compound; (c) 2–75% of a zwitterionic surfactant; and (d) 1–85% of a buffering compound capable of maintaining the pH of an aqueous solution of the composition within the range 7–12.

Scouring compositions. W.L. Hartman (Procter & Gamble). *U.S. 4,005,027.* An aqueous false body fluid hard surface scouring cleanser comprises (a) 0.2–5% of a bleaching agent which yields a hypochlorite species in aqueous solution; (b) 1–6% of an inorganic colloid-forming clay selected from the group consisting of smectites, attapulgites, and mixtures; (c) 0.1–3% of a bleach stable alkyl sulfate surfactant; (d) 5–60% of insoluble particulate abrasive material; (e) 1–15% of an inorganic buffering agent capable of maintaining the pH between 10.5 and 14; and (f) 10–80% of deionized water.

Detergent compositions containing novel crystalline forms of optical brighteners. J.C. Heath, R.E. Werner, J.W. Delaney, and N.N. Crounse (Sterling Drug Inc.). *U.S. 4,005,026.* The detergent composition consists of a detergent and an effective brightening amount of the compound disodium 4,4′-bis(4,6-dianilino-s-triazin-2-ylamino)-2,2′-stilbenedisulfonate in the form of birefringent crystalline rods in which the lowest index of refraction has a value between 1.53 and 1.54 and is parallel to the long axis.

Purification of sodium isethionate. V. Lamberti and B.A. DiLorenzo (Lever Bros. Co.). *U.S. 4,003,925.* A process for extracting ethylene glycol impurities from an aqueous solution of sodium isethionate comprises contacting the aqueous solution with *n*-propanol, isopropanol, 2-butanol, isobutanol, *n*-butanol, or mixtures of these and then removing the solvent phase containing the extracted ethylene glycol.

Concentrated aqueous olefins sulfonates containing carboxylic acid salt anti-gelling agents. R.D. Gorsich and W.J. DeWitt (Ethyl Corp.). *U.S. 4,003,857.* The composition consists of 50–70% of olefin sulfonate having 10–24 carbon atoms per molecule; 3–50% of a salt of the formula HCOOM in which M is alkali metal, ammonium, lower alkanol ammonium, or lower alkyl ammonium; and 5–57% water.

Cleaning fabrics. F.W. Gray and J.C. Jervert (Colgate-Palmolive Co.). *U.S. 4,003,700.* A composition for removing stains from fabrics in aqueous medium comprises a peroxygen compound, an activator for the peroxygen compound, and a salt of an aminopolycarboxylic acid. The activator has carboxylic acyl amide groups and reacts with the peroxygen compound to form a percarboxylic acid. The salt of the aminopolycarboxylic acid is selected from the group consisting of trisodium nitrilotriacetate and ethylene diamine tetraacetic acid sodium salt. Proportions of the three compounds in the water during use are 5–50 ppm of the activator, 3–80 ppm of active oxygen, and 100–300 ppm of the aminopolycarboxylic acid salt.

Clothes dryer additive containing crisping agents. A.P. Murphy and F.H. Habermehl, III (Procter & Gamble). *U.S. 4,000,340.* The additive consists of (a) a fabric conditioning composition comprising (i) a water insoluble fabric crisping component selected from alcohols, carboxylic acids, and carboxylic acid salts having a melting point of at least 38 C; and (ii) an oil soluble surfactant selected from nonionic ethoxylated alcohols and nonionic ethoxylated alkyl phenols having an HLB of 7–9; and (b) a means for dispensing the composition at dryer operating temperatures such as a sponge, cloth or paper bag, or woven or nonwoven fabric substrate. The crisping component is present at ratios of 1,000:1 to 1:1 to the surfactant.

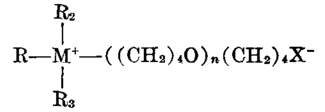
Carboxymethylated derivatives of polysaccharide and detergent compositions containing same. E.G.P. Cornelissens and J.J.H. Ploumen (Akzo N.Y.). *U.S. 4,000,127.* There is described a water soluble carboxylated polysaccharide having 0.5–3 hydrogen atoms of the hydroxyl groups per monomeric six carbon glucose unit substituted by etherification with radicals containing at least two groups selected from carboxyl and carboxylate.

Water insoluble aluminosilicate-containing detergent composition. H.P. Fleming and H.K. Krummel (Procter & Gamble). *U.S. 4,000,094.* A spray dried built detergent composition is comprised of granules which are crisp and free flowing and possess excellent storage stability and consists of 25–75% water insoluble aluminosilicate builder, 5–25% organic detergent, and as a processing aid, 2–20% of a mixture of sodium carbonate and sodium sulfosuccinate in a ratio of 1.75:1.

Alkyl sulfate detergent compositions. C.H. Nicol and M.E. Burns (Procter & Gamble). *U.S. 4,000,093.* The compositions comprise (a) 5–50% of C_{10}–C_{13} alkyl sulfate containing less than 5% C_{15} and higher alkyl sulfates; (b) 1–5% C_{14} alkyl sulfate; (c) 0.1–3% soil release ether component; (d) 0–70% detergency builder component; and (3) the balance comprising customary detergent additives.

Cleaning compositions. G.E. Wentler (Procter & Gamble). *U.S. 4,000,092.* A detergent composition consists of 1–99% of a water soluble detersive surfactant, 1–99% of a water soluble co-surfactant described in *U.S. 4,000,091*, and 0–95% of a detergency builder.

Built detergent compositions. G.E. Wentler (Procter & Gamble). *U.S. 4,000,091.* The compositions consist of 5–95% detergency builder and 1–99% of a water soluble surfactant of the formula:



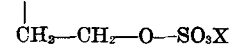
$$R-\overset{R_2}{\underset{R_3}{M^+}}-((CH_2)_4O)_n(CH_2)_4X^-$$

R_1, R_2, and R_3 are independently selected from C_1–C_{30} alkyl or alkenyl moieties, aryl moieties, alkaryl moieties having an alkyl group in the range of C_1–C_{30} or else two R groups are joined to form a C_4–C_6 heteroring with M. M is nitrogen or phosphorus; *n* is 1–20; and X is a water-solubilizing anionic moiety.

Sequestering agents. J.G. Heesen (B°V° Chemie Combinatie Amsterdam C°C°A°). *U.S. 4,000,083.* The agents consist of a mixture of organic compounds, each containing 4–6 carbon atoms, one or two terminal carboxylic acid or alkali metal carboxylate groups, and at least two vicinal hydroxy groups and one or more boron compounds selected from boric acid, borax, and alkali metal perborates.

Defoaming compositions based on lithium salts. J.V. Otrhalek and R.E. Gansser (BASF Wyandotte Corp.). *U.S. 4,000,082.* Defoaming properties of an aqueous cleaning concentrate consisting of 0–20% sequestering agent, 1.5–5% anionic surface active agent, 0.1–1.0% nonionic surface active agent, and 5–50% alkali are improved by including 1.0–5% of a water soluble lithium salt.

Lime soap dispersant compounds. G.L. Woo (Chevron Research Co.). *U.S. 4,000,081.* A toilet bar having good lime soap dispersing characteristics suitable for use in hard water comprises 30–99% water soluble soap, 0–70% water soluble detergent, and as a lime soap dispersing agent 1–50% of a compound of the formula:



$$R_1\text{—CH—}CH_2\text{—O—}SO_3X \quad (\text{CH} \text{—} CH_2\text{—}CH_2\text{—O—}SO_3X)$$

X is a cation and R_1 is a hydrocarbyl radical containing 14–36 carbon atoms and represented by the formula:

$$R_2\text{—CH(}R_3\text{)—}$$

R_2 and R_3 are hydrogen, alkyl, or alkenyl radicals.

ENHANCEMENT OF CATIONIC SOFTENER. H.E. Wixon (Colgate-Palmolive Co.). *U.S. 4,000,077.* A fabric softening composition having improved softening and whitening properties consists of a cationic quaternary ammonium softener and a higher aliphatic alcohol sulfate in ratios of 10:1 to 2:1, respectively.

• Biochemistry and Nutrition

PHASE TRANSITION IN A LIPID BILAYER. II. INFLUENCE OF ADAMANTANE DERIVATIVES. M.K. Jain, N. Yen-Min Wu, T.K. Morgan, Jr., M.S. Briggs and R.K. Murray, Jr. (Div. of Health Sci. and Dept. of Chem., Univ. of Delaware, Newark, Del. 19711) *Chem. Phys. Lipids* **17**, 71–8 (1976). The influence of thirty-four adamantane, protoadamantane, and homoadamantane derivatives on the phase transition characteristics of the bilayer in dipalmitoyl lecithin liposomes has been determined by differential scanning calorimetry. Each of these compounds induces a broadening of the phase transition profile of the lipid bilayer that is dependent upon the concentration of the solute and its molecular structure. The observations are consistent with the hypothesis that the position and orientation of a solute within the bilayer are critical factors in determining its relative potency. The position of a solute within the bilayer is significantly controlled by the presence of polar substituents and by the relative geometric relationships of these groups. For a given substituent group, the shape and size of the hydrocarbon cage becomes increasingly important. It is apparent that seemingly minor modifications in the structure of a solute can significantly alter its influence on the phase transition behavior of a bilayer.

THE STRUCTURE OF PHOSPHATIDYL GLYCEROL PREPARED BY PHOSPHOLIPASE D-CATALYZED TRANSPHOSPHATIDYLATION FROM EGG LECITHIN AND GLYCEROL. A. Joutti and O. Renkonen (Dept. of Biochem., Lab. of Lipid Res., Univ. of Helsinki, Haartmaninkatu 3, SF-00290 Helsinki 29, Finland) *Chem. Phys. Lipids* **17**, 264–6 (1976). Phosphatidyl glycerol obtained by transphosphatidylation with phospholipase D (EC 3.1.4.4) from egg phosphatidyl choline and glycerol was hydrolyzed with phospholipase C (EC 3.1.4.3) and the configuration of the released α-glycerophosphate was determined by 3-*sn*-glycerophosphate dehydrogenase (EC 1.1.1.8). The phosphatidyl glycerol proved to be a racemic mixture of 3-*sn*-phosphatidyl-1′-*sn*-glycerol and 3-*sn*-phosphatidyl-3′-*sn*-glycerol.

FATTY ACIDS AND LONG-CHAIN BASES OF GANGLIOSIDES OF HUMAN GASTROINTESTINAL MUCOSA. A. Keranen (Dept. of Med. Chem., Univ. of Helsinki, Siltavuorenpenger 10A, 00170 Helsinki 17, Finland) *Chem. Phys. Lipids* **17**, 14–21 (1976). The fatty acid and long-chain base composition of five major gangliosides from human stomach and small and large intestine mucosa were analyzed with gas chromatography. All the gangliosides greatly resembled each other in the fatty acid pattern. The main fatty acids were $C_{16:0}$, $C_{18:0}$, $C_{22:0}$ and $C_{24:1}$. No hydroxy fatty acids could be detected. In all the gangliosides 4-sphingenine was the predominant long-chain base (70–75%). About 15% of the long-chain bases had 20 carbon atoms in their chain. No trihydroxy long-chain bases could be detected.

HIGH RESOLUTION PREPARATIVE COLUMN CHROMATOGRAPHIC SYSTEM FOR GANGLIOSIDES USING DEAE-SEPHADEX AND A NEW PORUS SILICA, IATROBEADS. T. Momoi, S. Ando and Y. Magai (Dept. of Biochem., Tokyo Met. Inst. of Gerontology, 35-2 Sakaecho, Itabashi-ku, Tokyo 173, Japan) *Biochim. Biophys. Acta* **441**, 488–97 (1976). A new high-resolution preparative column chromatographic system was developed for efficient and rapid isolation of ganglioside molecular species. The system involved a combination of ion-exchange and adsorption chromatographies using DEAE-Sephadex A-25 and the newly developed, totally porous silica spheres, Iatrobeads. Using this system the brain gangliosides, GM_1, GD_{1a}, GD_{1b} and GT_1 were obtained in high purity and in milligram amounts, in a relatively short time, by simple procedures. The presence of a number of unidentified molecular species of gangliosides, which are present only in small amounts, was also demonstrated.

ROLE OF γ-CARBOXYGLUTAMIC ACID. CATION SPECIFICITY OF PROTHROMBIN AND FACTOR X-PHOSPHOLIPID BINDING. G.L. Nelsestuen, Margaret Broderius and Ginger Martin (Dept. of Biochem., College of Biol. Sci., Univ. of Minnesota, St. Paul, Minn. 55108) *J. Biol. Chem.* **251**, 6886–93 (1976). Divalent cations are required for two roles in prothrombin-phospholipid interaction. The first role, catalysis of a prothrombin protein transition has a reaction half-life of 100 min at 0° and is a prerequisite to phospholipid binding. The binding sites required for the transition have a very low cation specificity. All di- and trivalent cations tested were effective in this role with the exception of beryllium. Strontium is the only cation that will singly replace calcium. Barium is ineffective alone because the concentrations required to catalyze the protein transitions cause precipitation of the phospholipid. Combination of certain other cations with barium will, however, substitute for calcium. The other cations (specifically magnesium or manganous ion) catalyze the protein transitions and barium forms the correct protein · phospholipid complexes.

TRANSMISSION ELECTRON MICROSCOPY OF BILIARY MIXED LIPID MICELLES. S.L. Oh and R.T. Holzbach (GI Res. Unit, Dept. of Gastroenterology The Cleveland Clin. Foundation, Cleveland, Ohio 44106) *Biochim. Biophys. Acta* **441**, 498–505 (1976). One potential artifact problem in electron microscopy of micellar systems is that structural changes and aggregation could be induced by high vacuum dehydration in sample preparation prior to viewing and photomicrography. This could account for an earlier report on "macroassemblies" of biliary lipid, a finding which has been discrepant with the predominance of other evidence on the size, configuration and behavior of biliary micelles. In the present work, this possibility was explored and no evidence for such macroassemblies demonstrated when freeze-drying sample preparation was used; whereas, with conventional technique, the "macroassemblies" were again observed. It is concluded that freeze-drying or freeze-etching sample preparation is required to avoid this form of artifact in electron microscopy of micellar systems. The present findings are compatible with a spherical-equivalent or oblate ellipsoid configuration for biliary mixed micelles.

STUDIES ON THE INTERACTION OF CHOLESTEROL WITH DIESTER- AND DIETHERLECITHIN. F.T. Schwarz, F. Paltauf and P. Laggner (Inst. fur Biochem. der Technischen Univ. Graz, Schlogelgasse 9, A-8010 Graz, Austria) *Chem. Phys. Lipids* **17**, 423–34 (1976). The lamellar repeat distances of aqueous dispersons of *rac*-1,2-dioctadec-9′-*cis*-enyl-glycero-3-phosphorylcholine (dietherlecithin) and 1,2-dioctadec-9′-*cis*-enoyl-*sn*-glycero-3-phosphorylcholine (disterlecithin) have been measured by X-ray diffraction as a function of water concentration. The point of maximum hydration was found to be 43% (w/w) and 40% (w/w) for dietherlecithin and diesterlecithin respectively; the corresponding lamellar repeat distances being 62.3 Å and 60.5 Å. Incorporation of cholesterol above maximum hydration results in the initial increase in the lamellar repeat distance with a maximum around cholesterol concentrations of 25 and 33 mol % for dietherlecithin and diesterlecithin respectively. From these data a series of structure parameters are derived for the two lecithins and possible implications for the nature of the lecithin-cholesterol interaction are discussed.

