ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarcyk, J. G. Endres, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

COMPOSITION OF LIPIDS IN EXTRACTS OF PULLULARIA PULLULANS. E. Merdinger, P. Kohn and R. C. McClain (Biochem. Res. Lab., Roosevelt Univ., Chicago, Ill.). *Can. J. Microbiol.* 14, 1021–1027 (1968). Of the total lipid extracts from the yeast-like fungus *Pullularia pullulans*, 74% was found to be neutral lipids and 26% polar lipids. By GLC 15 fatty acids were demonstrated, 59.2% being unsaturated. The most abundant acids were the 18:1 (42%) and the 16:0 (30.8%). Ergosterol, stigmasterol, squalene and straight chain and branched chain hydrocarbons were also demonstrated. Trehalose, probably esterified with fatty acids, was also isolated from the lipid extracts.

POLISHING FILTRATION OF SUNFLOWER OIL. II. TECHNOLOGY. L. Petrov *et al. Mashlozhir. Prom.* 4(3), 39–47 (1968). The influence of cooling rate and of additives on the formation of crystals and the ease of filtration was studied. Since this operation is long and difficult, the influence of auxiliary filtering agents and of different methods for filtration of vegetable oils has been examined. Also discussed are modern installations for this operation. (Rev. Franc. Corps Gras)

NEW ELECTRICAL HYGROMETER. C. Wojnarowicz. *Tluszcze Jadalne* 12(2), 58–65 (1968). A transistorized apparatus is described which is capable of being used for determining water in grains and oilseeds. Light, small and convenient for use, the apparatus permits rapid measurements even under field conditions. (Rev. Franc. Corps Gras)

SULFURED NICKEL AS A HYDROGENATION CATALYST FOR FATS. B. N. Tjutjunnikov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pischevaya Tekhnol.* 6, 38–41 (1968). Sulfur-nickel catalysts (nickel sulfide, nickel persulfide), free from metallic nickel, have hardly any catalytic hydrogenating ability, but are distinguished by a high isomerization capability. Nickel-containing catalysts with a small amount of sulfur introduced by means of a sulfured fatty oil accelerate hydrogenation of fat and isomerization of unsaturated fatty acid radicals. (Rev. Franc. Corps Gras)

ON THE PROBLEM OF POLYMORPHIC TRANSFORMATIONS IN HYDROGENATED FATS. I. V. Nikonov. *Izv. Vysshikh Uchebn. Zavedenii Pischevaya Tekhnol.* 4, 32–35 (1968). Whether a hydrogenated fat is rapidly chilled or tempered at 16–24C, the heat of fusion in each case is almost the same. This observation prohibits making a supposition regarding a polymorphic transformation toward more stable forms. The peaks on the specific heat curve result from the fusion of different groups of triglycerides formed during the cooling or the tempering. (Rev. Franc. Corps Gras)

NICKEL IN HYDROGENATED OILS—PRESENCE, DETECTION, AND ELIMINATION. H. Szemraj *et al. Prace Inst. Lab. Badawczych Przemyslu Spozywczego* 18(2), 103–118 (1968). The nickel present in hydrogenated oils after filtration is found principally in the form of dissolved nickel soaps. In the nickel catalysts used in the hydrogenation process, a certain part of the nickel is present in the form of nickel soaps which pass into the oil during hydrogenation. Bleaching earth is a good agent for eliminating nickel soaps from the oil, but its effectiveness is closely bound to the nickel content of the hydrogenated oil. For an oil containing 5–10 mg nickel per kg, the addition of 1% earth is sufficient. The effectiveness of the bleaching earth can be considerably improved by a small addition of a concentrated aqueous solution of citric or lactic acid. For a nickel content on the order of 5 mg/kg, about 0.5% bleaching earth and 100 g of acid per ton of oil is sufficient. (Rev. Franc. Corps Gras)

A RAPID METHOD FOR DETERMINING THE IODINE VALUE OF VEGETABLE OILS. L. Nededceva *et al. Mashlozhir. Prom.* 4(3), 27–37 (1968). The rapid method of Mayerhofer for determining the iodine value of vegetable oils has been verified. The method has been compared with those of Hubl, Kaufmann, and Wijs. Experimental data showed that the rapid method is sufficiently precise and reproducible. (Rev. Franc. Corps Gras)

THE FREE FATTY ACID CONTENT OF AN ANIMAL OR VEGETABLE FAT AND THE RATE OF CORROSION OF STEEL. A. Rutkowski *et al. Tluszcze i Srodki Piorace* 12(4), 123–127 (1968). Neutral animal fat (lard) caused greater corrosion of ST-2S carbon steel than neutral vegetable fat (rapeseed oil). As the free fatty acid content of the animal or vegetable fat increased, the rate and the depth of corrosion of ST-2S carbon steel increased. The free fatty acids of rapeseed oil exerted a stronger corrosive effect on the steel than did the free fatty acids of lard. (Rev. Franc. Corps Gras)

CHEMICAL COMPOSITION OF THE LIPIDS OF INDIGENOUS RICE. Z. Ja. Sandler *et al. Izv. Vysshikh Uchebn. Zavedenii, Pischevaya Tekhnol.* 6, 11–13 (1968). Rice bran oil is noted for its high content of free fatty acids. The content of unsaponifiable matter is also higher than in numerous other vegetable oils. Rice lipids are rich in tocopherols. Rice bran oil contains myristic, palmitic, stearic, oleic, linoleic, and linolenic acids, the content of oleic and linoleic being particularly high. According to its fatty acid composition and iodine value, it is similar to cotton and sesame oils. (Rev. Franc. Corps Gras)

ULTRASONIC HYDRATION OF VEGETABLE OILS. V. M. Seredeko *et al. Izv. Vysshikh Uchebn Zavedenii, Pischevaya Tekhnol.* 4, 71–73 (1968). Ultrasonic treatment of an oil-water mixture improved the hydration of the hydrophilic portion and the coagulation of the non-hydrophilic portion, considerably accelerating the process. (Rev. Franc. Corps Gras)

RAPID ASSAY OF LABELED FREE FATTY ACIDS IN MIXTURES OF LABELED LIPIDS. T. F. Kelley (Bio-Res. Inst., Cambridge, Massachusetts 02141). *J. Lipid Res.* 9, 799–800 (1968). The fatty acids in lipid mixtures are adsorbed on dehydrated hydroxy-charged ion exchange resin, the other lipids are removed by washing with solvent, and the adsorbed fatty acids are released with quaternary ammonium base for counting. All manipulations are carried out directly in scintillation vials.

CHARACTERIZATION AND SYNTHESIS OF MONO- AND DIPHYTANYL ETHERS OF GLYCEROL. C. N. Joo, T. Shier and M. Kates (Div. of Biosciences, Nat. Res. Council, Ottawa, Canada). *J. Lipid Res.* 9, 782–8 (1968). The methanolyzed lipids of the extreme halophile, *Halobacterium cutirubrum*, were separated into glycerol diether and glycerol monoether fractions. The diether was shown by synthesis to be 2,3-di-O-(3′R,7′R,11′R,15′-tetramethylhexadecyl)-*sn*-glycerol. The monoether fraction was separated by thin-layer chromatography on boric acid-impregnated silicic acid into about equal amounts of α- and β-isomers. The α-isomer was found to be identical with the synthetic 3-O-(3′R,7′R,11′R,15′-tetramethylhexadecyl)-*sn*-glycerol, and the β-isomer was identical with the synthetic 2-O-(3′R,7′R,11′R,15′-tetramethylhexadecyl) glycerol.

STRUCTURE AND AMOUNT OF POSITIONAL ISOMERS OF MONOUNSATURATED FATTY ACIDS IN HUMAN DEPOT FAT. J. Jacob and Gernot Grimmer (Univ. of Hamburg, Hamburg, Germany). *J. Lipid Res.* 9, 730–2 (1968). Positional isomers of decenoic, dodecenoic, and tetradecenoic acids of human adipose tissue have been separated by gas-liquid chromatography and their amounts determined by oxidative cleavage. The following acids have been shown to be present: 7-decenoic, 8-decenoic, 9-decenoic, 7-, 8-, and 9-dodecenoic, and 7-, 8-, 9-, and 11-tetradecenoic acids. Among all isomers of the even-numbered acids from C_{10} to C_{18} the *cis*-9-isomer predominates. With increasing chain length, however, the content of 9-isomer decreases and the number of isomers increases. No 3- or 5-enoic acids could be detected. The origin and biosynthesis of all isomers are discussed.