ALTERNATING CURRENT STUDIES OF CHARGE CARRIER TRANSPORT IN LIPID BILAYERS. PENTACHLOROPHENOL IN LECITHIN-CHOLESTEROL MEMBRANES. A.D. Pickar and W.D. Amos (Environ. Sci. Prog., Dept. of Phys., Portland St. Univ., Portland, Ore. 97207) *Biochim. Biophys. Acta* **455**, 36–55 (1976). Surface and interior electrical properties of lecithin-cholesterol bilayer membranes treated with the uncoupler pentachlorophenol have been determined on the basis of a.c. measurements over a wide range of frequencies (0.02 to 1,000 kHz). The method used depends on accurately determining the resistance of the aqueous solution in series with each individual membrane by extrapolating admittance data to infinite frequency. Loss tangent vs. frequency curves are corrected by subtracting out a loss contribution which is present in untreated membranes and is due, presumably, to dielectric relaxation. The pH and concentration dependence of surface conductance is consistent with a scheme of transport in which, a fixed number of surface binding sites are filled preferentially with neutral pentachlorophenol molecules, which in turn dissociate to supply protons to the aqueous phase. Surface capacitances range from 15 to 90 times that of interior capacitance and show a systematic increase with pentachlorophenol concentration at high pH, and a decrease with concentration at low pH.

Effects of free fatty acids on the enzymic synthesis of diacyl and ether types of choline and ethanolamine phosphoglycerides. A. Radominska-Pyrek, J. Strosznajder, Z. Dabrowiecki, T. Chojnacki, and L.A. Horrocks (Polish Acad. of Sci., Warsaw, Poland) *J. Lipid Res.* **17**, 657–62 (1976). Activities of ethanolaminephosphotransferases and choline phosphotransferases in microsomal fractions from brains and livers of mature rats are increased several fold by the addition of 1,2-diacyl-*sn*-glycerols or 1-alkyl-2-acyl-*sn*-glycerols. Oleic acid added with diacylglycerols stimulated further the synthesis of lecithins by liver microsomes, confirming the work of Sribney and Lyman. With alkylacylglycerols, oleic and stearic acids were inhibitory and linoleic acid was even more inhibitory for the synthesis of both 1-alkyl-2-acyl-*sn*-glycero-3-phosphorylcholines and the corresponding ethanolamine compounds with microsomes from both tissues. Free fatty acids without added diglycerides had mixed effects. These results are best explained by postulating the presence of two isoenzymes each for ethanolaminephosphotransferase and cholinephosphotransferase of which only one is affected by free fatty acids. Regulation of the phosphotransferases by free fatty acids may determine the proportion of CDP-choline and CDP-ethanolamine used for synthesis of diacyl and alkylacy types of these phosphoglycerides.

Isolation of a novel lipid hapten, cytolipin S, from rat spleen. M.M. Rapport, L. Graf, B. Hungund, A. Kisic and Y. Huang (Div. of Neurosci., N.Y. State Psyciatric Inst., New York, N.Y. 10032) *Chem. Phys. Lipids* **17**, 233–43 (1976). Antisera against rat erythrocytes contain agglutinins directed against unknown lipid determinants. Complement-fixation shows more reactivity with lipid extracts of rat spleen than of other rat tissues. The isolation of the reactive lipid from rat spleen, cytolipin S, is described. Cytolipin S is a glycosphingolipid containing glucose, galactose, and galactosamine with molar ratios of 1:2:1. It migrates on TLC like asialo G_{M1} (more slowly than cytolipin R, a ceramide tetrasaccharide, or cytolipin F, a ceramide pentasaccharide). Asialo G_{M1} and cytolipin S, when properly combined with auxiliary lipids, react very similarly with anti-rat erythrocyte sera by complement fixation. However, cytolipin S is much more effective than asialo G_{M1} in inhibiting the hemagglutination reactions. It is concluded that cytolipin S and asialo G_{M1} are ceramide tetrasaccharides having different chemical structures and that the structural differences probably will be found in the carbohydrate linkages other than that between the terminal and penultimate residues.

Mass spectral identification of 2-(O-acyl)hydroxy fatty acid esters in the white portion of the rabbit harderian gland. C.O. Rock, V. Fitzgerald, W.T. Rainey, Jr. and F. Snyder (Med. and Health Sci. Div., Oak Ridge Associated Univ., and the Analytical Chem. Div., Oak Ridge Nat'l. Lab., Oak Ridge, Tenn. 37830) *Chem. Phys. Lipids* **17**, 207–12 (1976). A major lipid component of white portion of the rabbit harderian gland has been shown to be a mixture of 2-(*O*-acyl)hydroxy fatty acid esters. The fatty acid moieties in this lipid class are exclusively saturated and range in chain length from $C_{14:0}$ to $C_{22:0}$, with $C_{16:0}$ being the major component (65%). The fatty alcohols are also saturated and composed primarily of $C_{20:0}$, $C_{21:0}$, and $C_{22:0}$ chains. The hydroxy fatty acids are composed of $C_{14:0}$, $C_{15:0}$, and $C_{16:0}$ and mass spectroscopy combined with chemical techniques placed the hydroxyl group at the 2-carbon. 2-(*O*-acyl)Hydroxy fatty acid esters are not found in the pink portion of the rabbit harderian gland nor have they been reported to occur in harderian glands of other species.

C_{20}-Sphingosine as a determining factor in aggregation of gangliosides. H.C. Yohe, D.E. Roark and A. Rosenberg (Dept. of Biol. Chem., The Milton S. Hershey Med. Center, The Penn. State Univ., Hershey, Penn. 17033) *J. Biol. Chem.* **251**, 7083–7 (1976). Aggregation properties of gangliosides, the major synaptic membrane glycosphingolipids of mammalian brain, may prevent their segregation during membrane assembly and promote a uniform membrane matrix with minimum maintenance energy. The sphingosine residues of bovine brain gangliosides show an increase in C_{20}-sphingosine corresponding with an increase in sialic acid. Concentrations of C_{20}-sphingosine varied from 37% for the monosialoganglioside to 64% for the trisialoganglioside, the remainder being C_{18}-sphingosine. Ultracentrifugal analysis showed that changes in sialic acid content and in C_{20}-sphingosine content individually affect micellar size. Increases in sialic acid content decreased micellar size from 225 for the monosialoganglioside to 120 monomers per micelle for the trisialoganglioside.

Scanning electron microscopy in the evaluation of endothelial integrity of the fatty lesion in atherosclerosis. P.F. Davies, M.A. Reidy, T.B. Goode and D.E. Bowyer (Dept. of Pathol., Tennis Ct. Rd., Cambridge CB2 1QP, Great Britain) *Atherosclerosis* **25**, 125–30 (1976). The luminal surface of fatty lesions of atherosclerosis was viewed by scanning electron microscopy. Endothelial cells were outlined by staining intercellular junctions with silver and the aortas were fixed in situ at physiological pressure. When aortas were dehydrated by passage through organic solvents followed by critical point drying from liquid CO_2, there was considerable disruption of the luminal surface and it was not possible to correctly interpret the morphological integrity of the endothelium. In contrast, simple air-drying or aortas, without solvent dehydration after fixation, allowed the integrity of the cell layer overlying the lesion to be evaluated. The success of this technique was attributed to the retention of arterial lipids during dehydration of the tissue.

Composition of HDL-2 and HDL-3 in familial hyperalphalipoproteinemia. S. Mendoza, R.F. Lutmer, C.J. Glueck, C-Y. Chen, Paula M. Steiner, R.W. Fallat and M.L. Kashyap (Dept. of Med., General Clin. Res. Ctr. and Lipid Res. Ctr., Univ. of Cincinnati, College of Med., Cincinnati, Ohio 45267) *Atherosclerosis* **25**, 131–6 (1976). The content and percent composition of cholesterol, triglyceride, phospholipids, and total proteins in HDL-2 and HDL-3 were quantitated in 5 women with familial hyperalphalipoproteinemia to determine if there are any distinctive characteristics of the high density lipoproteins in this heritable disorder. The 5 women with familial hyperalphalipoproteinemia (FHA) were compared to 4 normal women, with the groups being comparable in regards to age (40 ± 3 and 37 ± 5 years), total plasma cholesterol (202 ± 9 and 188 ± 16 mg/100 ml), triglyceride (75 ± 12 and 95 ± 19), and differing in levels of high density lipoprotein cholesterol (C-HDL, 84 ± 6 and 61 ± 3 mg/100 ml) respectively. Lipid-protein percent composition of HDL-2 and HDL-3 in FHA and normals was nearly identical, and polyacrylamide gel electrophoresis revealed no qualitative differences in band migration and appearance of the HDL-2 and HDL-3 fractions in normal and FHA subjects.

Cell proliferation in the atherosclerotic plaques of cholesterol-fed rabbits. Part 3. Histological and radioautographic observations on glucocorticoids-treated rabbits. C. Cavallero, U.D. Tondo, P.L. Mingazzini, R. Nicosia, M.N. Pericoli, P. Sarti, L.G. Spagnoli and S. Villaschi (Inst. of Pathol. Anatomy II, Univ. of Rome, Rome, Italy) *Atherosclerosis* **25**, 145–52 (1976). Tritiated thymidine radioautography was employed to study the effect of cortisol and other glucocorticoids on cellular proliferation in the aorta and pulmonary artery of rabbits with cholesterol atherosclerosis. Labelled cell counts showed that glucocorticoids, even after one day and at a relatively low dose, decrease sharply the deoxyribonucleic acid synthesis in the intimal plaques. It is concluded that the antiatherogenic effect of glucocorticoids on cholesterol-fed ragbits may be due, at least partly, to the inhibitory effect of these steroids on the DNA synthesis of the cellular components of the intimal plaques.

Control of the interaction of cholesterol ester-rich lipoproteins with arterial receptors. C.E. Day (The Upjohn Com., Kalamazoo, Mich. 49001) *Atherosclerosis* **25**, 199–204 (1976). Incorporation of ^{125}I-labeled cholesterol ester rich lipoproteins from cholesterol fed rabbits into normal rabbit aorta in vitro was inhibited by heparin, lecithin, and collagenase and by succinylation of the lipoprotein. Aortic uptake of lipoprotein was increased by neuraminidase, proteases, lipase, and β-glucuronidase. These results suggest that it may be possible to control atherogenesis by controlling the interaction of atherogenic lipoproteins with their arterial receptor.

Effects of methyl prednisolone and colchicine on the development of aortic atherosclerosis in swine. W.M. Lee, E.S. Morrison, R.F. Scott, K.T. Lee and M. Kroms (Dept. of

Pathol., Specialized Ctr. of Res. in Arterio., Neil Hellman Bldg., Albany Med. College, Albany, N.Y. 12208) *Atherosclerosis* 25, 213–24 (1976). The effect of methyl prednisolone and colchicine on the development of both the early proliferative and advanced atherosclerotic lesion in swine aorta was studied. In order to accelerate the development of atherosclerosis, the abdominal aortic endothelium was partially denuded by a balloon before the animals were placed on either a moderate or severe hypercholesterolemic diet. Neither drug in either dietary group inhibited the development of atherosclerosis. In swine receiving the moderate hypercholesterolemic diet, methyl prednisolone significantly raised serum cholesterol levels. Colchicine only slightly worsened the atherosclerosis in swine aorta and had no effect on serum cholesterol levels.

BINDING TO PLASMA LIPOPROTEINS OF CHLOROPHENOXYISOBUTYRIC, TIBRIC AND NICOTINIC ACIDS AND THEIR ESTERS. ITS SIGNIFICANCE FOR THE MECHANISM OF LIPID LOWERING BY CLOFIBRATE AND RELATED DRUGS. J.-L. Beaumont and C. Dachet (Inst. de Res. sur les Maladies Vasculaires de l'Univ. Paris Val-de-Marne, Unite de Res. sur l'Athero. of the INSERM, F-94010 Creteil, France) *Atherosclerosis* 25, 255–66 (1976). The binding of chlorophenoxyisobutyric (CPIB), tibric (TA) and nicotinic (NA) acids and CPIB ethyl ester (Clofibrate), TA and NA isopropyl esters (TAPE and NAPE) to human lipoproteins of low density of different classes (LDL$_2$, LDL$_1$ and VLDL) and high density (HDL) were studied by equilibrium dialysis and Sephadex gel filtration. Clofibrate and TAPE bound strongly to lipoproteins, but their acids, CPIB and TA and also NA and NAPE, did not bind. In the same experimental conditions, Clofibrate and TAPE bound only weakly to human serum albumin (HSA) and CPIB bound to HSA with a K_a of $3.3 \times 10^5\ M^{-1}$ for 1 site of high affinity. These results, and those already found in experiments made with three other drugs related to Clofibrate, lead to the proposal that in their interaction with lipoproteins, the phenyl groups are necessary and the esterification is contributory. The possible role of this interaction in the lipid-lowering effect of the drugs is discussed with special reference to their possible implication in lipoprotein synthesis within the intestinal and hepatic cells.

COMPARISON OF THE SERUM LOW DENSITY LIPOPROTEIN AND OF ITS APOPROTEIN IN THE PIG, RHESUS MONKEY AND BABOON WITH THAT IN MAN. M.J. Chapman and S. Goldstein (INSERM U.35, Unite de Res. sur le Metabolisme des Lipides, Hopital Henri Mondor, 94010 Creteil, France) *Atherosclerosis* 25, 267–91 (1976). The principal form of the serum low density lipoprotein (LDL) in man, baboon, rhesus monkey and pig was isolated by preparative ultracentrifugation in the density interval 1.024–1.045 g/ml. The physicochemical characteristics of pig LDL most closely resembled those of man; thus, electrophoretic studies suggested that both baboon and rhesus LDL have a greater surface charge than that of their human counterpart, and electron-microscopic investigations showed baboon LDL (245 Å) to be larger and rhesus LDL (205 Å) smaller than those of man (217 Å) and pig (228 Å). It is apparent that many characteristics typical of human serum LDL are found in those of the pig, rhesus monkey and baboon. Moreover, in view of the striking relationship existing between the immunological properties and apoprotein components of the LDL of the two Old World monkeys and that of man, these subhuman primates appear to be highly suitable as animal models for experimental atherosclerosis.

MECHANISM OF PANCREATIC LIPASE ACTION. 1. INTERFACIAL ACTIVATION OF PANCREATIC LIPASE. C. Chapus, M. Semeriva, C. Bovier-Lapierre, and P. Desnuelle (Centre de Biochim. et de Biol. Moleculaire du C.N.R.S. 31, 13274 Marseille Cedex 2, France) *Biochemistry* 15, 4980–7 (1976). Hydrolysis of dissolved *p*-nitrophenyl acetate by pancreatic lipase follows the classical acy enzyme pathway already proposed for other esterases. Kinetic parameters of the hydrolysis have been determined. The turnover rate of the reaction is many orders of magnitude slower than that for the natural emulsified substrates. Nevertheless, several arguments are in favor of the specificity of this hydrolysis: (1) triacetin, which resembles the usual substrates for the enzyme, is also hydrolyzed very slowly in solution; (2) dissolved triacetin and tripropionin are competitive inhibitors for the *p*-nitrophenyl acetate hydrolysis; (3) the same chemical structural features which are required in the case of emulsified substrates are also necessary to promote hydrolysis of dissolved *p*-nitrophenyl esters.