4,8,12-TRIMETHYLTRIDECANOIC ACID: ISOLATION AND IDENTIFICATION FROM SHEEP PERINEPHRIC FAT. R. P. Hansen (Food Chem. Div., Dept. of Scientific and Industrial Res., Wellington, New Zealand). *Biochim. Biophys. Acta.* 164, 550–7 (1968). 4,8,12-Trimethyltridecanoic acid has been isolated and identified from a sample of sheep perinephric fat which earlier yielded phytanic and pristanic acids. This acid had formerly been isolated in

(Continued on page 164A)

(Continued from page 158A)

the pure state from marine fish oil and whale oil. The present finding, supported by detailed studies of other investigators in this field, suggests that phytanic, pristanic and 4,8,12-trimethyltridecanoic acid have their origin in dietary phytol, and that 4,8,12-trimethyltridecanoic acid is derived by β-oxidation of pristanic acid which itself is an α-oxidation product of phytanic acid. In the sample of sheep perinephric fat investigated, the content of 4,8,12-trimethyltridecanoic acid was of the order of 0.1% of the total weight of fatty acids.

PHASE TRANSITION AND CH_3-ROTATION IN SOLID CHOLESTEROL. K. Van Putte, W. Skoda, and M. Petroni (Unilever Res. Lab., Vlaardingen, Netherlands). *Chem. Phys. Lipids* 2, 361–71 (1968). The behaviour of solid cholesterol over a wide temperature range has been studied by NMR, calorimetry and dilatometry. Between −190 and −20C the temperature dependence of the spin-lattice relaxation time is fully determined by rotation of the methyl groups. The activation energy for this rotation, calculated from the measurements, is 2.0 kcal/mole, which is somewhat lower than the corresponding values found for alkanes. In the temperature range between +35 and 40C a reversible endothermic transition (already reported in the literature) occurs which is characterized by a low transition enthalpy (0.7 kcal/mole), a decrease in the molar volume (5 ml/mole) and an increase in the spin-lattice relaxation time (13%). NMR measurements of cholesterol adsorbed on silica indicate that these effects rely on a change in the crystal structure and not on intramolecular transitions (conformation isomerism). It is suggested that the polymorphous transition is related to a change in the packing of the terminal CH_3-groups of the aliphatic side chain.

PREPARATION OF PURE POLYUNSATURATED FATTY ACIDS. 1. LINOLENIC ACID. J. D. Nadenicek and O. S. Privett (Univ. of Minn., The Hormel Inst., Austin, Minn.). *Chem. Phys. Lipids* 2, 409–14 (1968). An improved procedure is described for the preparation of pure linolenic acid from linseed oil. Crystallization of urea inclusion compounds is used to produce a concentrate of methyl linolenate. Adsorption chromatography then is employed to provide fractions with a purity of approximately 99%. After fractional distillation, concentrates of linolenic acid are purified further by repeated crystallizations at low temperature.

CONFORMATION AND ORGANIZATION OF SINGLE-CHAIN LIPID MOLECULES IN THE LIQUID STATE. F. A. Vandenheuvel (Canada Dept. of Agr., Res. Branch, Animal Res. Inst., Central Exptl. Farm, Ottawa, Ontario). *Chem. Phys. Lipids* 2, 372–95 (1968). The appreciable degree of order which is revealed by x-ray patterns of long-chain lipids in the liquid state is discussed in respect to configurational changes lipids undergo upon melting. Over-all straight, contracted configurations of chains which arise from torsion around carbon-carbon bonds account remarkably well for x-ray, density, and other physical data. The process of fusion is discussed in the light of these findings.

POLYCYCLIC HYDROCARBON COMPOSITION OF WOOD SMOKE. K. S. Rhee and L. J. Bratzler (Dept. Food Sci., Mich. State Univ., East Lansing, Mich. 48823). *J. Food Sci.* 33, 626–32 (1968). Eleven polycyclic hydrocarbons derived from predominantly hard maple sawdust smoke have been separated and identified. The hydrocarbons were isolated and separated stepwise by a combination of liquid-liquid extraction, chromatography on silicic acid, thin-layer chromatography with acetylated cellulose powder and chromatography on aluminum oxide. They were characterized by ultraviolet and fluorescence studies on the fractions thus obtained from the aluminum oxide column. The polycyclic hydrocarbons found in the hardwood sawdust smoke include naphthalene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, fluoranthene, 1,2-benzanthracene, chrysene, 3,4-benzopyrene and 1,2-benzopyrene. Analysis of whole wood smoke and the vapor phase obtained by an electrostatic air filter showed only quantitative differences.

PHOSPHOLIPIDS AND COMPONENT FATTY ACIDS OF CHICKEN TISSUES. J. E. Marion and W. O. Miller (Food Sci. Dept., Georgia Expt. Station, Experiment, Georgia 30212). *Poultry Sci.* 47, 1453–59 (1968). Three studies were made of tissues from 8- and 20-week chickens in which lipids were extracted and fractioned by column and thin-layer chromatography. The component fatty acids were determined by gas-liquid chromatography. In the tissues examined (white and dark muscles, skin, liver, heart and gizzard), the following lipid classes were characterized: non-phospholipids, cardiolipin, sphingomyelin, and the phosphatides of ethanolamine, serine and choline. Traces of phosphatidyl inositol and lysophosphatidyl choline were also noted. The proportion of non-phospholipid to phospholipid was generally directly related to total lipid level. Of the phospholipids, phosphatidyl choline was predominant, followed by phosphatidyl ethanolamine. The effect of age and sex of chickens on tissue lipid levels and fatty acid composition of lipid fractions is discussed.

AMOUNT AND FATTY ACID COMPOSITION OF PHOSPHOLIPIDS IN BROILER NECK TISSUES. R. W. Franzen, Jr., H. M. Edwards, Jr. and K. N. May (Depts. of Food Sci. and Poultry Sci., Univ. of Georgia, Athens, Georgia 30601). *Poultry Sci.* 47, 1604–11 (1968). A study was designed to determine the phospholipid composition of various tissues of broiler necks. Four component tissues dissected from broiler necks and a sample of commercially deboned chicken neck meat were analyzed for moisture, lipid, protein and ash content. The lipid fractions were further examined for percentage neutral lipid and phospholipid composition. The total phospholipids were fractioned further into individual phospholipids by thin-layer chromatography. Muscle and bone tissues contained relatively larger quantities of phospholipids than did any of the other tissues studied. Phosphatidylcholine (PC) and phosphatidylethanolamine (PE) were found in relatively greater amounts than phosphatidylserine (PS) and sphingomyelin (S). The fatty acid content of the individual phospholipids was determined by gas-liquid chromatography. Palmitic acid (16:0) was found to be significantly higher in S and PC than in PE or PS. Oleic acid (18:1) was significantly higher in PS than in PC. Linoleic acid (18:2) was found to be present in significantly greater amounts in PC when compared to the other phospholipids studied.

THE FORMATION OF CARBONYL COMPOUNDS IN CUCUMBERS. H. P. Fleming, W. Y. Cobb, J. L. Etchells and T. A. Bell (U.S. Food Fermentation Lab., Southern Util. Res. and Devel. Div., Agr. Res. Serv., U.S. Dept. of Agr.; and Dept. of Food Sci., North Carolina State Univ., Raleigh, N. C. 27607). *J. Food Sci.* 33, 572–6 (1968). The carbonyl contents of benzene extracts of aqueous cucumber homogenates were estimated spectrophotometrically as their 2,4-dinitrophenylhydrazones. A large increase in the formation of carbonyl compounds occurred when cucumbers were blended with water in the presence of oxygen. This formation of carbonyl compounds was prevented by three methods; blending the cucumbers at pH 1.0; blending in an oxygen-free atmosphere; and heating whole cucumbers to an internal temperature of 77C before blending. Chromatographic assays indicated that negligible amounts of the 2-enals, 2,6-nonadienal, 2-nonenal, and 2-hexenal are present in intact cucumbers; but a rapid synthesis of this class of carbonyl compounds occurred when fresh cucumbers were blended in the presence of oxygen. The most significant increase occurred in the formation of 2,6-nonadienal, the aldehyde largely responsible for the flavor of fresh cucumbers. There were indications that ethanal and propanal were present in appreciable levels in intact cucumbers. These observations suggest that the characteristic flavor components of fresh cucumbers are generated enzymatically as a consequence of cutting or mechanically rupturing the fruit.

CARBONYLS IN OXIDIZING FAT. II. THE EFFECT OF THE PROOXIDANT ACTIVITY OF SODIUM CHLORIDE ON PORK TISSUE. R. Ellis, G. T. Currie, F. E. Thornton, N. C. Bollinger and A. M. Gaddis (East. Util. Res. and Develop. Div., Agr. Res. Serv., U.S. Dept. of Agr., Beltsville, Md. 20705). *J. Food Sci.* 33, 555–61 (1968). Oxidation of freezer-stored, sodium chloride-cured pork was characterized by a rapid rate and moderately high monocarbonyl/peroxide ratios. Increase in the concentration of NaCl accelerated autoxidation, but did not affect hydroperoxide decomposition to monocarbonyl compounds. High proportions of lean increased autoxidation and the monocarbonyl-peroxide ratios. Sodium nitrite (0.03%) catalyzed autoxidation by reaction with the meat pigment in an apparently independent effect to that exerted by NaCl. Composition of the free monocarbonyl compounds indicated linoleate specificity in peroxide decomposition, although hematin catalysis is nonspecific in its attack on unsaturated

fatty acids. Possible direct effects of NaCl did not appear to involve a reactive chloride ion.

PHOTOXIDATION OF CHOLESTEROL IN SPRAY-DRIED EGG YOLK UPON IRRADIATION. E. Chicoye, W. D. Powrie and O. Fennema (Dept. of Food Sci. and Ind., Univ. of Wisconsin, Madison, Wis.). *J. Food Sci.* 33, 581–7 (1968). Photoxidation products of cholesterol in spray-dried yolk exposed to nonionizing radiation were examined by thin-layer chromatography (TLC), gas-liquid chromatography (GLC) and infrared spectroscopy. Irradiation of yolk solids by radiant energy from either a 40-watt fluorescent lamp (about 280 hr) or summer sunlight (5 hr) brought about the formation of at least 5 photoxidation derivatives of cholesterol as demonstrated by TLC and GLC. The major oxidation products were identified as 7-ketocholesterol, 7*α*- and 7*β*-hydroxycholesterols, cholesterol-5*β*, 6*β*-oxide and cholestane-3*β*, 5*α*, 6*β*-triol. Neither fresh yolk or unirradiated spray-dried yolk (held at 25C for 1 year) contained significant amounts of typical autoxidation products of cholesterol.

SYNTHESIS OF L-α-PHOSPHATIDYLETHANOLAMINES FROM DIACYL-L-α-GLYCEROLBROMOHYDRINS. J. Singh Chadha (Unilever Res. Lab., The Frythe, Welwyn, Herts). *Chem. Phys. Lipids* 2, 415–18 (1968). Diacyl-L-α-glycerolbromohydrins condense with the silver salt of monophenylphosphoryl-N-carbobenzoxy-ethanolamine in acetonitrile solution. The diacyl-L-α-glyceryl-phenyl-phosphoryl-(N-carbobenzoxy)-ethanolamines thus obtained are readily purified by chromatography on silicic acid (Silic AR CC-7) using benzene-ether mixtures for elution. Pure cephalins are obtained from these intermediates by hydrogenolysis in the usual way. L-α-dipalmitoyl cephalin and L-α-distearoyl cephalin were prepared by this procedure.

LIQUID SHORTENING COMPOSITION. G. N. Bookwalter and F. H. Brock (A. E. Staley Mfg. Co.). *U.S. 3,407,071.* An edible liquid shortening which can be used in formulating cake mixes contains an edible liquid vegetable oil and less than 14% of an emulsifier system. The emulsifier system contains a glyceride ester, a solid fatty acid partial ester of a hexitan and a solid fatty acid ester of a hexitan polyoxyethylene ether and, in addition, may contain a free saturated fatty acid and glycerol monooleate.

PROCESS FOR PRODUCING LOW FAT SPREAD AND THE PRODUCT THEREOF. E. M. Barker (Better Spreads, Inc.). *U.S. 3,407,075.* A new and improved product for use as a substitute spread for butter and the process for its production are described. The product contains non-fat and fat components of whole milk and has important shortening effect and high moisture-retaining properties for production of baked goods. The process produces a fine emulsion of fat or oil globules in water having substantially less fat content than that of butter or margarine.

PRODUCTION OF ALIPHATIC CARBOXYLIC ACIDS. P. H. Williams and E. F. Lutz (Shell Oil Co.). *U.S. 3,407,220.* Straight-chain, saturated, aliphatic primary alcohols, in admixture with branched-chain alcohols, are selectively oxidized to the corresponding carboxylic acids by reaction of the alcohols in inert, non-polar liquid phase reaction medium with molecular oxygen in the presence of finely dispersed platinum as catalyst.

PROCESS FOR THE TREATMENT OF VEGETABLE MATERIALS. J. C. Cavanaugh and R. R. Couche. *U.S. 3,408,374.* The invention relates to a multi-stage countercurrent process for extracting oils from vegetable materials such as rice bran, soybean, groundnuts, maize germ and coconut meat, using hydrophilic solvents such as acetone and in the presence of water added to the material or the extraction liquor.

PROCESS AND APPARATUS FOR CONTINUOUS RENDERING OPERATIONS. C. D. Macy, J. A. Burton and R. E. Laugen (Geo. A. Hormel & Co.). *U.S. 3,410,882.* A process and apparatus are described for the rendering of fat from adipose tissues. The apparatus includes a plurality of horizontally oriented, vertically spaced, interconnected chambers through which the animal matter to be rendered flows. The chambers are heated to 210–280F, have agitating means causing the animal matter to impinge on an inner cylindrical surface, gate means partially obstructing the interior of each chamber to retain a predetermined volume of animal matter to cause liquefaction of the fat and rupturing of the fat tissues and means for separating liquefied and solid materials.

PROCESS FOR ALKALI REFINING OF GLYCERIDE OILS AND FATTY ACID ESTERS. P. J. Seip (Lever Bros. Co.). *U.S. 3,413,324.* A process for the alkali refining of glyceride oils and other fatty

(Continued on page 166A)

(Continued from page 165A)

acid esters which gives unexpectedly low refining losses comprises mixing the ester with an ester (of the same or different chemical composition) containing a lower percentage of free fatty acids in such proportion that the percentage of free fatty acid in the mixture is not greater than 4% and substantially less than in the first-mentioned esters, and the free fatty acid in the mixture is then substantially neutralized by the action of aqueous alkali. Continuous methods for carrying out the reaction are described, in one of which part of the neutralized oil issuing from a reaction space in which neutralization has been effected is recirculated to that space.

STORAGE-STABLE COOKING AND SALAD OILS HAVING ANTI-SPATTERING PROPERTIES. R. G. Cunningham, R. D. Dobson, L. H. Going and E. R. Purves (Procter & Gamble Co.). *U.S. 3,415,658.* Storage-stable, anti-spattering cooking and salad oil compositions are claimed, containing as an active anti-spattering ingredient 0.1 to 1.0% by wt. of the total composition of acid-treated C_{14}–C_{18} unsaturated fatty acid monoester of polyoxyethylene sorbitan containing an average of 20 oxyethylene units per molecule; and 20 to 100% by wt., based on the weight of anti-spattering agent, of C_{14}–C_{18} unsaturated fatty acid polyester of polyglycerol having an average of 4 to 6 glycerol units, the average ratio of free hydroxyl groups to fatty acid ester groups being from about 0.16 to 1.0.