MEMBRANE-ASSOCIATED PHOSPHATIDYLGLYCEROPHOSPHATE SYNTHETASE FROM ESCHERICHIA COLI: PURIFICATION BY SUBSTRATE AFFINITY CHROMATOGRAPHY ON CYTIDINE 5′-DIPHOSPHO-1,2-DIACYL-SN-GLYCETOL SEPHAROSE. T. Hirabayashi, T.J. Larson and W. Dowhan (Dept. of Biochem. and Mole Biol., Univ. of Tex. Med. School, Houston, Tex. 77025) *Biochemistry* 15, 5205–11 (1976). The membrane-associated cytidine 5′-diphospho-1,2-diacyl-*sn*-glycerol (CDPdiglyceride): *sn*-glycerol-3-phosphate phosphatidyltransferase (EC 2.7.8.5) from *Escherichia coli* has been solubilized with Triton X-100 and purified 6000-fold to 85% of homogeneity. The major purification was attained using several modifications of the CDPdiglyceride Sepharose affinity chromatography system described by Larson et al. The native enzyme in Triton X-100 had an apparent molecular weight of over 200,000, as judged by Sepharose 6B gel filtration. The enzyme would not hydrolyze the pyrophosphate bond of its lipid substrate or the phosphate esters of its lipid product but would catalyze a cytidine 5′-monophosphate dependent exchange reaction between glycero-3-phosphate and phosphatidylglycerophosphate.

MOLECULAR CONTROL OF MEMBRANE PROPERTIES DURING TEMPERATURE ACCLIMATION. MEMBRANE FLUIDITY REGULATION OF FATTY ACID DESATURASE ACTION? R. Kasai, Y. Kitajima, C.E. Martin, Y. Nozawa, L. Skriver and G.A. Thompson, Jr. (Dept. of Botany, The Univ. of Texas, Austin, Tex. 78712) *Biochemistry* 15, 5228–33 (1976). Further studies on the molecular mechanisms of temperature acclimation have been carried out using the ciliate *Tetrahymena pyriformis*. The most prominent change in lipid metabolism during acclimation to high temperature-depression of fatty acid desaturase activity-could be simulated by supplementing the growth medium of isothermally-grown cells with polyunsaturated fatty acids. Such cells resisted the membrane-fluidizing effect of the incorporated exogenous acids by increased use of de novo synthesized saturated acids in their phospholipids. The data support the conclusions arising from earlier experiments with temperature-shifted cells, showing that, when membrane fluidity increased to a superoptimal level, the activity of membrane-associated fatty acid desaturases was decreased. Since the reaction is controlled by membrane fluidity, rather than temperature per se, we postulate that it is the general mechanism employed by cells adjusting to any fluidity-modifying factor, such as cations, drugs, etc.

STUDY OF ABNORMAL PLASMA LOW-DENSITY LIPOPROTEIN IN RHESUS MONKEYS WITH DIET-INDUCED HYPERLIPIDEMIA. G.M. Fless, R.W. Wissler and A.M. Scanu (Depts. of Med., Biochem., and Pathol., The Univ. of Chicago, Pritzker School of Med., Chicago, Ill. 60637) *Biochemistry* 15, 5799–805 (1976). Male rhesus monkeys were divided into three groups: five were fed a regular primate chow diet and were used as controls; four received an "average" American diet; and five a special low-fat primate chow diet supplemented with 25% coconut oil and 2% cholesterol. In all of these animals, the plasma low-density lipoproteins (LDL) were isolated by ultracentrifugal flotation between densities of 1.019 and 1.050 g/ml. The administration of either an "average" American diet or a coconut oil-cholesterol diet was accompanied by hypercholesterolemia associated with changes in LDL which were characterized by increases in molecular weight to $3.52 \pm 0.21 \times 10^6$ (average of nine monkeys) and in partial specific volume to 0.973 ± 0.002 ml/g. These changes were particularly evident when the molecular weight of LDL from monkeys in the normolipidemic state was compared with that obtained from the same monkeys during the hyperlipidemic state. The changes in physical and chemical properties noted in the LDL of rhesus monkeys with experimentally induced hypercholesterolemia contrast with the apparent structurally normal LDL from rhesus monkeys with spontaneous hypercholesterolemia reported previously.

LIPID BILAYER ULTRASTRUCTURE. ELECTRON DENSITY PROFILES AND CHAIN TILT ANGLES AS DETERMINED BY X-RAY DIFFRACTION. T.J. McIntosh, R.C. Waldbillig and J.D. Robertson (Dept. of Anat., Duke Univ. Sch. of Med, Durham, N.C. 27710) *Biochim. Biophys. Acta* 448, 15–33 (1976). High resolution (6 Å) electron density profiles have been computed on an absolute electron density scale for bilayers composed of both saturated fatty acids and fatty acids associated with the alkaline earth series of divalent cations. Low-angle X-ray diffraction data have been interpreted by an isomorphous replacement technique. The position on the X-ray film of discrete wide-angle reflections has provided direct information on the hydrocarbon chain packing and chain tilt in these bilayers. These results have been correlated to an electron microscopy study of the same bilayers and also to X-ray diffraction studies of fatty acid crystals. A method for forming and structurally analyzing bilayers of well defined chemical asymmetry is also described.

PHOSPHOLIPIDS OF SEMLIKI FOREST VIRUS GROWN IN CULTURED MOSQUITO CELLS. A. Luukkonen, L. Kaariainen and O. Renkonen (Dept. of Biochem. and Virology, Univ. of Helsinki, Haartmaninkatu 3, SF-00290 Helsinki 29 Finland) *Biochim. Biophys. Acta* **450**, 109–20 (1976). The phospholipids of Semliki Forest virus grown in mosquito cells *(Aedes albopictus)* were analyzed radiochemically. The ratio of ^{32}P-labeled phospholipids to total ^{32}P-label in the virus grown in mosquito cells equilibrated with radiophosphorus was 0.558 ± 0.021. This value was similar to the lipid phosphorus:total phosphorus ratio (0.539 ± 0.025) of the virus grown in the BHK cells. It is concluded that an average virion of the two types of Semliki Forest virus contains approximately the same number of phospholipid molecules. Phosphatidylethanolamine (62%), phosphatidylcholine (14%), phosphatidylserine (10%) and the ethanolamine analogue of sphingomyelin, ceramide phosphoethanolamine (9%) were the principal phospholipids in the mosquito cell-grown virus. Comparison with the lipids of virus grown in hamster cells (BHK cells) revealed that two-thirds of the polar structures were dissimilar. Surface labeling with formylmethionyl[^{35}S]sulfone methylphosphate suggests that a relatively large fraction of ceramide phosphoethanolamine is located in the outer half of the lipid bilayer of the viral membrane.

STUDIES ON PULMONARY SURFACTANT. EFFECTS OF CORTISOL ADMINISTRATION TO FETAL RABBITS ON LUNG PHOSPHOLIPID CONTENT, COMPOSITION AND BIOSYNTHESIS. S.A. Rooney, L. Gobran, I. Gross, T.S. Wai-lee, L.L. Nardone and E.K. Motoyama (Yale Univ. Lung Res. Cen., New Haven, Conn. 06510) *Biochim. Biophys. Acta* **450**, 121–30 (1976). Corticosteroids are known to accelerate maturation of the fetal lung and production of surfactant. We examined the effect of cortisol administration to fetal rabbits on the phospholipid content and composition of lung lavage and lung tissue, as well as on the activities of enzymes involved in the synthesis of phosphatidylcholine and phosphatidylglycerol, the major surface-active components of surfactant. Cortisol was administered by intrauterine injection at 25 days' gestation and the fetuses were delivered at 27 days (full term, 31 days). Saline-injected fetuses, littermates of the cortisol-treated as well as non-littermates, were used as controls. Cortisol administration had no effect on the activities of pulmonary choline kinase, cholinephosphotransferase, lysophosphatidic acid acyltransferase and glycerolphosphate phosphatidyltransferase, although we have previously shown the latter enzyme to be stimulated following a longer period of exposure to the hormone. Saline injection produced some maturational effects presumably as a result of stress, which may be mediated by corticosteroids or other hormones.

IDENTIFICATION OF ACYL PHOSPHATIDYLGLYCEROL AS A MINOR PHOSPHOLIPID OF PSEUDOMONAS BAL-31. N. Tsukagoshi, M.N. Kania, and R.M. Franklin (Dept. of Structure Biology, Biocenter, Univ. of Basel, Klingelbergstrasse 70, CH-4056 Basel, Switzerland) *Biochim. Biophys. Acta* **450**, 131–6 (1976). Compound X, a minor phospholipid of *Pseudomonas* Bal-31 and bacteriophage PM2, has been identified as X-3-phosphatidyl-1'-(3'-acyl)-glycerol, or acyl phosphatidylglycerol. The water-soluble product obtained by mild alkaline hydrolysis showed the same R_F value as that of glycerophosphoryl-glycerol. The chemical analysis gave the ratio 1:3:2 for phosphate-acyl ester-glycerol. The position of the third acyl group was determined by nuclear magnetic resonance techniques.

FATTY ACID COMPOSITION AND PHOSPHOLIPID PATTERN IN AUXOTROPHS FOR UNSATURATED FATTY ACIDS. A.R. Beaudoin (Dept. de Biol., Faculte des Sciences, Univ. de Sherbrooke, Sherbrooke, Quebec, Canada) *Biochim. Biophys. Acta* **450**, 137–41 (1976). The relationship between fatty acid composition and phospholipid pattern has been studied in *Escherichia coli* auxotrophs for unsaturated fatty acids. The presence of a regulatory mechanism which enables the organism to maintain a given fluidity of the lipids has been corroborated using exogenous fatty acids which cause dramatic changes in fatty acid composition. The fatty composition of phosphatidic acid is different from that of the other classes of phospholipids. Changes in fatty acid composition are concomittant with the alteration of the phospholipid pattern. The ratio of phosphatidylglycerol to diphosphatidylglycerol is particularly sensitive to the physical characteristics of the exogenous unsaturated fatty acid. The relative increase in diphosphatidylglycerol is associated with membrane alterations.

PROPERTIES OF TRIACYLGLYCEROL LIPASE IN A MITOCHONDRIAL FRACTION FROM BAKER'S YEAST (SACCHAROMYCES CEREVISIAE). I. Schousboe (Dept. of Biochem. C, Univ. of Copenhagen, Panum Inst., Blegdamsvej 3, DK-2200 Copenhagen N, Denmark) *Biochim. Biophys. Acta* **450**, 165–74 (1976). A triacylglycerol lipase in a mitochondrial fraction isolated from yeast *(Saccharomyces cerevisiae)* has been characterized and the hydrolysis studied kinetically using an insoluble artificial triacylglycerol suspension. The triacylglycerol was hydrolyzed almost completely to fatty acids and glycerol. The lipase activity was inhibited by potassium flouride and the sodium salts of -chloride, -glycocholate and -pyrophosphate as well as by protamine sulfate but at concentrations much too high to indicate that the lipase is a nonspecific esterase or a lipoprotein lipase. Also parachloromercuribenzoate inhibited the lipase activity. Inhibitory effect of fatty acid was observed at concentrations above 1 mM. This inhibition may provide a regulatory mechanism of the lipase in vivo. The particulate nature of the assay system was illustrated by the observation that the apparent K_m value of the lipase increased with the concentration of mitochondrial protein.

PROPERTIES OF MICROSOMAL PHOSPHOLIPASES IN RAT LIVER AND HEPATOMA. R.H. Lumb and K.F. Allen (Dept. of Biol., Western Carolina Univ., Cullowhee, N.C. 28723) *Biochim. Biophys. Acta* **450**, 175–84 (1976). Phospholipase A_1, A_2 and lysophospholipase activities in microsomes of Novikoff hepatoma, host rat liver and regenerating rat liver were compared using 1-[9',10'-^{3}H$_2$]palmitoyl-2-[1'-^{14}C]linoleoyl-*sn*-glycero-3-phosphoethanolamine as substrates. Microsomes of all three tissues showed two pH dependent peaks of hydrolytic activity, one at pH 7.5 and another at pH 9.5. Lysophospholipase activity was evident in the microsomes from all three tissues. The activity was inhibited by both Ca^{2+} and Triton X-100. Differences were also detected between host liver and hepatoma microsomal phospholipid hydrolase activities with respect to the effect of increasing protein concentration, apparent Michaelis-Menten constants, and time course of the reaction.

THE EFFECTS OF DIETARY FAT AND CHOLESTEROL ON THE METABOLISM OF PLASMA LOW DENSITY LIPOPROTEIN APOPROTEINS IN SQUIRREL MONKEYS. O.W. Portman, M. Alexander, N.T. and P. Soltys (Dept. of Nutr. and Metabolic Diseases, Oreg. Reg. Primate Res. Cen., Beaverton, Oreg. 97005) *Biochim. Biophys. Acta* **450**, 185–96 (1976). Low density lipoprotein apoproteins from squirrel monkeys *(Saimiri sciureus)* had characteristic 2-phase die-away curves in plasma. The kinetic constants were similar with three methods of labeling: in vitro with ^{125}I by the iodine monochloride or the Bolton-Hunter methods or in vivo by the injection of [^{3}H]-leucine into a donor animal. Dietary cholesterol and the type of dietary fat influenced the concentration of plasma cholesterol and low density lipoproteins. The fractional turnover of low density lipoprotein apoprotein was greater in monkeys fed semipurified diets with safflower oil than in those on butter but was not influenced by dietary cholesterol. The total low density lipoprotein apoprotein turnover (the product of fractional turnover and plasma lipoprotein concentration) was highest in monkeys fed butter plus added cholesterol and lowest in those on safflower oil without cholesterol. Dietary safflower oil resulted in a smaller proportion of the total low density lipoprotein pool in the intravascular compartment than did butter, regardless of whether cholesterol was added.

RELATIONSHIP BETWEEN CELL SIZE, PLASMA CHOLESTEROL AND RAT ADIPOCYTE CHOLESTEROL STORAGE. B.R. Krause and A.D. Hartman (Dept. of Physiol., Univ. of Ill. at the Med. Cen., Chgo., Ill. 60612) *Biochim. Biophys. Acta* **450**, 197–205 (1976). Plasma cholesterol and cholesterol storage/10^6 adipocytes were determined in the epididymal, perirenal, subcutaneous, and mesenteric fat depots of the fasted male rat. Adipocyte cholesterol increased exponentially as functions of mean cell diameter, body weight, and cell size (μg triacylglycerol/cell) in all depots examined, whereas plasma cholesterol was best described as a parabolic function of body weight. In all but the mesenteric depot, expression of storage as a ratio of cellular cholesterol:triacylglycerol was also described as a parabolic function of body weight, resulting in curves parallel to the cholesterol-body weight relationship. It is suggested that adipose tissue cholesterol storage is most rapid after adipocyte number becomes fixed, the level of cholesterol in the plasma may be a major determinant of fat cell cholesterol storage, especially in subcutaneous cells from adult animals in which cell size is constant but cholesterol storage continues to increase, and the effect of plasma cholesterol is less pronounced in *mesenteric adipocytes*.

The stereochemical configuration of lysobisphosphatidic acid from rat liver, rabbit lung and pig lung. A. Joutti, J. Brotherus, O. Renkonen, R. Laine and W. Fischer (Dept. of Biochem., Lab. of Lipid Res., Univ. of Helsinki, Haartmaninkatu 3, SF-00290 Helsinki 29, Finland) *Biochim. Biophys. Acta* **450**, 206–9 (1976). Lysobisphosphatidic acid known also as bis(monoacyl-glycerol)phosphate, was isolated from liver of rats treated with Triton WR1339, and from rabbit and pig lung. Alkaline hydrolysates of all these samples of lysobisphosphatidic acid were essentially similar and contained phosphorus, total glycerol, free glycerol, total glycerophosphates, β-glycerophosphate, total α-glycerophosphates, *sn*-glycero-1-phosphate and *sn*-glycero-3-phosphate in a molar ratio of 1.0 : 2.0 : 1.0 : 1.0 : 0.6 : 0.4 : 0.38 : 0.04. This proves that the backbone of the principal lysobisphosphatidic acid from all three sources has the structure of 1-*sn*-glycerophospho-1-*sn*-glycerol.

An ornithine-containing lipid isolated from Gluconobacter cerinus. Y. Tahara, M. Kameda, Y. Yamada and K. Kondo (Lab. of Applied Microbiol., Dept. of Agr. Chem., Shizuoka Univ., Shizuoka 422, Japan) *Biochim. Biophys. Acta* **450**, 225–30 (1976). The three ornithine-containing lipids of *Gluconobacter cerinus* were isolated from each other. One of the three lipids was postulated as Nα-3-hydroxypalmitoyl-ornithine, to the fatty acid moiety of which 2-hydroxy fatty acid is linked by an ester linkage. The 2-hydroxy acid was possibly *cis*-11, 12-methylene-2-hydroxyoctadecanoate. Such an ornithine-containing lipid was found to be distributed in other acetic acid bacteria.

Potentiation of ethanol fatty liver in rats by chronic administration of nicotinic acid. M.F. Sorrell, H. Baker, D.J. Tuma, O. Frank and A.J. Barak (Liver Study Unit, Gastroenterology Sect., Vet. Admin. Hosp. and the Dept. of Biochem. and Med., Univ. of Nebraska Med. Cen., Omaha, Nebr., 68105) *Biochim. Biophys. Acta* **450**, 231–8 (1976). Two groups of rats were fed isocalorically on alcohol and control semi-liquid diet for 28 days; two other groups had the same diets except for supplementation with nicotinic acid at 50 mg/100 ml of diet. Blood ethanol levels were unaffected by nicotinic acid administration, even though nicotinic acid was well absorbed and stored in the liver. Lipid analyses of liver and plasma after 28 days revealed that nicotinic acid, per se, stimulated fatty infiltration of the liver and this effect was potentiated when given in conjunction with ethanol.

Modification of the Ehrlich ascites tumor cell nuclear lipids. A.B. Awad and A.A. Spector (Dept. of Biochem. and Med., Univ. of Iowa, Iowa City, Iowa 52242) *Biochim. Biophys. Acta* **450**, 239–51 (1976). The fatty acid composition of Ehrlich ascites tumor cell nuclei was different when the tumor-bearing mice were fed diets rich in either coconut or sunflower oil. When coconut oil was fed, the monoenoic fatty acid content of many of the nuclear lipids was increased and their polyenoic fatty acid content was reduced as compared with the sunflower oil diet. By contrast, only small changes were produced in the saturated fatty acid contents of the nuclear lipids. The nuclear membrane choline phospholipid, ethanolamine phospholipid and combined serine phospholipid plus inositol phospholipid fractions exhibited statistically significant changes in fatty acid composition, but the sphingomyelins were not altered appreciably by dietary lipid modification. The fatty acid composition of the small quantity of phospholipids associated with the chromatin was much more resistant to diet-induced modification.

Comparison of linoleic acid and stearic acid absorption by the gallbladder. D.H. Neiderhiser and C.K. Harmon (Med. Res. Service, Vet. Admin. Hosp., Cleveland, Ohio 44106) *Biochim. Biophys. Acta* **450**, 252–60 (1976). The absorption of $[^{14}C]$linoleic acid and $[^{14}C]$stearic acid in guinea pig bile by the in situ guinea pig gallbladder was compared. Linoleic acid was adsorbed at a faster rate than was stearic acid. Differences were also observed in the incorporation of these two fatty acids into complex lipids of the gallbladder mucosa. A greater portion of adsorbed linoleic acid was incorporated into triacylglycerol whereas a greater portion of stearic acid was incorporated into sphingomyelin. The significance of these findings in relation to the fatty acid composition of bile is discussed.

Biosynthesis of cyclopentenyl fatty acids. (2-Cyclopentenyl)carboxylic acid (aleprolic acid) as a special primer for fatty acid biosynthesis in Flacourtiaceae. U. Cramer and F. Spener (Inst. for Biochem., Univ. Munster, Orleansring 23a, 4400 Munster, G.F.R.) *Biochim. Biophys. Acta* **450**, 261–5 (1976). The biosynthesis of cyclopentenyl fatty acids from (2-cyclopentenyl)carboxylic acid (aleprolic acid) via chain-lengthening by C_2-units was tested in seeds and leaves of ***Caloncoba echinata*** and ***Hydnocarpus anthelminthica*** of Flacourtiaceae and in various preparations of higher plants other than Flacourtiaceae. Only tissues of Flacourtiaceae, where cyclopentenyl fatty acids are found naturally, were able to accept aleprolic acid as a starter molecule for the synthesis of cyclic fatty acids. Labelling patterns of straight chain and cyclic fatty acids, synthesized after incubation of Flacourtiaceae seeds with $[1\text{-}^{14}C]$-acetate, indicated de novo synthesis of C_{16} fatty acids in either case, followed by elongation to higher homologs.

The formation of prostaglandin A_1-glutathione adduct in the lung. K.B. Gross and C.N. Gillis (Dept. of Anesthesiology and Pharm., Yale Univ. Sch. of Med., 333 Cedar St., New Haven, Conn. 06510) *Biochim. Biophys. Acta* **450**, 266–8 (1976). Prostaglandin A_1 is conjugated with glutathione during passage through the pulmonary vasculature in a blood-free medium.

Purification and positional specificity of sn-glycerol-3-phosphate acyltransferase from Escherichia coli membranes. M. Ishinaga, M. Nishihara and M. Kito (Res. Inst. for Food Sci., Kyoto Univ. Uji, Kyoto 611, Japan) *Biochim. Biophys. Acta* **450**, 269–72 (1976). *sn*-Glycerol-3-phosphate acyltransferase was solubilized from membranes of *Escherichia coli* B and K-12 and purified on an affinity column of Sepharose 4B coupled with 6-phosphogluconic acid. Phosphatidylglycerol was required for activation and stabilization of the purified enzyme. The acyl residues were exclusively transferred to the position 1 of *sn*-glycerol 3-phosphate by the enzyme, regardless of whether the acyl-CoA was saturated or unsaturated.

New aspects of liposomes. D.A. Tyrrell, T.D. Heath, C.M. Colley and B.E. Ryman (Univ. of London, Dept. of Biochem., Charing Cross Hosp. Med. School, Fulham Palace Rd., London W68RF, U.K.) *Biochim. Biophys. Acta* **457**, 259–302 (1976). Although all the aspects of liposomes discussed in this review are of considerable interest and will undoubtedly repay further study, before liposomes can be accepted as therapeutic agents in man, more must be known about the factors governing the uptake of liposomes when given in vivo. Until this aspect and the other matters outlined above are clarified, the paeans of praise for the multipotential liposome must remain slightly muted.

Interaction of glucose oxidase with phospholipid vesicles. B. Solomon and I.R. Miller (Dept. of Membranes, The Weizmann Inst. of Sci., Rehovot, Israel) *Biochim. Biophys. Acta* **455**, 332–42 (1976). The interactions between glucose oxidase and phospholipid vesicles were investigated. The investigations were carried on molecules adsorbed on the outer surfaces as well as entrapped in the interior of the vesicles. The adsorption of glucose oxidase on the surfaces of egg lecithin vesicles, containing varying amounts of cholesterol and stearoylamine was measured by determining the free fraction of glucose oxidase detected in the filtrates. In order to entrap glucose oxidase into the vesicles, the lipid was sonicated in the presence of the enzyme. After removal of the free and adsorbed enzyme the amount of the entrapped enzyme was determined by measuring its activity after disintegration of the vesicles with Triton. The enzymic activity of the entrapped glucose oxidase served as a measure for the permeability of the bilayer membrane of the lipid vesicles to glucose. Addition of insulin to the suspension of vesicles containing the entrapped glucose oxidase increased the permeability of glucose by up to $9 \cdot 10^{-8}$ cm/s. This value is the lowest estimate based on the assumption that one glucose oxidase molecule was entrapped in every vesicle.

Lipid-protein interactions with native and modified myelin basic protein. A.J. Steck, H.P. Siegrist, P. Zahler and N.N. Herschkowitz (Dept. of Ped., Univ. of Bern, Switzerland) *Biochim. Biophys. Acta* **455**, 343–52 (1976). The basic protein of central nervous system myelin has been shown to form complexes with acidic lipids in vitro. We measured the interaction of myelin basic protein with several charged and neutral lipids in a biphasic chloroform/methanol/water system and investigated the effect of decreasing the electrical charge of the basic amino groups of the myelin basic protein by acetylation. The modified myelin basic protein, which has an average of eight acetyl residues incorporated, was characterised by gel electrophoresis and circular dichroism. Complexes formed between the acetylated myelin basic protein and acidic lipids exhibited a reduction in the amount of lipids bound, a value that could be correlated with the number of modified amino groups. The significance of these experiments with reference to protein-lipid interaction in the myelin membrane is discussed.

MOLECULAR ARRANGEMENTS IN SPHINGOLIPIDS. CONFORMATION AND HYDROGEN BONDING OF CERAMIDE AND THEIR IMPLICATION ON MEMBRANE STABILITY AND PERMEABILITY. I. Pascher (Dept. of Structural Chem., Faculty of Med., Univ. of Goteborg, Fack, S-40033 Goteborg 33, Sweden) *Biochim. Biophys. Acta* **455**, 433–51 (1976). The preferred conformation of the ceramide part of sphingolipids has been deduced from single crystal structures of a series of sphingolipid constituents: *N*-tetracosanoylphytosphingosine, glycosylphytosphingosine hydrochloride, sphingosine hydrochloride, triacetylsphingosine, DL-2-hydroxytetradecanoic acid and *N*-stearoylethanolamine. The amide group of the ceramide, which serves as a link between the hydrocarbon chains, has a basic significance for the conformation of the entire molecule. The functional role of the hydrogen bonding groups in the ceramide part of sphingolipids is emphasized and their significance for the formation of lateral hydrogen bonds within the membrane layer and thereof arising effects on membrane stability and permeability are discussed.

CALORIMETRIC AND FREEZE FRACTURE ANALYSIS OF LIPID PHASE TRANSITIONS AND LATERAL TRANSLATIONAL MOTION OF INTRAMEMBRANE PARTICLES IN MITOCHONDRIAL MEMBRANES. C.R. Hackenbrock, M. Hochli and R.M. Chau (Dept. of Cell Biol., The Univ. of Texas Health Sci. Ctr., Southwestern Med. Schl., Dallas, Texas 75235) *Biochim. Biophys. Acta* **455**, 466–84 (1976). Differential scanning calorimetry combined with freeze fracture electron microscopy reveals that thermotropic lipid phase transitions and lateral translational motion of intramembrane particles occur in both membranes of whole, intact rat liver mitochondria and in isolated inner and outer membranes. The onset temperature of the liquid crystalline to gel state lipid phase transition in whole mitochondria and in the isolated outer membrane fraction is biphasic with an initial transition exotherm occurring at 9°C. The onset temperature of the transition exotherm of the isolated inner membrane occurs at −4°C. The onset temperature of the lipid transition endotherm is −15°C for whole mitochondria, the inner membrane, and the outer membrane fractions. These calorimetric analyses reveal that the bilayer lipid in the inner, energy transducing membrane is more fluid than in the outer membrane.

GLYCOLIPIDS IN MODEL MEMBRANES. SPIN LABEL AND FREEZE-ETCH STUDIES. F.J. Sharom, D.G. Barratt, A.E. Thede and C.W.M. Grant (Dept. of Biochem., Univ. of Western Ontario, London, Ontario, N6A 5C1, Canada) *Biochim. Biophys. Acta* **455**, 485–92 (1976). Several types of glycolipid are examined in lipid bilayer model membranes as part of a program to clarify their function in living cells. Data obtained with three spin labelled derivatives of galactosyl ceramide is reported showing a fatty acid gluidity gradient similar to that obtained with phospholipid spin labels. Some possible structural implications of the observed differences are considered. Results obtained using Freeze-Etch electron microscopy and hemagglutination inhibition are given showing beef brain gangliosides in lipid vesicles to be effective receptors for influenza virus.

EFFECT OF BILAYER CURVATURE ON VIBRATIONAL RAMAN SPECTROSCOPIC BEHAVIOR OF PHOSPHOLIPID-WATER ASSEMBLIES. R.C. Spiker, Jr. and I.W. Levin (Lab. of Chem. Phys., Nat'l. Inst. of Arthritis, Metabolism and Digestive Diseases, Nat'l. Inst. of Health, Bethesda, Md. 20014) *Biochim. Biophys. Acta* **455**, 560–75 (1976). In order to clarify the effect of bilayer curvature upon phospholipid conformation, vibrational Raman spectra were recorded for dipalmitoyl and dimyristroyl phosphatidylcholine in the gel state for both multilayer and single-wall vesicle assemblies. An intensity comparison, based upon a nonperturbing internal standard, between the two classes of bilayer systems reflected a decrease in peak height intensity for the observed hydrocarbon chain transitions in the single shell vesicle form. No intensity change between bilayer form was detected, however, for the two observed head group modes. Trends in the peak height intensity ratios for the 1100 cm^{-1} carbon-carbon stretching vibrations indicated an increase in hydrocarbon chain *trans-gauche* isomerization for the vesicle in comparison to the multilayer arrangements.

USE OF PHOSPHOLIPID-CLAY COMPLEXES FOR DETERMINING VIBRATIONAL SPECTRA OF MEMBRANE RELATED SYSTEMS. R.C. Spiker, Jr., T.J. Pinnavaia and I.W. Levin (Lab. of Chem. Phys., Nat'l. Inst. of Arthritis, Metabolism and Digestive Diseases, Nat'l. Insts. of Health, Bethesda, Md. 20014) *Biochim. Biophys. Acta* **455**, 588–96 (1976). For determining the infrared and Raman spectra of membrane related systems, a method is developed to incorporate phospholipid bilayer assemblies in a clay matrix to form ultra-thin, self-supporting films. These films, containing stabilized bilayers arranged between the silicate layers of hectorite, are in the shape of discs which measure about 2 cm in diameter and 25 microns thick and require approximately 2 mg of phospholipid for preparation. Although several spectral regions below 1100 cm^{-1} are masked by the host clay, both head group and acyl chain vibrations may be conveniently observed and monitored for phospholipid conformational changes.