COOKING AND SALAD OIL HAVING ANTISPATTERING PROPERTIES. E. R. Purves (Procter & Gamble Co.). *U.S. 3,415,659.* A storage-stable, anti-spattering cooking and salad oil composition is claimed, containing: (1) 0.125 to 0.3% by wt. of the total composition of acid treated unsaturated C_{14}–C_{18} fatty acid monoester of polyoxyethylene sorbitan containing an average of about 20 oxyethylene units per molecule, and (2) 0.05 to 0.20% by wt. of the total composition of unsaturated C_{14}–C_{18} fatty acid polyester of polyglycerol having an average of 4 to 6 glycerol units, the average ratio of free hydroxyl groups to fatty acid ester groups being from greater than 1.0 to about 2.5.

CLEAR COOKING AND SALAD OILS HAVING ANTISPATTERING PROPERTIES. E. R. Purves, L. H. Going and R. D. Dobson (Procter & Gamble Co.). *U.S. 3,415,660.* Clear cooking and salad oils having anti-spattering properties are made by adding about 0.1 to 1.0% by wt. of an acid treated unsaturated fatty acid ester of polyoxyethylene sorbitan containing an average of about 20 oxyethylene units per molecule, the fatty acid containing 14 to 18 C atoms.

• Fatty Acid Derivatives

QUATERNARY AMMONIUM COMPOUNDS AND PROCESS OF MAKING. P. A. Froehlich (Emery Industries, Inc.). *U.S. 3,401,119.* A process is claimed for preparing quaternary ammonium compounds which comprises reacting an acylated tertiary amine such as N,N-dimethylamino propylamine, or N-methyl, N-ethyl oleylamine with a quaternizing agent such as diethyl sulfate in the presence of a molten fatty acid.

METHOD OF SIZING PAPER WITH FATTY ACID CONDENSATION PRODUCTS. C. E. Feazel (Allied Chemical Corp.). *U.S. 3,404,064.* This application relates to a method of internally sizing paper by mixing with an aqueous slurry of paper pulp 0.2–2.5% by wt. (based on the weight of the dry pulp) of a condensation product obtained by heating, in the presence of catalyst, at least one fatty acid of the formula RCOOH, with R being a C_9-C_{25} unsubstituted hydrocarbon radical, the condensation product being further characterized by having at least 32% of unsaponifiable matter and by having a mean molecular weight at least three times that of the acid, and then forming the treated paper pulp into sheets. The fatty acid starting material should preferably contain at least 40% C_{20}–C_{22} acids. The resultant condensation product is treated with alkali and has its water soluble fraction removed before mixing with the slurry.

MONO- AND DIALKOXYALKYL QUATERNARY AMMONIUM COMPOUNDS. G. K. Hughes (Ashland Oil & Refining Co.). *U.S. 3,404,183.* Quaternary ammonium compounds useful as fabric softeners and surfactants contain, as one ammonium nitrogen substituent, a long chain alkoxyalkyl group having a total of 15 to 23 C and O atoms and 1 to 3 O atoms; a second ammonium nitrogen substituent being an alkoxyalkyl group as described above or a C_{15}–C_{23} alkyl group; and the remaining two ammonium substituents being lower alkyl groups.

PROCESS FOR SYNTHESIZING SPECIFIC COMPLETE MIXED POLYOL ESTERS. J. B. Martin and R. A. Volpenhein (Procter & Gamble Co.). *U.S. 3,410,881.* The process of reacting a partial polyol monocarboxylic acid ester with a molar excess of acidic lipid anhydride in the presence of a perchloric acid catalyst produces specific complete mixed polyol esters with substantially no ester group rearrangement occurring during the reaction. The reaction of a molar excess of oleic anhydride with a 1,3-diglyceride in the presence of a perchloric acid catalyst produces a synthetic cocoa butter.

CLAY CATALYST FOR POLYMERIZATION OF UNSATURATED FATTY ACIDS. S. E. Miller (General Mills, Inc.). *U.S. 3,412,039.* This invention relates to polymerization of unsaturated fatty acids where the polymerization catalyst is clay which has been stabilized with acetic anhydride and a lithium compound.

METHOD OF MAKING AMIDES FROM MOISTURE AND ACID-GAS CONTAINING ESTER. V. P. Kuceski (C. P. Hall Co.). *U.S. 3,417,114.* Amides are produced by reacting an ester of a carboxylic acid with an amine, using as catalyst an alkoxide of an alkali metal. The ester is first heated to at least 75C under a pressure of no more than 500 mm. of mercury to remove moisture and acid gases which would prevent the reaction and then converted to amide without heating to initiate the reaction.

• Biochemistry and Nutrition

25-HYDROXYCHOLECALCIFEROL. A BIOLOBICALLY ACTIVE METABOLITE OF VITAMIN D_3. J. W. Blunt, H. F. DeLuca, and H. K. Schnoes (Dept. of Biochem., Univ. of Wis., Madison, Wis. 53706). *Biochemistry* 7, 3317–22 (1968). Milligram quantities of a polar metabolite of vitamin D_3 have been isolated in pure form from the plasma of pigs fed 250,000 IU of vitamin D_3 per day for 26 days. This metabolite is the major biologically active component of the peak IV metabolite fraction reported earlier. A combination of ultraviolet spectra, gas-liquid partition chromatography and mass spectrometric and nuclear magnetic resonance spectrometric analyses have unequivocally established its structure as 25-hydroxycholecalciferol. Its biological activity has been set at 1.4 that of vitamin D_3 in its ability to cure rickets in rats.

GEL CHROMATOGRAPHY OF HYPERLIPIDEMIC PLASMA ON 2% AGAROSE. T. Hanai, P. D. S. Wood, G. E. Michaels and L. W. Kinsell (Inst. for Metabolic. Res., Highland Gen. Hosp., Oakland, Calif. 94606). *Proc. Soc. Expt. Biol. Med.* 129, 226–32 (1968). The quantitative and qualitative analysis of human plasma lipoproteins has been and continues to be an area of major interest and equally great technical difficulty. The methods used have been chiefly of ultracentrifugal separation based upon relative and absolute density of different lipoprotein classes, and b) various forms of electrophoresis based upon the charge of the lipoprotein molecule. The data obtained from such separations have been used for classification systems of hyperlipidemia as well as for other purposes. Substances can be separated on the basis of molecular size using various forms of gel chromatography. Recently this has been applied to separation of quite large proteins and lipoproteins. The use of ultracentrifugal and electrophoretic methods has led to the current concept that four major

• *Obituaries*

Word has been received of the recent death of A. J. KAISER ('66) Chief Mechanical Engineer at Crown Iron Works, generally recognized as an expert in solvent extraction processes.

K. T. HOLLEY ('45) died January 20, 1969 following a brief illness.

Word was received of the death of Procter Thompson ('33) on Feb. 21, 1969.

We have just been informed of the death of Roderick Van Trump ('59) on December 14, 1968 after a brief illness.

lipoprotein groups exist in plasma, namely, very low density (VLD) exogenous particles (chylomicrons); VLD endogenous particles (pre-beta lipoproteins); low density (LD) beta lipoproteins; and high density (HD) alpha lipoproteins. Considerable difficulty has been experienced in trying to separate endogenous from exogenous VLD lipoproteins. Since gel chromatography fractionates lipoproteins according to molecular size, separations by this technique probably would not parallel separations obtained by the better established methods, where advantage is taken of other molecular properties. The present paper describes very preliminary work with plasma from hyperlipidemic subjects designed to fractionate the groups of lipoproteins noted above on the basis of molecular size, using agarose gel chromatography.