FUSION AND PROTEIN-MEDIATED PHOSPHOLIPID EXCHANGE STUDIED WITH SINGLE BILAYER PHOSPHATIDYLCHOLINE VESICLES OF DIFFERENT DENSITY. E.A. Dawidowicz and J.E. Rothman (Biophys. Lab. and Dept. of Biol. Chem., Harvard Med. School, 25 Shattuck St., Boston, Mass. 02115) *Biochim. Biophys. Acta* **455**, 621–30 (1976). A novel method has been developed for the study of phospholipid exchange and fusion of phospholipid vesicles. Two homogeneous populations of single bilayer phosphatidylcholine vesicles of similar size but markedly different density have been prepared. "Dense" vesicles were made from brominated dioleoyl phosphatidylcholine. "Light" vesicles were prepared from dioleoyl phosphatidylcholine. The two populations were easily separated by density gradient centrifugation. Phosphatidylcholine exchange protein from beef liver was used to promote lecithin exchange between the vesicle populations. Only the lecithin of the external monolayers of the vesicles was available for exchange by exchange protein, implying that flip-flop of vesicle phosphatidylcholine did not take place at a detectable frequency. No spontaneous intervesicle phosphatidylcholine exchange was observed. However, the dense and light vesicles did spontaneously fuse, over several hours, to produce particles of hybrid density.

THE LIPID COMPOSITION OF PLASMA MEMBRANE SUBFRACTIONS ORIGINATING FROM THE THREE MAJOR FUNCTIONAL DOMAINS OF THE RAT HEPATOCYTE CELL SURFACE. T. Kremmer, M.H. Wisher and W.H. Evans (Inst. of Oncopathology, Budapest XII, Hungary) *Biochim. Biophys. Acta* **455**, 655–64 (1976). The neutral and phospholipid compositions of three rat liver plasma membrane subfractions originating predominantly from the three major functional domains of the hepatocyte viz the blood sinusoidal, contiguous and bile canalicular fractions, were determined. The phospholipid profiles of the three surfractions were generally similar. However, the canalicular plasma membrane subfraction contained a higher proportion of sphingomyelin than the other subfractions. Correlations between the neutral and phospholipid composition of the subfractions and membrane integrity and function are discussed, especially with respect to a possible role of lipids in governing the resilience of the canalicular plasma membrane to the action of bile salts.

POSITIONAL AND SPECIES ANALYSIS OF MEMBRANE PHOSPHOLIPIDS EXTRACTED FROM GOLDFISH ADAPTED TO DIFFERENT ENVIRONMENTAL TEMPERATURES. N.G.A. Miller, M.W. Hill and M.W. Smith (Agr. Res. Council Inst. of Animal Physiol., Babraham, Cambridge CB2 4AT, U.K.) *Biochim. Biophys. Acta* **455**, 644–54 (1976). The proportion of ethanolamine phosphoglycerides in microsomal fractions of goldfish intestine increases at low environmental temperatures. The fatty acyl composition also changes, the proportion of $C_{22:6}$ and $C_{20:4}$ fatty acids increasing in positions 1 and 2 and position 2 respectively. The proportion of $C_{16:0}$ and $C_{18:0}$ fatty acids falls in position 1 and there is an apparent switch of $C_{18:1}$ and $C_{20:1}$ fatty acids from position 2 to position 1. Present results show temperature adaptation to be highly complex, involving both quantitative and qualitative changes in different phospholipids. The possible physiological significance of these changes are discussed together with the effects these changes might have on cholesterol-phospholipid interactions.

MECHANISM OF ION TRANSPORT THROUGH LIPID BILAYER-MEMBRANES MEDIATED BY PEPTIDE CYCLO-(D-VAL-L-PRO-L-VAL-D-PRO)$_3$. R. Benz, B.F. Gisin, H.P. Ting-Beall, D.C. Tosteson, and P. Lauger (Dept. of Biol., Univ. of Konstanz, D-7750

Konstanz, G.F.R.) *Biochim. Biophys. Acta* **455**, 665–84 (1976). The cyclic dodecapeptide PV, *cyclo*-(D-Val-L-Pro-L-Val-D-Pro)$_3$, a structural analogue of the ion-carrier valinomycin, increases the cation permeability of lipid bilayer membranes. This paper reports the results of two types of relaxation experiments, namely relaxation of the membrane current after a voltage jump and decay of the membrane voltage after a charge pulse in lipid bilayer membranes exposed to PV. These and earlier results are consistent with the idea that PV promotes cation movement across membranes by the solution complexation mechanism which involves complexation between ion and carrier in the aqueous phase and transport of the carrier across the membrane. The comparison of the kinetic properties of these two closely related compounds yields interesting insights into the relationship between chemical structure and function of ion carriers.

Voltage-induced capacitance relaxation of lipid bilayer membranes. Effects of membrane composition. R. Benz and K. Janko (Fachbereich Biol., Univ. Konstanz, D-775 Konstanz, G.F.R.) *Biochim. Biophys. Acta* **455**, 721–38 (1976). The specific capacity of black lipid membranes of different phospholipids dissolved in *n*-alkanes was investigated. The hydrocarbon thickness of these membranes, as calculated from the electric capacity with a dielectric constant of 2.1, was in most cases close to 5 nm. It was found that the specific capacity is not constant with time after blackening. It shows a linear time dependence characteristic for each lipid-solvent system. The influence of a transmembrane potential on the capacity of the membranes was measured. It was shown that the extent of the capacity change, obtained 10 s after applying a voltage, was strongly dependent on the lipid composition as well as the solvent content of the membranes. The capacity change of the membranes seems to be caused mainly by a thickness change and not by an area increase of the membranes.

Voltage-clamp experiments on oxidized cholesterol membranes modified with excitability-inducing material and comparison with a model. R.A. Hoffman, D.D. Long, R.A. Arndt and L.D. Roper (Dept. of Phys., Virginia Polytechnic Inst. and St. Univ., Blacksburg, Va. 24061) *Biochim. Biophys. Acta* **455**, 780–95 (1976). The conductance of oxidized cholesterol membranes modified with excitability-inducing material was observed in membranes containing either single conductance channels or 100–1,000 channels. Membranes containing single channels have several conductance states for each voltage polarity, and the current through membranes containing many channels decays with at least two, and probably three, time constants following a step change in voltage (voltage-clamp). The time constants differ by about an order of magnitude. The multi-state behavior seems more pronounced in membranes made from highly oxidized cholesterol. Although a given conductance state could occur at either positive or negative voltages, each state was much more frequent at one polarity or the other.

Facilitated transport of di- and trinitrophenolate ions across lipid membranes by valinomycin and nonactin. H. Ginsburg and G. Stark (The Inst. of Life Sci., The Hebrew Univ. of Jerusalem, Jerusalem, Israel) *Biochim. Biophys. Acta* **455**, 685–700 (1976). The conductance of black lipid membranes in the presence of 2,4,6-trinitrophenol (or 2,4-dinitrophenol) is considerably enhanced, if the cation carriers valinomycin, enniatin B or nonactin are added. The effect is, however, largely independent of the cation concentration and is identical for the cations Li^+, Na^+ and Ba^{2+}. This finding, as well as the sign and magnitude of the diffusion potential in the presence of a gradient of picrate are consistent with the assumption that the transport of picrate anions is facilitated by the above-mentioned macrocyclic compounds, but that cations *not* directly involved.

Dietary cholesterol caused modification in the structure and function of rat hepatic microsomes, studied by fluorescent probes. M. Lang (Dept. of Physiol., Univ. of Kuopio, SF-70101 Kuopio 10, Finland) *Biochim. Biophys. Acta* **455**, 947–60 (1976). A 4% cholesterol diet fed to rats for four weeks was found to increase the phospholipid and cholesterol contents and the activities of drug metabolizing enzymes in rat liver microsomes. Microsomes from rats on a high cholesterol diet were able to enhance the fluorescence of membrane bound 1-anilinonaphthalene 8-sulphonate (1,8-ANS) and ethidium bromide more than microsomes from rats on a standard diet. In the case of 1,8-ANS, the enhanced fluorescence was found to be due to the increased affinity of the molecules for microsomes. In the case of ethidium bromide the fluorescence increased partly because of the larger amount of binding sites and partly because of the enhanced quantum yield of the molecules. It is concluded that the binding sites of 1,8-ANS in microsomes are important for the activity of drug-metabolizing enzymes.

An analysis of the X-ray interchain peak profile in dipalmitoylglycerophosphocholine. G.W. Brady and D.B. Fein (Div. of Lab. and Res., New York State Dept. of Health, Albany, N.Y. 12208) *Biochim. Biophys. Acta* **464**, 249–59 (1977). The primary X-ray peak profile characterizing the *interchain structure in the dipalmitoylglycerophosphocholine* membrane has been measured as a function of temperature. The scattering between 23 and 34.6°C is characterized by an asymmetric crystalline reflection accounting for 85% of the total intensity, the remaining 15% being liquid-like in character. At a pre-transition temperature of 34.6°C, the reflection profile becomes (nearly) symmetrical, indicating a change in tilt angle of the chains with respect to the membrane surface. This change is accompanied by an increase of 20% in the amount of liquid-like scattering, indicating that the pre-transition mechanism includes a partial melting of the chains. At the melting point, 41.5°C, the crystalline reflection disappears, and the liquid component of the scattering increases to a point where it includes all the scattered intensity. The relative values of the integrated intensities at each temperature are tabulated, and the significance of the peak widths and shapes are discussed.

Lipid phase transitions in model biomembranes. The effect of ions on phosphatidylcholine bilayers. D. Chapman, W.E. Peel, B. Kingston and T.H. Lilley (Dept. of Chem., Chelsea College, Univ. of London, London, SW3 6LX, U.K.) *Biochim. Biophys. Acta* **464**, 260–75 (1977). Differential scanning calorimetry has been used to study the endothermic phase behaviour of some model biomembranes (i.e. phosphatidylcholine-water systems) in the presence of a wide range of alkaline, alkaline earth and heavy metal salts. Studies and comparisons were made of both cation and anion effects. Shifts occur in the temperatures of both the pre-transition and main transition endotherms. The observed shifts are smaller than those which have been reported for charged lipids, and no evidence has been found for the formation of specific complexes. Electron microscopic studies on freeze-fractured dispersions of phosphatidylcholine-water-salt systems show that with some salts the typical rippled surface observed with L-α-dimyristoyl phosphatidylcholine, when in the gel state, is replaced by a smooth surface.

Raman spectroscopic investigation of the interaction of gramicidin A with dipalmitoyl phosphatidylcholine liposomes. E. Weidekamm, E. Bamberg, D. Brdiczka, G. Wildermuth, F. Macco, W. Lehmann and R. Weber (Univ. Konstanz, Fachbereich Biol., D-775 Konstanz, G.F.R.) *Biochim. Biophys. Acta* **464**, 442–7 (1977). The interaction of gramicidin A with dipalmitoyl phosphatidylcholine liposomes is investigated by Laser-Raman spectroscopy. As revealed by the methylene C-H stretching mode the phase transition of the hydrocarbon chains near 40°C is eliminated in the presence of gramicidin A. Liposomes prepared from a mixture of lecithin and cholesterol seem to be unaffected by gramicidin A and show only the normal broadened phase transition.

Effect of angiotensin II on artificial lipid membranes. P. Schlieper (Inst. de Biol. Celular, Facultad de Med., Univ. de Buenos Aires, 1121 Buenos Aires, Argentina) *Biochim. Biophys. Acta* **464**, 448–52 (1977). (5-Isoleucine)-angiotensin II applied to black lipid membranes produced current fluctuations varying between $\Delta G = 5 \cdot 10^{-11} \Omega^{-1}$ and $3.5 \cdot 10^{-10} \Omega^{-1}$. These fluctuations depend on the voltage and the hydrostatic pressure. The membrane resistance is lowered by $\Delta R = 6.1 \cdot 10^{7} \Omega \cdot cm^2$. With (5-isoleucine, 8-leucine)-angiotensin II the jumps are of a single amplitude ($\Delta G = 2 \cdot 10^{-10} \Omega^{-1}$). In both cases water and ions are transported across the membrane.

Transverse asymmetry of phospholipids in subcellular membranes of rat liver. O.S. Nilsson and G. Dallner (Dept. of Pathol., Huddinge Hosp., Karolinska Inst., Stockholm, Sweden) *Biochim. Biophys. Acta* **464**, 453–8 (1977). Subcellular membranes isolated from rat liver in a form impermeable to macromolecules were treated with phospholipase A_2 from *Naja naja* venom. The phosphatidylserine, phosphatidylethanolamine and about half of the phosphatidylcholine of microsomes, Golgi membranes, inner mitochondrial membranes, lysosomes and nuclear membranes were hydrolyzed. It is proposed that these phospholipids are localized in the outer surface of the membrane bilayer, which represents the cytoplasmic side in the living cell, while the remaining phosphatidylcholine and most of the phosphatidylinositol, sphingomyelin and cardiolipin may be assigned to the inner side of the bilayer.

THE BINDING OF [^{3}H]DOLICHOL BY PLASMA HIGH DENSITY LIPOPROTEINS. R.W. Keenan, M.E. Kruczek and J.B. Fischer (Dept. of Biochem., The Univ. of Tex. Health Sci. Ctr., San Antonio, Tex. 78284) *Biochim. Biophys. Acta* **486**, 1–9 (1977). Radioactive dolichol was rapidly taken up by a plasma protein fraction following the intravenous injection of detergent suspended [^{3}H]dolichol into rats. The half-life of labeled dolichol in the plasma was found to be approx. 13 h. Density gradient centrifugation or gel filtration of samples of human or rat plasma incubated with [^{3}H]dolichol suspensions also showed that the labeled material became associated with the same plasma protein fractions as in the in vivo studies. Evidence was obtained to indicate that dolichol is specifically associated with the high density lipoprotein fraction of plasma. The possible role of high density lipoproteins as a vehicle for dolichol transport and the problems involved in the binding of this long molecule are discussed.

CONTROL OF LONG CHAIN FATTY ACID OXIDATION IN HEART MITOCHONDRIA AS STUDIED BY SPIN LABELING. N. Fournier, M. Geoffroy and S. Rous (Dept. de Biochim. Med., Ecole de Med. et Dept. de Chimie Phys., Ecole de Chimie, Univ. de Geneve, Geneve, Switzerland) *Biochim. Biophys. Acta* **486**, 82–90 (1977). Spin-labeled stearic acid is shown to exhibit the same β-oxidation kinetics as normal stearic acid. ESR spectra recorded in conditions allowing β-oxidation indicate that membrane-bound fatty acids can be directly β-oxidized and that the rate of this reaction depends on the concentration of albumin in the medium. The regulating function of albumin and pool role of the lipidic phase of the mitochondrial membranes are discussed.

PURIFICATION AND CHARACTERIZATION OF CHOLESTEROL ESTERASE FROM PORCINE PANCREAS. W.E. Momsen and H.L. Brockman (Univ. of Minn., The Hormel Inst., Austin, Minn. 55912) *Biochim. Biophys. Acta* **486**, 103–13 (1977). A protein catalyzing the hydrolysis of cholesterol esters and *p*-nitrophenylacetate has been purified 200-fold from porcine pancreas. The enzyme is homogeneous as judged by polyacrylamide gel electrophoresis and exhibits a molecular weight of 80,000 as determined by sodium dodecyl sulfate electrophoresis and gel filtration. Activity toward *p*-nitrophenylacetate exhibits a broad pH optimum and is influenced by a group with a pK_a of 5.5–6.0. The enzyme is completely inhibited by diisopropylfluorophosphate at concentrations as low as 10^{-5} M, suggesting that it is a serine esterase. Partial inhibition was observed with *p*-chloromercuribenzoate.

DIOL LIPIDS. ACYLATED ETHYLENEGLYCOL GLYCOSIDES. A NEW TYPE OF NATURAL GLYCOLIPID. V.A. Vaver, K.G. Todria, N.V. Prokazova, B.V. Rozynov and L.D. Bergelson (Shemyakin Inst. of Bioorganic Chem., U.S.S.R. Acad. of Sci., Moscow, U.S.S.R.) *Biochim. Biophys. Acta* **486**, 60–9 (1977). A new type of glycolipid has been detected in ripening corn seeds. The presence of ethyleneglycol, galactose, glucose and fatty acids was shown by degradation studies. The products of alkaline deacylation were identified as galactosyl- and glycosylethyleneglycol by thin-layer chromatography and combined gas-liquid chromatography-mass spectrometry. The native ethyleneglycol galactolipid was isolated by distribution of the total lipids between heptane and 95% methanol, following silica gel column chromatography of the methanol soluble fraction. Analysis of the alkaline deacylation products of the isolated ethyleneglycol lipid as well as examination of the mass-spectrum of its tetraacetate showed the new lipid to have the structure of 1-acyl-2-(*O*-β-D-galactopyranosyl) ethyleneglycol with palmitic, oleic and stearic acids as the main fatty acid components. The fragmentation patterns under electron impact of trimethylsilyl ethers of synthetic ethyleneglycol glycopyranosides and of 1-palmitoyl-2-(*O*-β-D-tetraacetylgalactopyranosyl)ethyleneglycol are described.

THE ESTERIFICATION OF EXOGENOUS FATTY ACIDS BY ADIPOSE TISSUE OF HYPERTRIGLYCERIDAEMIC SUBJECTS WITH OR WITHOUT DIABETES MELLITUS. P. Clifton-Bligh and D.J. Galton (Diabetes and Lipid Res. Lab., St Bartholomew's Hosp., London) *Clin. Sci. Mole. Med.* **51**, 257–65 (1976). The esterification of exogenous palmitate to diglyceride and triglyceride in adipocytes was studied in obese and diabetic patients with and without hypertriglyceridaemia. The rate of esterification correlated significantly with the triglyceride content of adipocytes. In diabetic patients with hypertriglyceridaemia, the rate of esterification of triglyceride was significantly greater than in diabetic patients with normotriglyceridaemia. This difference could not be attributed to differences in glucose tolerance or to the degree of obesity. Fasting plasma insulin levels were greater in the hypertriglyceridaemic group than in the normotriglyceridaemic group. The difference in esterification rates could have been due to differences in adipocyte size.

INVERSE RELATIONSHIP IN JAMAICA BETWEEN PLASMA HIGH-DENSITY LIPOPROTEIN CHOLESTEROL CONCENTRATION AND CORONARY-DISEASE RISK AS PREDICTED BY MULTIPLE RISK-FACTOR STATUS. G.J. Miller, N.E. Miller and M.T. Ashcroft (Med. Res. Council Pneumoconiosis Unit, Llandough Hosp., Penarth, Glamorgan, South Wales) *Clin. Sci. Mole. Med.* **51**, 475–82 (1976). The relation between plasma high-density lipoprotein (HDL) cholesterol concentration and multiple coronary-risk factor status has been assessed in fifty-two middle-aged clinically healthy men from urban and rural Jamaica. Rural hill-farmers had a superior exercise performance (assessed by the responses to submaximal test exercise), less body fat, and lower fasting levels for plasma total cholesterol, low-density lipoprotein (LDL) cholesterol, total triglyceride and blood glucose than urban businessmen. Mean plasma HDL cholesterol was considerably higher in farmers than businessmen. The results raise the possibility that coronary-risk can be more simply estimated from the plasma HDL cholesterol concentration than from a consideration of other major lipid risk factors and blood pressure.

INTRAVENOUS FAT-TOLERANCE TEST IN ISCHAEMIC HEART DISEASE AND PERIPHERAL VASCULAR DISEASE. B. Lewis, A.C. Onitiri, I.D.P. Wootton, A. Chait, G. Sigurdsson and C.M. Oakley (Dept. of Chem. Pathol. and Med., Royal Postgraduate Med. Schl., London) *Clin. Sci. Mole. Med.* **51**, 415–20 (1976). The intravenous fat-tolerance test and serum lipid and lipoprotein measurements were carried out in ninety-three normal subjects, fifty-one patients with ischaemic heart disease and thirty patients with peripheral vascular disease. The fractional turnover rate of exogenous triglyceride was significantly slower in patients with ischaemic heart disease and in patients with peripheral vascular disease than in normal men. The rate was also slower in normal men than normal women. Serum triglyceride and cholesterol concentrations were higher in both vascular disease groups than in control subjects.

ACYL CARRIER PROTEIN METABOLISM AND REGULATION OF FATTY ACID BIOSYNTHESIS BY LACTOBACILLUS PLANTARUM. J.E. Sabaitis, Jr. and G.L. Powell (Dept. of Chem. and the Dept. of Biochem., Clemson Univ., Clemson, S.C. 29631) *J. Biol. Chem.* **251**, 4706–12 (1976). Endogenous fatty acid biosynthesis in the bacterium *Lactobacillus plantarum* is greatly decreased upon addition of exogenous fatty acids. We have demonstrated the presence of five pantothenate-containing compounds in *L. plantarum* which have been identified by cochromatography with authentic samples: pantothenate, 4′-phosphopantetheine, 3′-dephosphocoenzyme A, coenzyme A, and acyl carrier protein (ACP). The concentrations of the above pantothenate-containing compounds were found to be: 0.009, 0.13, 0.067, 0.69, and 0.22 nmol/mg of protein, respectively. *L. plantarum* ACP was shown to have a molecular weight near that of *Escherichia coli* ACP but to have a lower isoelectric point (pI = 3.75). Thus, the change in rate of fatty acid biosynthesis in *L. plantarum* upon addition of oleate to the medium can be quantitatively related to the concentration of ACP (and probably to the concentrations of co-repressible enzymes of fatty acid biosynthesis).

RAT HIGH DENSITY LIPOPROTEIN SUBFRACTION (HDL_3) UPTAKE AND CATABOLISM BY ISOLATED RAT LIVER PARENCHYMAL CELLS. T. Nakai, P.S. Otto, D.L. Kennedy and T.F. Whayne, Jr. (Cardiovascular Res. Program, Oklahoma Med. Res. Foundation, Oklahoma City, Okla. 73104) *J. Biol. Chem.* **251**, 4914–21 (1976). Rat liver parenchymal cell binding, uptake, and proteolytic degradation of rat ^{125}I-labeled high density lipoprotein (HDL) subfraction, HDL_3 ($1.110 < d < 1.210$ g/ml), in which apo-A-I is the major polypeptide, were investigated. Structural and metabolic integrity of the isolated cells was verified by trypan blue exclusion, low lactic dehydrogenase leakage, expected morphology, and gluconeogenesis from lactate and pyruvate. These data suggest that liver cell binding, uptake, and proteolytic degradation of rat HDL_3 are actively performed and linked in the sequence: binding, then uptake, and finally proteolytic degradation. Furthermore, there may be a specific HDL$_3$ (lipoprotein A) receptor or recognition site(s) on the plasma membrane. Finally, our data further support our previous reports of the important role of liver lysosomes in proteolytic degradation of HDL$_3$.

On the mechanism of regulation of ω oxidation of fatty acids. I. Bjorkhem (Dept. of Clin. Chem., Huddinge Hosp., Huddinge, Sweden) *J. Biol. Chem.* **251**, 5259–66 (1976). The stimulatory effect of starvation on ω oxidation of stearate by the 20,000 × *g* supernatant fluid of rat liver homogenates was studied. The effect was obtained after starvation for 24 hours. Starvation for longer times did not further increase ω oxidation. The stimulatory effect of starvation on ω oxidation of stearic acid was accompanied by a reduced incorporation of stearic acid into phosphatidic acid, diglycerides, and triglycerides. The results are consistent with a competition for free fatty acids between the acyl-CoA synthetases involved in biosynthesis of glycerides and the microsomal hydroxylase(s) involved in ω oxidation of fatty acids. The concentration of ATP in the soluble fraction is of importance in this competition. The possibility is discussed that this competition is of importance also under *in vivo* conditions and that a decreased rate of esterification in the starved state is responsible for the higher excretion of ω-oxidized fatty acids in urine in the ketotic state.

Reduced nicotinamide adenine dinucleotide phosphate, a structural and conformational probe of chicken liver fatty acid synthetase. K.R. Srinivasan and S. Kumar (Dept. of Biochem., College of Med. and Dentistry of New Jersey, New Jersey Med. School, Newark, N.J. 07103) *J. Biol. Chem.* **251**, 5352–60 (1976). Structural and conformational organization of chicken liver fatty acid synthetase has been probed using its fluorescent coenzyme, NADPH. Three NADPH binding sites per mole of the enzyme complex, of apparently identical dissociation constant ($K_D = 0.6\ \mu M$) can be titrated at temperatures above 12°. These results are in disagreement with the earlier studies of Hsu and Wagner in which four such sites could be titrated. Measurement of NADPH binding in the presence of NADP$^+$, NADH, NAD$^+$ and adenosine-2′-monophospho-5′-diphosphoribose demonstrates that NADP$^+$ shows competitive behavior for NADPH sites ($K_D = 10.6\ \mu M$), whereas NADH and NAD$^+$ show noncompetitive (K_D (apparent) = nearly 600 μM) and rather complicated interactions implicating nonspecific conformational alteration of the enzyme complex. The behavior of adenosine 2′-monophospho-5′-diphosphoribose is intermediate between NADP$^+$ and NADH. These data are discussed in terms of substrate-mediated conformational changes and the moles of each of the reductase enzymes per mole of the enzyme complex, the polarity of the NADPH binding region, and the probable structure of the nicotinamide moiety when bound to the enzyme.

Role of γ-carboxyglutamic acid. An unusual protein transition required for the calcium-dependent binding of prothrombin to phospholipid. G.L. Nelsestuen (Dept. of Biochem., College of Biol. Sci., Univ. of Minnesota, St. Paul, Minn. 55108) *J. Biol. Chem.* **251**, 5648–56 (1976). A first order calcium-dependent transition can be monitored by a decrease in the intrinsic fluorescence of the isolated "pro" (Fragment 1) region of prothrombin. The maximum fluorescence change is −40% for Fragment 1, and only about −6% for whole prothrombin. The most remarkable features of this transition are its rate and activation energy. The half-life for the transition at 0° is about 100 min, and the temperature dependence shows an activation energy of 21 kcal/mol. The rate constant for the forward reaction is zero order in calcium and is not affected by the presence of phospholipid membranes. The equilibrium for the transition, however, is affected by phospholipid.

Triacylglycerol synthesis in isolated fat cells. Evidence that the sn-glycerol-3-phosphate and dihydroxyacetone phosphate acyltransferase activities are dual catalytic functions of a single microsomal enzyme. D.M. Schlossman and R.M. Bell (Dept. of Biochem., Duke Univ. Med. Center, Durham, N.C. 27710) *J. Biol. Chem.* **251**, 5738–44 (1976). The acyl-CoA:*sn*-glycerol-3-phosphate acyltransferase (EC 2.3.1.15) (glycerol-P acyltransferase) and acyl-CoA:dihydroxyacetone phosphate acyltransferase (EC 2.3.1.42) (DHAP acyltransferase) activities were investigated in vitro in order to evaluate the quantitative contribution of the glycerol-P and DHAP pathways for the synthesis of triacylglycerols in isolated fat cells and to test the hypothesis that these two activities may be dual catalytic functions of a single enzyme. More than 85% of both acyltransferase activities was associated with the microsomal subcellular fraction. Taken as a whole, the data strongly suggest that the microsomal glycerol-P and DHAP acyltransferase activities actually represent dual functions of a singly enzyme. Calculations based on the above kinetic constants and previously reported glycerol-P and DHAP pools in adipocytes suggest that the *in vivo* ratio of glycerol-P to DHAP acylation should be greater than 24:1.

Accumulation of neutral lipids in Saccharomyces carlsbergensis by myo-inositol deficiency and its mechanism. Reciprocal regulation of yeast acetyl-CoA carboxylase by fructose bisphosphate and citrate. E. Hayashi, R. Hasegawa and T. Tomita (The Shizuoka College of Pharmaceutical Sci., 2-2-1 Oshika, Shizuoka, Japan) *J. Biol. Chem.* **251**, 5759–69 (1976). The abnormal accumulation of lipids due to *myo*-inositol deficiency in *Saccharomyces carlsbergensis*, and the mechanism involved was investigated. The deficient cells contained much more neutral lipids with a greater ratio of unsaturated fatty acids compared to the supplemented cells, whereas there was no significant change in their phospholipid contents. The biosynthesis of fatty acids and sterols from acetate, and of triacylglycerols and sterol esters from palmitate was markedly augmented in the deficient cells. Acetyl-CoA carboxylase activity of the deficient supernatant was 2- to 5-fold higher than that of the supplemented. It was concluded from these results that neutral lipid accumulation in the deficient cells reflected an increase in the synthesis of fatty acids, at least partly based on an enhancement of acetyl-CoA carboxylase activity, and that the operation of a reciprocal regulation of the enzyme by fructose-1,6-P$_2$ and citrate caused a marked elevation of the enzyme activity in the deficient cells with a high fructose-1,6-P$_2$ level and a low citrate level.

Lipid-saccharide intermediates in glycoprotein biosynthesis. II. Studies on the structure of an oligosaccharide-lipid from thyroid. R.G. Spiro, Mary Jane Spiro and V.D. Bhoyroo (Depts. of Biol. Chem. and Med., Harvard Med. School, Boston, Mass. 02215) *J. Biol. Chem.* **251**, 6409–19 (1976). Structural studies have been performed on an oligosaccharide-lipid from thyroid believed to be an intermediate in glycoprotein synthesis. For these investigations the compound was isolated from the gland in unlabeled form as well as differentially radiolabeled in its saccharide, lipid, and phosphate portions by incubation of slices with [^{14}C]- or [^{3}H] glucose, [^{3}H]mevalonic acid and [^{32}P]phosphate, respectively. From these studies a tentative structure for the carbohydrate moiety of the oligosaccharide-lipid has been proposed. In this formulation an inner core (periodate-resistant) made up of 4 mannose and 2 *N*-acetylglucosamine residues is attached to the pyrophosphate group by the most internal glucosamine. This core, as well as an additional mannose and 1 to 2 glucose residues, constitutes the α-mannosidase-resistant fragment. More peripherally are found other mannose residues, all in α-linkage. In this structural scheme the glucose is located so as to prevent the enzymatic release of more internally situated α-linked mannose residues.