INHOMOGENEITY OF VITAMIN K_2 IN MYCOBACTERIUM PHLEI. I. M. Campbell and R. Bentley (Dept. of Biochem. and Nutr., Grad. School Public Health, Univ. Pittsburgh, Pitt., Pa. 15213). *Biochemistry* **7**, 3323–8 (1968). The use of gel filtration in the isolation of pure menaquinones from bacterial nonpolar lipids has been developed. During this procedure, fractionation of any naturally occurring menaquinones with side-chain variation takes place. Thus, in addition to the previously known dihydromenaquinone-9, *Mycobacterium phlei* has been shown to produce a dihydromenaquinone-8 and probably a dihydromenaquinone-10. The dihydromenaquinone-8 has been characterized, the position of the saturated double bond being determined mass spectrometrically. Some observations on the natural existence of geometrical isomerism in menaquinones and biosynthesis of dihydromenaquinones are made.

SERUM CHOLESTEROL AND LACTATE DEHYDROGENASE PATTERNS OF YOUNG WOMEN. H. Y. Davis (Nutr. Research, Tuskegee Inst., Alabama). *J. Am. Dietetic Assoc.* **53**, 32–5 (1968). Serum cholesterol and lactate dehydrogenase (LDH) levels were determined in obese college women fed at two low caloric levels, along with two nonobese control subjects maintained on a diet of 2200 cal/day. In a 4-week pre-test period the two controls and eight obese subjects ate self-selected meals, while two other obese subjects ate 1300-cal. diets. During an 8-week test period, the two controls received 2200 cal/day and essentially maintained weight; the two obese subjects previously receiving 1300 cal/day were fed 1000 cal/day and lost 18 and 18.5 lbs. The other eight obese women, reduced from self-selected diets to 1300 cal/day, lost from 14.5 to 25 lbs, for a mean weight reduction among the ten obese subjects of 18.5 lbs. Serum cholesterol levels of all the obese subjects were higher than in the control women during the test period but decreased an average of 81 mg/100 ml in the eight obese subjects fed 1300 calories. LDH activity increased in all subjects during the test period, indicating an inverse relationship between serum LDH and serum cholesterol.

EFFECTS OF INFUSION OF SOME PROSTAGLANDINS IN ESSENTIAL FATTY ACID-DEFICIENT AND NORMAL RATS. F. P. Kupiecki, N. C. Sekhar and J. R. Weeks (Depts. of Metabolic Res. and Pharmacology, Upjohn Co., Kalamazoo, Mich. 49001). *J. Lipid Res.* **9**, 602–5 (1968). Infusion of 1 mg/kg per day of prostaglandin E_1 (PGE_1) for 2 and 7 wks failed to correct the dermal signs of essential fatty acid (EFA) deficiency in rats despite the known conversion of EFA to certain prostaglandins. PGE_1 caused no significant changes in serum cholesterol, triglycerides or phospholipids or in liver neutral lipids in EFA-deficient or normal rats. In normal rats epinephrine-induced lipolysis was greater in fat pads from infused than from untreated rats. The effect on epinephrine-induced lipolysis was greater after the 7 wk infusion than after the 2 wk infusion. The 7 wk infusion also lowered plasma free fatty acid (FFA) concentrations. Infusion of PGE_2 and PGF_{2a} in combination for 4 wks had no significant effect on either dermal signs of EFA deficiency, lipolysis or plasma FFA concentrations.

THE INCORPORATION OF LABELLED GLYCEROPHOSPHORIC ACID INTO THE LIPIDS OF RAT BRAIN PREPARATIONS. III. ON THE BIOSYNTHESIS OF PHOSPHATIDYL GLYCEROL. F. Possmayer, G. Balakrishnan and K. P. Strickland (Dept. of Biochem., Univ. of West. Ontario, London, Canada). *Biochim. Biophys. Acta* **164**, 79–87 (1968). Experiments have been conducted investigating the synthesis of phosphatidyl glycerol and phosphatidyl glycerophosphate in preparations from rat brain cerebral hemisheres. *rac*-Glycero-3-phosphoric acid-^{32}P in the presence of CDP-diacylglycerol, was incorporated into a lipid tentatively identified as phosphatidyl glycerophosphate. The addition of $HgCl_2$ stimulated this incorporation. *sn*-Glycero-3-phosphoric acid was incorporated into two lipids, phosphatidyl glycerophosphate and phosphatidyl glycerol. In the presence of an acylating system, small amounts of *rac*-glycero-3-phosphoric acid-^{32}P could be incorporated into phosphatidyl glycerol. This latter incorporation was markedly stimulated by CTP and CDP-choline. These results are consistent with the view that these lipids can be synthesized in brain by reactions in which CDP-diacylglycerol reacts with *sn*-glycero-3-phosphoric acid to form phosphatidyl glycerophosphate which is subsequently hydrolyzed to phosphatidyl glycerol.

FATTY ACID SYNTHESIS BY CHAIN ELONGATION IN RAT-LIVER MITOCHONDRIA. E. Qualgliariello, C. Landriscina and P. Coratelli (Dept. of Biochem., Univ. of Bari, Bari, Italy). *Biochim. Biophys. Acta* **164**, 12–24 (1968). Fatty acid synthesis from acetyl-1-^{14}C-CoA has been studied in rat-liver mitochondria. The incorporation proceeded linearly for the first 10 min. The activity was greatly increased when the mitochondria were disrupted. The ratio of total radioactivity to radioactivity in carboxyl carbon of the synthesized fatty acids, under all the conditions tested, was always between 1.6:1 and 2.1:1. Both NADPH and NADH were needed for maximum incorporation of acetyl-1-^{14}C-CoA. Evidence is presented that malonate does not participate to fatty acid synthesis in rat-liver mitochondria. The results indicate that in rat-liver mitochondria fatty acid synthesis proceeds exclusively by chain elongation of endogenous fatty acids *via* acetyl-CoA. Citrate stimulated acetyl-1-^{14}C-CoA incorporation into fatty acids by rat-liver mitochondria, without affecting the ratio of total radioactivity to radioactivity in carboxyl carbon. The enzymes of chain elongation are located in the inner mitochondrial membrane fraction. The labelling pattern of synthesized fatty acids and their incorporation into complex lipids is described.

ENZYMATIC CLEAVAGE OF THE CHOLESTEROL SIDE-CHAIN TO DEHYDROEPIANDROSTERONE AND 2-METHYLHEPTAN-6-ONE. R. A. Jungmann (Dept. of Biochem., Northwestern Univ. Medical School, Chicago Wesley Mem. Hosp., Chicago, Ill. 60611). *Biochim. Biophys. Acta* **164**, 110–23 (1968). Evidence is presented indicating a new pathway of androgen biosynthesis, i.e. the direct conversion of cholesterol to dehydroepiandrosterone and 2-methylheptan-6-one by rat adrenal, ovarian and testicular tissue homogenates without intermediary formation

of pregnenolone. Under the conditions of the experiments, the new direct pathway of dehydroepiandrosterone formation exists parallel to the well established classical pathway, i.e. cholesterol → pregnenolone → dehydroepiandrosterone. Ovaries, testes and adrenals from Sprague-Dawley rats were homogenized and incubated with (26-^{14}C) cholesterol or (70C-^{3}H) cholesterol and NADPH. ^{3}H-Labelled dehydroepiandrosterone and pregnenolone were purified and identified by paper and thin-layer chromatography, reverse-isotope dilution, derivative formation and crystallization to constant specific activity. A procedure for the analysis of the cholesterol side-chain fragment (^{14}C)2-methylheptan-6-one was developed. The procedure consists of steam distillation, removal of (^{14}C)isocaproic acid by $NaHCO_3$ partition, and purification to radiochemical homogeneity by formation of three derivatives, (i) (^{14}C)2-methylheptan-6-one semicarbazone, (ii) (^{14}C)2-methylheptan-6-one·$NaHSO_3$-addition compound and (iii) (^{14}C)5-methylhexanoic acid (after oxidation with NaOI).

REGULATION OF PRODUCTION AND RELEASE OF LIPOPROTEIN BY THE PERFUSED RAT LIVER. N. B. Ruderman, K. C. Richards, V. Valles de Bourges and A. L. Jones (Joslin Res. Lab., Dept. of Med. and Dept. of Anatomy, Harvard Med. School, Boston, Mass. 02215). *J. Lipid Res.* 9, 613–9 (1968). The relationship between protein and triglyceride release into d <1.007 lipoprotein was studied in the isolated perfused rat liver. Livers were perfused with a medium either high or low in linoleate content. Perfusion with the linoleate-rich medium resulted in a marked increase in the net release of both d <1.007 lipoprotein triglyceride and lipoprotein protein, and caused a significant increase in amino acid incorporation into the protein moiety. Amino acid incorporation into d 1.008–1.21 protein was not affected by fatty acid concentration, while incorporation into whole perfusate and tissue proteins was depressed by a perfusate high in fatty acid content. Electron microscopic studies demonstrated that the livers with the higher rate of triglyceride release also produced a greater number of lipoprotein particles. The particles they released were also somewhat larger. These studies suggest that the intracellular concentration of newly esterified triglyceride and (or) some other lipid metabolite can specifically influence the release and perhaps the synthesis of d <1.007 lipoprotein protein.

IN VITRO INCORPORATION OF CHOLESTEROL-^{14}C INTO VERY LOW DENSITY LIPOPROTEIN CHOLESTERYL ESTERS. Yasuo Akanuma and J. Glomset (Dept. of Med. and Reg. Primate Res. Ctr., Univ. of Washington, Seattle, Wash. 98105). *J. Lipid Res.* 9, 620–6 (1968). The cholesteryl esters of very low density lipoproteins become labeled when human plasma is incubated with cholesterol-^{14}C. The relative order of magnitude of the specific activity of the cholesteryl esters of the major lipoprotein fractions is: high density lipoproteins << very low density lipoproteins < low density lipoproteins. This pattern of labeling is similar to that found by others in experiments performed *in vivo*. Very low density lipoprotein cholesteryl esters are probably not formed by direct action of the plasma lecithin:cholesteryl acyltransferase, since significant esterification of cholesterol does not occur when very low density lipoproteins are incubated separately with the enzyme. Instead, labeled cholesteryl esters formed in the other lipoprotein fractions transfer to the very low density lipoproteins, the relative amount of monounsaturated esters transferred being slightly greater than that of saturated and polyunsaturated esters. The results support the possibility that the acyltransferase indirectly increases the concentration of very low density lipoprotein cholesteryl esters *in vivo*.

GLYCEROL PERMEABILITY OF HUMAN FETAL AND ADULT ERYTHROCYTES AND OF A MODEL MEMBRANE. T. Moore (St. Luke's Hosp. Center, New York 10025). *J. Lipid Res.* 9, 642–46 (1968). When erythrocytes from different mammalian species are compared, the hemolysis rate in 0.3 M glycerol is seen to be directly related to the percentage of lecithin in the erythrocyte phospholipid. Since this percentage is higher in erythrocytes from human adults than in those from infants, the hemolysis times in 0.3 M glycerol were compared. As expected, hemolysis was more rapid in the adult cell, which is therefore more permeable to glycerol under these conditions. The permeability to glycerol of a film of erythrocyte lipids *in vitro* was next examined in a model system containing the two phases water and butanol. Lipid introduced into the bulk butanol appears as a film at the interface. When equal amounts of total lipid extracted from adult and fetal erythrocytes were introduced into the butanol phase of two such chambers, the initial flux of glycerol-^{14}C across the lipid boundary was greater in the cell containing lipid from adult erythrocytes than in the cell containing fetal erythrocyte lipid.

CHOLESTERYL ESTERASE AND CHOLESTERYL ESTER POOLS IN CORPUS LUTEUM. J. Coutts and D. Stansfield (Dept. of Biochem., Univ. of Dundee, Dundee, Scotland). *J. Lipid Res.* 9, 647–51 (1968). Cholesteryl esterase activity has been demonstrated in the corpus luteum of the rat and the cow. The hydrolytic activity in bovine corpora lutea shows two pH optima, and is distributed throughout the particulate and supernatant fractions of the tissue. The greatest activity is present in the 5000 g pellet. The size of the available endogenous cholesteryl ester pools is also estimated. Some properties of the bovine luteal enzyme are different from those of pancreatic cholesteryl esterase from the same species.

CITRATE, PYRUVATE, AND LACATE CONTAMINANTS OF COMMERCIAL SERUM ALBUMIN. R. Hanson and F. J. Ballard (Fels Research Inst., Temple Univ. Medical School, Philadelphia, Pa. 19140). *J. Lipid Res.* 9, 667–68 (1968). Commercial serum albumin was found to contain lactate, pyruvate and especially citrate in addition to fatty acids. Glucose, aspartate and α-ketoglutarate were also present but at lower concentrations, Charcoal treatment followed by prolonged dialysis was effective in removing most of these contaminants.

EFFECTS OF A SINGLE ORAL LOAD OF MEDIUM-CHAIN TRIGLYCERIDE ON SERUM LIPID AND INSULIN LEVELS IN MAN. I. Tamir, D. B. Grant, A. Fosbrooke, M. Segall and J. Lloyd (Inst. of Child Health, Univ. of London, London, England). *J. Lipid Res.* 9, 661–66 (1968). Analysis of serum free fatty acids by gas-liquid chromatography showed high proportions (27–57%) of octanoic acid for up to 4 hr after the ingestion of a single oral load of medium-chain triglyceride (approximately 1 g/kg body weight) in four volunteers. The effects of a medium-chain triglyceride load on the concentrations of plasma free long-chain fatty acids, plasma glucose, serum insulin, and serum triglyceride were observed and compared with the effects of a glucose load. A rapid fall in the free long-chain fatty acids followed both loads but only a small rise in serum insulin was observed after medium-chain triglyceride. The fall in free long-chain fatty acids following ingestion of medium-chain triglyceride cannot therefore be caused mainly by the release of insulin and may be due to a direct action on adipose tissue.

ACYLATION OF SN-GLYCEROL 3-PHOSPHATE BY CELL FRACTIONS OF RAT LIVER. H. Fallon and R. Lamb (Dept. of Medicine, Univ. of N. Carolina School of Med., Chapel, Hill, N.C. 27514). *J. Lipid Res.* 9, 652–60 (1968). The esterification of sn-glycerol 3-(dihydrogen phosphate) with long-chain fatty acids by rat liver microsomal preparations has been studied. A newly modified spectrophotometric assay for glycerolphosphate acyltransferase (GP-acyltransferase) compared favorably with other assay methods, including measurement of the incorporation of sn-glycerol-^{14}C 3-(dihydrogen phosphate) into glycerolipids. Cofactor requirements, preliminary kinetic constants and optimum pH were determined. The product of the reaction was identified as monoacylglycerophosphate by thin-layer chromatography. Albumin activated GP-acyltransferase at low concentrations of acyl CoA but was inhibitory at higher concentrations. Serum β-lipoprotein also caused activation of GP-acyltransferase. The effect of albumin could not be attributed to binding of substrate or fatty acids or the provision of metal ions.

EFFECT OF PHOSPHOLIPASE A TREATMENT OF LOW DENSITY LIPOPROTEINS ON THE DEXTRAN SULFATE-LIPOPROTEIN INTERACTION. T. Nishida (Burnsides Res. Lab., Univ. of Illinois, Urbana, Ill. 61801). *J. Lipid Res.* 9, 627–635 (1968). The effect of phospholipase A on the interaction of low density lipoproteins of the S_i0-10 class with dextran sulfate was studied in phosphate buffer of pH 7.4 and ionic strength 0.1 by chemical, spectrophotometric and centrifugal methods. When low density lipoproteins that had been treated with phospholipase A were substituted for untreated lipoproteins, the amount of insoluble dextran sulfate-lipoprotein complex was greatly reduced. Hydrolysis of over 20% of the lecithin and phosphatidyl ethanolamine constituents of the lipoproteins prevented the formation of insoluble complex. However, even the lipoproteins in which almost all the phosphoglycerides were hydrolyzed produced soluble complex, which was converted to insoluble complex upon addition of magnesium sulfate. It is apparent that the lipoproteins altered extensively by treatment with phospholipase A retain many characteristic properties of native low density lipoproteins.