Lipid-saccharide intermediates in glycoprotein biosynthesis. III. Comparison of oligosaccharide-lipids formed by slices from several tissues. Mary Jane Spiro, R.G. Spiro, and V.D. Bhoyroo (Depts. of Med. and Biol. Chem., Harvard Med. Schl., the Elliott P. Joslin Res. Lab. and the Peter Bent Brigham Hosp., Boston, Mass. 02215) *J. Biol. Chem.* **251**, 6420–5 (1976). The synthesis of oligosaccharide-lipids thought to play a role in the attachment of carbohydrate to protein has been studied in incubations of slices from calf kidney, pancreas, thymus, and liver, as well as from hen oviduct. These compounds were characterized after radiolabeling of their saccharide moiety by incubation with [^{14}C]glucose or [^{14}C]mannose and a comparison was made with the oligosaccharide-lipid produced by thyroid slices. Furthermore, the unlabeled glycolipid was prepared from hen oviduct for the purpose of quantitating its sugar constituents. Analysis of the radiolabeled oligosaccharide-lipids from oviduct, kidney, and thymus indicated that they, like the compound from thyroid slices, but unlike those believed to be formed by cell-free systems from various tissues, contained glucose in addition to mannose and *N*-acetylglucosamine as their monosaccharide constituents. The radiolabeled oligosaccharide from the glycolipid produced by pancreas differed from the others analyzed in that it contained only trace amounts of glucose.

Studies on the regulation of chloroplast NADP-linked

GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE. R.A. Wolosiuk and B.B. Buchanan (Dept. of Cell Physiol., Univ. of Calif., Berkeley, Calif. 94720) *J. Biol. Chem.* **251**, 6456-61 (1976). Chloroplast NADP-linked glyceraldehyde-3-phosphate dehydrogenase was resolved into three forms that differed in molecular weight: (a) $\geqslant$1.5 million; (b) 600,000; and (c) $\leqslant$100,000. After preincubation with an effector (ATP, NADPH, or P_i) the activity of forms a and c was unaffected, whereas the activity of b, the regulatory form, was increased 10-fold. Activation was accompanied by the exposure of previously hidden sulfhydryl groups. The rate of activation was slower than the rate of catalysis and resulted in a lag phase during the measurement of activity when the enzyme was preincubated in the absence of an effector. The results are consistent with the view that the products of the photochemical reactions of chloroplasts, ATP, and NADPH, in conjunction with other metabolites, regulate the activity of glyceraldehyde-3-phosphate dehydrogenase in the photosynthetic assimilation of CO_2.

TEMPERATURE DEPENDENCE OF CHOLESTEROL BINDING TO CYTOCHROME P-450$_{scc}$ OF THE RAT ADRENAL. EFFECT OF ADRENOCORTICOTROPIC HORMONE AND CYCLOHEXIMIDE. D.P. Paul, S. Gallant, N.R. Orme-Johnson, W.H. Orme-Johnson and A.C. Brownie (Depts. of Biochem. and Pathol., State Univ. of New York at Buffalo, N.Y. 14207) *J. Biol. Chem.* **251**, 7120-6 (1976). A type I absorbance change is observed in suspensions of adrenal cortical mitochondria as the temperature is increased from 0-22°. This "heat-generated" type I absorbance change is similar in magnitude to the pregnenolone-induced type II absorbance change of these mitochondria. Studies with inhibitors of cholesterol side chain cleavage indicate that the heat-generated type I absorbance change represents the specific interaction of cytochrome P-450$_{scc}$ with endogenous cholesterol in the mitochondria. This finding is confirmed by low temperature EPR spectroscopy on temperature-equilibrated, quick frozen adrenal mitochondrial samples.

EQUILIBRIUM CONSTANTS UNDER PHYSIOLOGICAL CONDITIONS FOR THE REACTIONS OF CHOLINE KINASE AND THE HYDROLYSIS OF PHOSPHORYLCHOLINE TO CHOLINE AND INORGANIC PHOSPHATE. R.W. Guynn (Dept. of Psychiatry, Univ. of Texas Med. School at Houston, Tex. 77030) *J. Biol. Chem.* **251**, 7162-7 (1976). The observed equilibrium constants (K_{obs}) of the P-choline hydrolysis reaction have been determined under physiological conditions of temperature (38°) and ionic strength (0.25 M) and physiological ranges of pH and free [Mg^{2+}]. Using Σ and square brackets to indicate total concentrations:

$$K_{obs} = \frac{[\Sigma P_i]\,[\Sigma \text{choine}]}{[\Sigma \text{P-choline}]\,[H_2O]} \quad K = \frac{[HPO_4^{2-}]\,[\text{choline}^+]}{[\text{P-choline}^-]\,[H_2O]}$$

The value of K_{obs} has been found to be relatively insensitive to variations in pH and free [Mg^{2+}]. Attempts to determine the K_{obs} of the choline kinase reaction directly were unsuccessful because of the high value of the constant. The results indicate that in contrast to the high ΔG^0_{obs} for the hydrolysis of the ester bond of acetylcholine, the ΔG^0_{obs} for the hydrolysis of the ester bond of P-choline is quite low, among the lowest known for phosphate ester bonds of biological interest.

IDENTIFICATION OF 17-METHYL-18-NORANDROSTA-5,13(17)-DIEN-3β-OL, THE C_{19} FRAGMENT FORMED BY ADRENAL SIDE CHAIN CLEAVAGE OF A 20-ARYL ANALOG OF (20*S*)-20-HYDROXYCHOLESTEROL. R.B. Hochberg, P.D. McDonald, L. Ponticorvo and S. Lieberman (Depts. of Biochem. and Obstetrics and Gynecol. and the Internatl. Inst. for the Study of Human Reproduction, College of Physicians and Surgeons, Columbia Univ., New York, N.Y. 10032) *J. Biol. Chem.* **251**, 7336-42 (1976). Incubation of (20*R*)-20-phenyl-5-pregnene-3β,20-diol, an aromatic analog of (20*S*)-20-hydroxycholesterol, with an adrenal mitochondrial preparation leads to the formation of four compounds: pregnenolone, phenol, a C_8 ketone, acetophenone, and a nonpolar C_{19} compound. This latter compound has now been identified by reverse isotope dilution analysis and by gas chromatography/mass spectrometry as 17-methyl-18-norandrosta-5,13(17)-dien-3β-ol. From these results it is evident that enzymatic fission of the C-17,20 bond of this synthetic derivative occurs. On the other hand, when (20*S*)-20-hydroxy[21-^{14}C]cholesterol was used as substrate, the analogous cleavage did not take place. Thus, substitution of an aromatic group on C-20 facilitates side chain cleavage between that carbon atom and the nucleus whereas neither of the naturally occurring precursors, cholesterol or its 20-hydroxylated counterpart, are metabolized to a C_8 fragment.

GONADOTROPIN RECEPTORS IN PLASMA MEMBRANES OF BOVINE CORPUS LUTEUM. II. ROLE OF MEMBRANE PHOSPHOLIPIDS. S. Azhar, A.K. Hajra and K.M.J. Menon (Endocrine Lab., Depts. of Obstet. and Gynecol. and Biol. Chem., The Univ. of Mich. Med. School, Ann Arbor, Mich. 48109) *J. Biol. Chem.* **251**, 7405-12 (1976). The role of phospholipids in the binding of ^{125}I-choriogonadotropin to bovine corpus luteum plasma membranes has been investigated with the use of purified phospholipase A and phospholipase C to alter membrane phospholipids. The phospholipase C-digested plasma membrane preparation showed 85 to 90% inhibition of ^{125}I-choriogonadotropin binding activity when 70% of the membrane phospholipid was hydrolyzed. Similarly, treatment of plasma membranes with phospholipase A resulted in 45 to 55% hydrolysis of membrane phospholipid and almost 75% inhibition of receptor activity. Both these enzymes hydrolyzed membrane-associated phosphatidylcholine to a greater extent than phosphatidylethanolamine and phosphatidylserine. Phosphorylaminoalcohols of phospholiphase C end products were completely released into the medium, while phospholipase A by-products remained associated with plasma membranes. Addition of a phospholipids suspension or liposomes to plasma membranes pretreated with phospholipase A and C did not restore gonadotropin binding activity. It is concluded that the phospholipase-mediated inhibition of gonadotropin binding activity was due to hydrolysis and alterations of the phospholipid environment in the case of phospholipase C and by direct inhibition by end products in the case of phospholipase A.

INVESTIGATION OF MICROSOMAL OXYGENASES OF BIOSYNTHETIC PROCESSES. STEARYL-CoA DESATURASE OF ADIPOSE TISSUE AND LIVER. H.E. Seifried and J.L. Gaylor (Sec. of Biochem., Mole and Cell Biol., and the Div. of Nutr. Sci., Cornell Univ., Savage Hall, Ithaca, N.Y. 14853) *J. Biol. Chem.* **251**, 7468-73 (1976). Porcine and rat microsomal stearyl-CoA desaturases require reduced pyridine nucleotide and oxygen, are cyanide sensitive, and are insensitive to carbon monoxide. The K_m for stearyl-CoA is somewhat larger for liver than for the adipose desaturases, but, in general, assay conditions are quite similar. The effects produced by isotopic hydrogen substitution both in stearyl-CoA and in the medium (^2H_2O) are similar with microsomes from both tissues. The rate-determining step of desaturase appears to be similar in both tissues. The primary isotope effect, k_H/k_T, observed with [9,10-$^3H_2$]stearyl-CoA is relatively small, 2.88. Since little, if any, primary isotope effect is associated with methyl sterol oxidase, these two mixed function oxidases of biosynthetic processes also appear to share this property in common.

GANGLIOSIDES OF HUMAN KIDNEY. H. Rauvala (Dept. of Med. Chem., Univ. of Helsinki, Helsinki 17, Finland) *J. Biol. Chem.* **251**, 7517-20 (1976). Five gangliosides isolated from human kidney have been characterized. The two main fractions were shown to be typical extraneural gangliosides in having lactose as their neutral carbohydrate moiety. Their structures were identified as: AcNeu(α2-3)Gal(β1-4)-Glc(β1-1)Cer and AcNeu(α2-8)AcNeu(α2-3)Gal(β1-4)Glc(β1-4)Glc(β1-1)Cer. The two main hexosamine-containing gangliosides are structurally related to human blood group substances of glycosphingolipid nature. The following structures are postulated: AcNeu(α2-3)-Gal(β1-4)GlcNAc(β1-3)Gal(β1-4)Glc(β1-1)Cer and AcNeu(α2-3)Gal(β1-4)[Fuc(α1-3)]Glc-NAc(β1-3)Gal(β1-4)Glc(β1-1)Cer. The third hexosamine-containing ganglioside belongs to a different series of glycolipids and was shown to have the structure of a major ganglioside of human brain: AcNeu(α2-3)Gal-(β1-3)GalNAc(β1-4)[AcNeu(α2-3)]Gal(β1-4)Glc(β1-1)Cer. The fatty acid structure of different gangliosides was shown to resemble that of neutral glycolipids of human kidney with the nonhydroxy acids $C_{16:0}$, $C_{22:0}$, and $C_{24:9}$ as major components.

UNSATURATED FATTY ACID BIOSYNTHESIS IN TETRAHYMENA. EVIDENCE FOR TWO PATHWAYS. M.J. Koroly and R.L. Conner (Dept. of Biol., Bryn Mawr College, Bryn Mawr, Pa. 19010) *J. Biol. Chem.* **251**, 7588-92 (1976). The ciliate *Tetrahymena pyriformis* synthesizes a wide variety of saturated and unsaturated fatty acids. Variations in growth temperature or the addition of sterols such as cholesterol or ergosterol alter the proportions of a number of unsaturated fatty acids. The pattern of substitution is complex when examined on the basis of individual fatty acids. A straight-forward explanation is possible, however, if biosynthetic groupings are considered. Stearic acid gives rise to oleic, linoleic, and γ-linolenic acids as shown by others. The environmental parameters influence the amounts of the unsaturated derivatives of stearic acid as a group and result in an increase or decrease in all members of this biosynthetic family in a fashion that depends on a particular set of conditions. The replacement of the stearate derivatives by unsaturated components that are derived from palmitic acid has been demonstrated. These observations confirm the existence of alternative and separate pathways for the synthesis of unsaturated fatty acids.

Lipolytic action of cholera toxin on fat cells. Reexamination of the concept implicating G_{M1} ganglioside as the native membrane receptor. J.N. Kanfer, T.P. Carter and H.M. Katzen (Eunice Kennedy Shriver Ctr. for Mental Retardation, Inc., Waltham, Mass. 02154) *J. Biol. Chem.* **251**, 7610–9 (1976). The possible role of galactosyl-*N*-acetylgalactosaminyl-[*N*-acetylneuraminyl]-galactosylglucosylceramide (G_{M1}) ganglioside in the lipolytic activity of cholera toxin on isolated fat cells has been examined. Analyses of the ganglioside content and composition of intact fat cells, their membranous ghosts, and the total particulate fraction of these cells indicate that *N*-acetylneuraminylgalactosylglucosylceramide (G_{M3}) represents the major ganglioside, with substantial amounts of *N*-acetylgalactosaminyl-[*N*-acetylneuraminyl]-galactosylglucosylceramide (G_{M2}) and smaller amounts of other higher homologues also present. Native G_{M1} was not detected in any of these preparations. Examination of the relative capacities of various exogenously added radiolabeled sphingolipids to bind to the cells indicated that G_{M2} and glucosylsphingosine were accumulated by the cells to extents comparable to G_{M1}. Galactosylsphingosine and sulfatide also exhibited significant, although lesser, binding affinities for the cells.

Biosynthesis of glycosphingolipids in cultuted mouse neuroblastoma cells. Precursor-product relationships among sialoglycosphingolipids. S.F. Kemp and A.C. Stoolmiller (Depts. of Ped. and Biochem. and the Joseph P. Kennedy, Jr. Mental Retardation Res. Ctr., Univ. of Chicago, Chicago, Ill. 60637) *J. Biol. Chem.* **251**, 7626–31 (1976). The reaction sequence for the biosynthesis of gangliosides by mouse neuroblastoma cells has been investigated by studying the pattern of incorporation of labeled precursors into sialogylcosphingolipids. Cultured NB41A cells incorporated *N*-[^{3}H] acetylmannosamine into the sialic acid moiety of G_{M3} in less than 10 min. Labeled G_{M2} was not detected in cells incubated for less than 30 min, while measurable radioactivity did not appear in G_{M1} until after 60 to 90 min. Analogous experiments were carried out using [^{14}C]galactose. No significant amount of labeled hexose was incorporated into asialo-G_{M2} during 60 min of culture. These studies are in accord with results of previous studies on glycosyltransferases of NB41A cells, and further support the concept that the pathway of synthesis of gangliosides proceeds via $G_{M3} \rightarrow G_{M2} \rightarrow G_{M1}$.

Lipid-protein interactions in Escherichia coli. Membrane-associated fl bacteriophage coat protein and phospholipid metabolism. B.K. Chamberlain and R.E. Webster (Dept. of Biochem., Duke Univ. Med. Ctr., Durham, N.C. 27710) *J. Biol. Chem.* **251**, 7739–45 (1976). The effects of insertion of the major coat protein of fl bacteriophage into *Escherichia coli* membranes were investigated. The relative level of phosphatidylethanolamine decreased due to the failure to accumulate phosphatidylethanolamine when the cellular levels of phosphatidylglycerol and cardiolipin were increasing. This decreased accumulation was correlated with a 4-fold reduction in phosphatidylethanolamine synthesis. A 10- to 20-fold increase in cardiolipin content resulted from both a 3-fold increase in cardiolipin synthesis and a decrease in cardiolipin turnover. As long as cell division and protein synthesis continued, the number of cardiolipin molecules per coat protein molecule in the bacterium attained a constant value. The coat protein had little effect on phosphatidylglycerol synthesis. This data suggests that the coat protein forms a specific association with cardiolipin in the host membranes. Additional evidence suggests that cardiolipin also may facilitate the entry of coat protein into membranes.