PHYSICAL STUDIES OF MYELIN. I. THERMAL ANALYSIS. B. D. Ladbrooke, T. J. Jenkinson, V. B. Kamat and D. Chapmen (Unilever Res. Lab., The Frythe, Welwyn, Hert., Great Britain). *Biochim. Biophys. Acta* 164, 101–9 (1968). Myelin isolated from ox brain white matter and the lipids extracted

from this material have been examined by thermal analysis techniques including differential thermal analysis and differential scanning calorimetry. The results provide information about the organization of lipids and water in the myelin structure. On drying myelin a crystallization and precipitation of the lipid and the cholesterol takes place. Endothermic transitions associated with the lipid and cholesterol can then be observed. The total lipid extract in water does not show a detectable endothermic transition but the cholesterol-free lipid does. In the absence of cholesterol, part of the myelin lipid is crystalline at body temperature. With wet myelin no thermal transitions are detectable. In this case the lipids and cholesterol appear to be organized into a single phase. The presence and organization of the cholesterol in the membrane appear to prevent the lipids from crystallizing. To maintain the organization of the lipid in the myelin there appears to be a critical amount of water required. This water is unfreezable at 0C and may correspond to "bound" water.

LECITHIN AND LYSOLECITHIN METABOLISM BY ISOLATED MUCOSAL CELLS OF THE TOAD BLADDER. A. A. Rosenbloom and P. Elsbach (Dept. of Med., N. Y. Univ., Univ. Sch. of Med.). *Biochim. Biophys. Acta* **164**, 72–8 (1968). Extending previous observations on homogenates of toad bladder, the metabolism of lysolecithin and lecithin by isolated whole mucosal cells was further examined *in vitro*. These intact cells actively convert lysolecithin complexed to albumin in the medium to cellular lecithin. Lecithin of the mucosal cell, labeled by preincubation with lysolecithin-^{32}P, undergoes considerable hydrolysis upon reincubation. In homogenates this breakdown is faster than in whole cells and results in accumulation of lysolecithin-^{32}P but no glycerylphosphorylcholine, while in whole cells only glycerylphosphorylcholine accumulates. This formation of glycerylphosphorylcholine is due to lysolecithinase activity which is maximal at pH 6.0. Lecithin synthesis as well as breakdown are enhanced when lysolecithin is added to the medium. It is suggested that operation of the lecithin-lysolecithin cycle and of the lysolecithinase activity in the mucosal cell regulates the relative amounts of lecithin and lysolecithin in this tissue under various physiologic conditions.

COMPOSITIONS OF PHOSPHATIDES FROM BACILLUS NATTO AT VARIOUS GROWTH PHASES. Chieko Urakami and Keiko Umetani (Foods and Nutr., Fac. of the Sci. of Living, Osaka City Univ., Osaka, Japan). *Biochim. Biophys. Acta* **164**, 64–71 (1968). Studies were made on composition of phosphatides and fatty acids of the phosphatide fraction from *Bacillus natto* harvested at various growth phases, and from the spores. The content of lipid phosphorus on a dry weight basis decreased from 2% in the cells of the logarithmic growth phase to 1.5% in those of the phase of decline and only 0.7% in the spores. The phosphatide fraction of the organism was found to be composed of relatively large amounts of phosphatidylglycerol, phosphatidylethanolamine and cardiolipin and smaller amounts of phosphatidic acid, a ninhydrin-negative phosphatide and two ninhydrin positive phosphatides, one of which may be the O-ornithine ester of phosphatidylglycerol. The fatty acid composition of the phosphatide fraction was not affected by the age of the culture and 80% of the total acids was composed of anteiso-pentadecanoic and anteiso-heptadecanoic acids, 8.5% iso-tetradecanoic and iso-hexadecanoic acids and 6–8% palmitic acid.

THE EFFECT OF GLUCOSE AND INSULIN IN VITRO ON THE UPTAKE OF TRIGLYCERIDE AND ON LIPOPROTEIN LIPASE ACTIVITY IN FAT PADS FROM NORMAL FED RATS. W. Austin and P. J. Nestel (Dept. of Clinical Science, Australian Nat. Univ., Canberra, Australia). *Biochim. Biophys. Acta* **164**, 59–63 (1968). The effect of insulin and glucose *in vitro* on chylomicron triglyceride uptake and lipoprotein lipase activity was studied in epididymal fat pads of normal, fed rats. In 16 paired experiments using chylomicrons containing tritiated palmitic acid, significantly more labelled triglyceride fatty acid was found in rat fat pads when insulin and glucose were both present in the incubation mixture. Neither glucose nor insulin alone had a significant effect on triglyceride uptake. In 10 paired experiments the addition of glucose and insulin significantly raised the activity of lipoprotein lipase in fat pads. The findings support the concept that insulin enhances triglyceride removal.

FORMATION OF MONOHYDROXY-POLYENIC FATTY ACIDS FROM LIPID PEROXIDES BY A GLUTATHIONE PEROXIDASE. B. O. Christophersen (Inst. of Clinical Biochem., Rikshospitalet, Univ. of Oslo, Norway). *Biochim. Biophys. Acta* **164**, 35–46 (1968). It has been confirmed that the oxidation of GSH by linoleic acid hydroperoxide is enzymically catalyzed in rat liver. By thin-layer chromatography, gas-liquid chromatogra-

phy and mass spectrometry, and by chemical modifications such as acetylation, methylation and hydrogenation, the products formed by the enzymic removal of linoleic acid hydroperoxide have been identified as 9-hydroxy-10,12-octadecadienoic acid and 13-hydroxy-9,11-octadecadienoic acid. The hydroperoxide can thus be detoxified to products that can be metabolized in the cell. It is suggested that the extremely rapid enzymic reaction of GSH with lipid hydroperoxides breaks the autocatalytic chain reactions of lipid peroxidation and thus protects the vital cellular compounds from the effect of lipid peroxides.

THE PREFERRED METABOLIC PATHWAY FROM LINOLEIC ACID TO ARACHIDONIC ACID IN VITRO. Y. L. Marcel, K. Christiansen and R. T. Holman (Univ. of Minn., The Hormel Inst., Austin, Minn. 55912, USA). *Biochim. Biophys. Acta* **164**, 25–34 (1968). The two possible pathways which lead from linoleic acid to arachidonic acid were simultaneously studied in liver microsomes from fat-deficient rats and from fat-fed rats. The overall yields of the conversion of linoleic acid to eicosa-8,11,14-trienoic and arachidonic acids were calculated and gave a ratio of 16 to 1 for the pathway *via* γ-linolenic acid over the pathway *via* eicosa-11,14-dienoic acid in the fat-fed rat, and a ratio of 6 to 1 in the fat-deficient rat. The side reactions to the alternative pathways were also investigated. A relatively high rate of chain elongation was found for eicosa-8,11-dienoic acid which minimizes the importance of the pathway *via* this acid. The inhibition and enhancement of the different reactions in the two pathways were tested under the same conditions using either mixtures of fatty acids extracted from rat livers or single fatty acids of the linoleic acid family. The interactions of the different acids in chain elongation and desaturation reactions are of small magnitude. However, the desaturation of eicosa-8,11,14-trienoic acid is strongly enhanced by linoleic and γ-linolenic acids which may account for its non-accumulation in tissue lipids.