Mechanism of cholesterol side-chain cleavage: Enzymic rearrangement of 20β-hydroperoxy-20-isocholesterol to 20β,21-dihydroxy-20-isocholesterol. J.E. Van Lier and J. Rosseau (Biochem. Labs., Dept. of Nuclear Med. and Radiobiol., Centre Hospitalier Univ., Shergrooke, Quebec, Canada) *FEBS Letters* **70**, 23–7 (1976). In the present paper we report the isolation and characterization of both 20α-hydroperoxycholesterol (I) and its 20β-hydroperoxy-20-isocholesterol (II). Incubation of I with an acetone-dried bovine adrenocortical mitochondrial preparation gave 20α,22R-dihydroxycholesterol (III) in quantitative yield as the sole product.

^{1}H-NMR studies of protein-lipid interactions in retinal rod outer segment disc membranes. M.F. Brown, G.P. Miljanich, L.K. Franklin and E.A. Dratz (Div. of Natural Sci., Univ. of Calif., Santa Cruz, Calif. 95064) *FEBS Letters* **70**, (56–60) (1976). In the study reported herein we use ^{1}H relaxation behavior in a similar comparative manner to demonstrate and characterize interactions between the photoreceptor protein rhodopsin and phospholipids in the retinal rod outer segment (ROS) disc membrane. Recent experiments indicate that the exponential spin lattice relaxation of liposomes of total ROS phospholipids is unchanged upon addition of 4% by weight cholesterol.

Lateral diffusion rates of phosphatidylcholine in vesicle membranes: Effects of cholesterol and hydrocarbon phase transitions. P.R. Cullis (Dept. of Biochem., Univ. of Oxford, South Parks Rd., Oxford, OX1 3QU, England) *FEBS Letters* **70**, 223–8 (1976). In summary, a technique for obtaining lateral diffusion rates of phospholipids in vesicle bilayers has been demonstrated. Reasonable agreement is obtained between diffusion rates measured by this technique and those obtained by alternative methods. It is shown that cholesterol strongly decreases the lateral diffusion rates of egg-yolk lecithin in concentrations up to 30 mol%.

Variable rachitogenic effects of grain and alleviation by extraction or supplementation with vitamin D, fat and antibiotics. T. MacAuliffe, A. Pietraszek and J. McGinnis (Dept. of Animal Sci., Washington State Univ., Pullman, Washington 99163) *Poult. Sci.* **55**, 2142–7 (1976). Three experiments were conducted using day-old broiler type chicks to determine the effect of different cereal grains on vitamin D_3 utilization and to investigate the effects of rye, corn, wheat and triticale as the cereal grain component of the diets on the development of a rachitic condition in chicks. Rye was submitted to acid treatment and water extraction in an attempt to destroy or isolate the rachitogenic factor. Results showed that with chicks fed a diet containing 200 I.U. of vitamin D_3 with corn as the grain, mineralization of their bones was normal. Growth and bone ash were depressed when rye replaced corn in the diet. These effects were partially reversed when either fat or procaine penicillin was added to the diet, and completely prevented with a high level of vitamin D_3 (2,000 I.U./k.g.). In another experiment, triticale depressed bone ash even though it did not affect body growth to the same extent as rye. Our results indicate that the factor responsible for the rachitogenic condition of rye-fed chicks can be removed by water extraction of this grain or partially destroyed by acid autoclaved treatment. A combination of acid autoclaved treatment and penicillin supplementation prevented the depression in bone ash.

The use of bile salts to improve absorption of tallow in chicks, one to three weeks of age. M.X. Gomez and D. Polin (Dept. of Poultry Sci., Michigan State Univ., East Lansing, Mich. 48824) *Poult. Sci.* **55**, 2189–95 (1976). Apparent fat absorption was 39.6 and 68.2% in chicks 4–7 and 14–19 days of age, respectively, fed purified-type diets with 8.2% tallow (TLW). Cholic acid (C.A.), chenodesoxycholic acid (Ch.A.) and taurocholate, sodium salt (T.A.) at .025 and .05% increased significantly the apparent absorption of fat by 8.4 percentage units in chicks 4–7 days of age, and as much as 10 percentage units in chicks 14–19 days of age. No significant increase in metabolizable energy of diets was detected. C.A. was fed to S.C.W.L. hens at graded levels up to .2% in corn-soy diets containing either 4 or 8% TLW or hydrogenated soybean oil. No improvement in fat absorption or M.E. was detected in these hens which absorbed 86–89% of the fat. The data indicate that bile salts appear to be effective in improving the absorption of saturated-type fats only in young chicks whose absorptive mechanism for fat is not fully developed.

Effect of ultraviolet light and oral vitamin D_3 on rachitic chicks fed diets containing either corn or rye. T. Mac-Auliffe and J. McGinnis (Dept. of Animal Sci., Washington State Univ., Pullman, Wash. 99163) *Poult. Sci.* **55**, 2305–9 (1976). Three experiments using day-old chicks were conducted in battery brooders to further study the rye-vitamin D antagonism. Birds were fed a vitamin D_3-free diet containing corn or rye and submitted to diverse treatments for the first 10 days. At this time the chicks were either continued on the same diet or changed to other grain-type diets. The effect of ultraviolet light exposure on the chicks and of a single oral dose of vitamin D_3 was studied, and body weight gain and bone ash were determined after a one-week experimental period. Rachitic chicks on a corn diet responded significantly better than rye-fed chicks to a single oral dose of vitamin D_3, based on bone ash of fat-free, dry tibia. This rachitogenic effect of rye was completely overcome by exposing the chicks to ultraviolet light or by water extraction or acid-autoclaving this grain. The results also demonstrate that the interference by rye does not persist after this grain is removed from the diet.

Comparative effect of glucagon, dibutyryl cyclic AMP, and epinephrine on the desaturation and elongation of linoleic acid by rat liver microsomes. I.N.T. de Gomez Dumm, M.J.T. de Alaniz and R.R. Brenner (Inst. de Fisiologia, Facultad de Ciencias Med., Univ. Nacional de La Plata, calle 60 y 120, 1900 La Plata, Argentina) *Lipids* **11**, 833–6 (1976). The effect of glucagon, dibutyryl cyclic adenosine $3',5'$-monophosphate, and epinephrine on the biosynthesis of polyunsaturated fatty acids of the linoleic acid family was studied. The incubations were performed with rat liver microsomes and labeled linoleic acid under desaturating and elongating conditions. Under desaturating conditions, linoleic acid was converted to γ-linolenic acid, whereas under elongating conditions it was converted to $20{:}2\omega6$. Glucagon, dibutyryl cyclic AMP, and epinephrine decreased the oxidative desaturation of linoleic acid to γ-linolenic acid while the elongating reaction was not modified in the experimental conditions tested. Consequently, the results support the hypothesis that the oxidative desaturation of linoleic acid to γ-linolenic acid is the main controllable step in the biosynthesis of polyunsaturated fatty acids of the linoleic acid family in the microsomes.

Lipid composition of 30 species of yeast. H. Kaneko, M. Hosohara, M. Tanaka and T. Itoh (Div. of Chem., School of General Studies, Kitasato Univ., 1-Asamizodai, Sagamihara, Kanagawa, 228, Japan) *Lipids* **11**, 837–44 (1976). The detailed composition of cellular lipid of more than 23 species of yeast has been determined quantitatively by thinchrography on quartz rods, a method previously used for estimating cellular lipids of seven species of yeast. That data was fortified by neutral and phospholipid quantitations on 30 species of yeast cells. Most of the test organisms contained 7–15% total lipid and 3–6% total phospholipid per dry cell weight, except for the extremely high accumulation of triglycerides in two species of *Lipomyces*. Only one exception of polar lipid composition in yeast cells was found in *Rhodotorula rubra* species which contained phosphatidyl ethanolamine as the most abundant phospholipid. Fatty acid distribution patterns in yeast cells consistently coincided with other reports concerning fatty acid composition of yeast cells.

Vitamin K requirement and the concentration of vitamin K in rat liver. T.E. Knauer, C.M. Siegfried and J.T. Matschiner (Dept. of Biochem., Univ. of Nebraska College of Med., Omaha, Neb. 68105) *J. Nutr.* **106**, 1747–56 (1976). The concentration of vitamin K was determined in the liver of different strains of rats, and in male and female warfarin-resistant rats by feeding ^{3}H-vitamin K in a purified diet. In each case, the level of vitamin K in the liver correlated approximately with the amount of vitamin K fed. The results indicate that differences in the requirement for vitamin K between the sexes and between strains of rats are due principally to different required concentrations of vitamin K in liver and not to differences in absorption or turnover of the vitamin. The results of the determination of vitamin K epoxide levels in male and female warfarin-resistant rats, and other data, suggest that the amount of vitamin K required in liver may be in part due to differences in the activity of the enzyme, vitamin K epoxide reductase.

Serum lipid and lipoprotein responses of six nonhuman primate species to dietary changes in cholesterol levels. S.R. Srinivasan, B. Radhakrishnamurthy, C.C. Smith, R.H. Wolf and G.S. Berenson (Dept. of Med., Louisiana State Univ. Med. Center, New Orleans, La.) *J. Nutr.* **106**, 1757–67 (1976). The response of serum lipids and lipoproteins to different levels of cholesterol in the diet was studied in chimpanzee *(Pan troglodytes)*, rhesus *(Macaca mulatta)*, green *(Cercopithecus aethiops)*, patas *(Erythrocebus patas)*, squirrel *(Saimiri sciurea)* and spider *(Ateles sp.)* monkeys. Five animals of each species were fed increasing amounts of dietary cholesterol (0.05% to 1.5% W/W) for 3-week periods; between each experimental diet, the animals were fed a basal diet without cholesterol for a similar period. Serum cholesterol response of different species measured in terms of response index (area under the time-concentration curve above basal value) varied with the dietary cholesterol content and showed a significant interspecies difference at 0.5% dietary cholesterol (1.8 mg/kcal) level. Challenging the animals with dietary cholesterol seems to be an essential step for determining inter- and intraspecies differences.

Effects of zinc and vitamin A deficient diets on the hepatic mobilization and urinary excretion of vitamin A in rats. S.M. Carney, B.A. Underwood and J.D. Loerch (Nutr. Program, Div. of Biol. Health, The Penn. State Univ., University Park, Penn. 16802) *J. Nutr.* **106**, 1773–81 (1976). Weanling rats were fed diets deficient in zinc (ZD), vitamin A (AD), or both (ZAD) for 3 weeks. Each then received 20 μg of 11,12-^{3}H-retinyl acetate. Plasma retinol was monitored for radioactivity for 5 hours and urine for 6 days. Rats were killed and measurements made of plasma and liver vitamin A and plasma zinc. Plasma vitamin A was depressed but growth was not affected in AD rats compared to pair-fed controls. Radioactivity appeared most rapidly in the plasma retinol fractions of the two vitamin A-depleted groups (AD and ZAD) and was excreted most rapidly in the urine of these same groups. Zinc-deficient diets (ZD and ZAD) caused depressed plasma levels of zinc and vitamin A and growth retardation greater than in pair-fed controls. The data indicate that zinc deficiency is not a limiting factor in hepatic vitamin A release except as it influences growth and body demand for the vitamin.

Effect of dietary lactose at levels comparable to human consumption on cholesterol and bile acid metabolism of conventional and germfree rats. B. Wostmann, E. Bruckner-Kardoss, M. Beaver, L. Chang and D. Madsen (Lobund Lab., Dept. of Microbiol., Univ. of Notre Dame, Notre Dame, Ind. 46556) *J. Nutr.* **106**, 1782–90 (1976). In recent years, the use of milk products and the concomitant intake of lactose have been tentatively linked to the etiology of cardiovascular disease. In the present study, lactose intake, ranging up to 30% of total diet increased β-muricholic (β-MC) but not cholic acid concentrations in conventional (CV) rat small intestine to the extent that at the 20% and 30% intake level, the intestinal cholic: β-MC ratio approached that in germ-free (GF) rats. Total intestinal bile acid (BA) content increased by approximately ⅓, but remained at less than half the value found in GF rats. At lactose intake levels within a range corresponding to the consumption of dairy products often recommended for adult man (5% to 10%) only moderate changes in intestinal, and little change in fecal BA were found during and after the 3 months experimental period. Intestinal β-MC was increased in the presence and in the absence of an intestinal microflora. The present data indicate that no major effect specifically related to a normal dietary intake of lactose on cholesterol and BA metabolism of the adult rat could be demonstrated for the duration of these experiments.

Effect of essential and nonessential fatty acids in complex mixture on fatty acid composition of liver lipids. W.O. Caster, J.W. Andrews, Jr., H. Mohrhauer and R.T. Holman (Home Econ. Nutr., Univ. of Georgia, Athens, Ga 30602) *J. Nutr.* **106**, 1809–16 (1976). Linoleate, linolenate, arachidonate, docosahexaenoate and six other fatty acids were major components of 24 ester preparations fed as 5% of the diet for 60 days to groups of male white rats. The experiment was designed so as to provide that all major fatty acid components were independent of each other in the sense that the intake of each was poorly correlated with the intake of any of the others. Fatty acid compositions of liver lipids were determined and were related to the composition of the diet lipids. Linolenate and docosahexaenoate contents of diet and tissue revealed the same relationships reported previously from experiments in which individual pure acid esters were added to a rat-free diet. Linoleate, when fed in lipid mixtures, was more effective in raising the linoleate concentration in liver lipids than when fed alone, but this increase did not change the shape of the dose-response curve or the estimated nutritional requirement. Large amounts of fish oil in the diet tended to depress the arachidonate concentration in tissue lipids.

Effect of chronic hypovitaminosis A on water metabolism in the weanling rat. L. Mahant and H.D. Eaton (Dept. of Nutr. Sci., Univ. of Conn., Storrs, Conn. 06268) *J. Nutr.* **106**, 1817–26 (1976). To study water imbalance reported to occur in vitamin A deficiency, chronic hypovitaminosis A was produced in 7-week old rats by feeding deficient or adequate vitamin A (12 or 256 μg/kg body weight/day, respectively) for a comparison period of 6 weeks. In the case of the deficient rats, these were partially depleted of their vitamin A stores prior to feeding the 12 μg intake. At the termination of the comparison period, the deficient rats exhibited elevated cerebrospinal fluid pressure, and lower plasma and liver vitamin A concentrations. Based upon kinetics of a single intrajugular injection of ^3H_2O and ^{14}C-inulin, total body water, extracellular water and renal clearances were lower in vitamin A deficient rats. However, when these criteria were expressed on a body weight basis, there were no significant differences. The turnover of total body water was reduced in the hypovitaminotic A rats. The results are discussed in terms of an inhibitory effect of vitamin A deficiency on growth. ●

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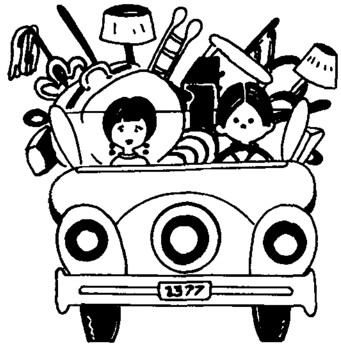

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