ACTION OF SOME EFFECTORS ON THE HYDROLYSIS OF LONG-CHAIN TRIGLYCERIDES BY PANCREATIC LIPASE. G. Benzonana and P. Desnuelle (Inst. de Chimie Biol., Faculte des Sciences St. Charles, Marseille, France). *Biochim. Biophys. Acta* **164**, 47–58 (1968). In order to study the action of various agents on lipolysis of emulsified long chain triglycerides by pancreatic lipase, a simple system was devised. It was composed of the two reactants, triglyceride and water, with NaCl and a trace of oleate for the stabilization of the emulsions. The initial effect of NaCl is to favor the normally poor ionization of long chain acids at pH 9.0. In the system described above, lipase was very active at the beginning of the reaction. However, early inhibition was observed. This inhibition is caused by the long-chain soaps formed during the reaction. Ca^{2+} and deoxycholate were not found to appreciably increase the initial rate of lipolysis, but rather to prevent to some extent the inhibitory effect of long-chain soaps. Higher concentrations of deoxycholate and of other bile salts were inhibitory. Lipolysis did not appear to take place in this system unless some NaCl was added. In the presence of increasing NaCl concentrations, the initial rate soon reached a maximum and then decreased. Various mechanisms are discussed for the inhibition of lipolysis by soaps and for the observed effect of Ca^{2+}, bile salts and NaCl.

SOME PHYSICAL PROPERTIES OF PALMITYL-COENZYME A MICELLES. W. L. Zahler, R. E. Barden and W. W. Cleland (Dept. of Biochem., Univ. of Wis., Madison, Wis. 53706). *Biochim. Biophys. Acta* **164**, 1–11 (1968). On the basis of light scattering and dye binding studies, palmityl-CoA forms micelles in aqueous solution which appear to have a critical micelle concentration of 3 to 4 μM in the presence of 0.01 M K^+ and an aggregation number around 1000. After chromatography on silicic acid, the micelles are of a larger and more variable size. Micelle formation is also demonstrated by the increase in pK's seen for the adenine group (5.6–5.7) and secondary phosphate (7.1–7.2) relative to the values seen in CoA (4.0 and 6.3). The absorptivity of the adenine band around 260 mμ is the same in the micelle as for the free palmityl-CoA molecule in dilute salt (below 0.01 M cation), but a high cation concentration (1 to 3 M) the molar absorptivity is reduced about 15%. Solvent perturbation studies with ^2H_2O show that the adenine groups are exposed to an aqueous environment at both low and high cation concentration. This hypochromic effect is apparently caused by base stacking of the adenine groups in largely non-stereospecific fashion, and can be reversed by Schardinger dextrin, a specific complexing agent for adenine groups.

DIFFERENT RATIOS OF THE LDD AND DDD DIASTEREOISOMERS OF PHYTANIC ACID IN PATIENTS WITH REFSUM'S DISEASE. L. Eldjarn and K. Try (Inst. Clinical Biochem., Univ. of Oslo, Rikshospitalet, Oslo, Norway). *Biochim. Biophys. Acta* **164**, 94–100 (1968). Both the LDD and DDD diastereoisomers of phytanic acid accumulate in patients with Refsum's disease. Considerable differences occur in the LDD/DDD ratios of the phytanic acid in these patients, probably depending on differences in the diet. The limited degradation of phytanic acid which takes place in patients with Refsum's disease removes the LDD and DDD isomers at approximately the same rate. Experiments with polecats also indicate that the rapid degradation of phytanic acid, which takes place in normal mammals, removes the LDD and DDD isomers at approximately the same rate. The distribution of the LDD and DDD isomers of phytanic acid among the various lipid fractions in serum indicates that the LDD and DDD isomers have different kinetics for several acyl activating systems and/or acyltransferases. Administration of phytol to the polecat gives rise to an accumulation of phytanic acid with a preponderance of the LDD isomer.

ABSORPTION OF CHLOROPHYLL PHYTOL IN NORMAL MAN AND IN PATIENTS WITH REFSUM'S DISEASE. J. Baxter (Lab. of Metabolism, National Heart Inst., Nat. Inst. of Health, Bethesda, Md. 20014). *J. Lipid Res.* **9**, 636–41 (1968). This study was made to determine the extent of absorption of chlorophyll phytol from the intestine of man, and the importance of chlorophyll as a source of the phytanic acid that accumulates in Refsum's disease. Uniformly ^{14}C-labeled pheophytin *a* (the Mg-free derivative of chlorophyll *a*) was fed to normal human subjects and to patients with Refsum's disease. Feces were collected and analyzed. In all subjects, 90–95% of the administered radioactivity was recovered in the feces, still largely in the form of pheophytin *a*. The phytol radioactivity recovered in the feces averaged about 95% of that in the administered material, which indicates that there had been little absorption of the phytol moiety. Similarly, after 250 g of cooked spinach had been fed to a normal subject, almost the entire phytol content was found in the feces. Less than 5% of the ingested spinach phytol was accounted for in the thoracic duct lymph of another subject.

LIPID MONOLAYERS: INTERACTIONS WITH THE APOPROTEIN OF HIGH DENSITY PLASMA LIPOPROTEIN. G. Camejo, G. Colacicco and M. Rapport (Dept. of Biochem., A. Einstein College of Med., Yeshiva Univ., Bronx, N.Y. 10461). *J. Lipid Res.* **9**, 562–69 (1968). Monolayer techniques were used to study the interactions of various lipids (cholesterol, lysophosphatidyl choline, phosphatidal ethanolamine, phosphatidyl choline, sphingomyelin, stearic acid and lipids extracted from plasma high density lipoproteins and very low density lipoprotein) with the lipid-free protein subunit of rat plasma high density lipoprotein and with rat plasma albumin. The proteins were injected under the lipid monolayer at fixed area, and the increase in surface pressure (decrease in surface tension) was measured as a function of time. With all lipids, both the rate and magnitude of this increase were greater with the apolipoprotein than with the albumin. The degree of film penetration of pure lipid films (at an initial film pressure of 15 dynes/cm) by the two proteins followed the same order: cholesterol > phosphatidal ethanolamine > phosphatidyl choline > stearic acid > sphingomyelin > lysophosphatidyl choline. Other variables studied were protein concentration, initial film pressure and pH. Two distinctive properties of the apolipoprotein were the penetration of lipid films at pressures above the collapse pressure of the protein, and the formation of a film even at low salt concentration. The unusual surface activity of HDL-protein may be intimately related to the formation of lipoprotein.

LIPID COMPOSITION OF THE NERVOUS SYSTEM IN REFSUM'S DISEASE. Monica MacBrinn and J. O'Brien (Dept. of Pathol., Univ. of S. California, School of Med., Los Angeles, Calif. 90033). *J. Lipid Res.* **9**, 552–61 (1968). The compositions of the major lipids and their constituent fatty acids and fatty aldehydes from cerebral gray matter, white matter and myelin, spinal cord myelin, and sciatic nerve were determined in a 57 yr old woman who died of Refsum's disease. There were deficiencies of ethanolamine glycerophosphatides (EGP) in gray matter and frontal lobe myelin, and a lipid with the chromatographic properties of lyso-EGP accumulated in all tissues. The proportions of the remaining lipids were nearly normal in the central nervous system tissues. In the sciatic nerve the proportions of sphingolipids were small; this observation is consistent with the severe demyelination noted on pathologic examination. Cholesteryl esters were not detected in any tissue. Phytanate (3,7,11,15-tetramethylhexadecanoate) was present in the glycerophosphatides from each tissue. Higher proportions of phytanate were found in choline glycerophos-

phatides (CGP) than in EGP or in serine glycerophosphatides (SGP). Hydrolysis with phospholipase established that phytanate was confined to the 1-position of CGP. More phytanate was found in CGP from myelin than from gray or white matter. Fourfold higher proportions of phytanate were found in CGP from sciatic nerve than in CGP from the central nervous system.

INSECT PHEROMONES. F. E. Regnier and J. H. Law (Dept. of Biochem., Univ. of Chicago, Ill. 60637). *J. Lipid Res.* 9, 541–551 (1968). The evidence for intraspecies chemical communication in insects is reviewed, with emphasis on those studies where known organic compounds have been implicated. These signal-carrying chemicals are known as pheromones. There are two distinct types of pheromones, releasers and primers. Releaser pheromones initiate immediate behavioral responses in insects upon reception, while primer pheromones cause physiological changes in an animal that ultimately result in a behavior response. Chemically indentified releaser pheromones are of three basic types: those which cause sexual attraction, alarm behavior and recruitment. Six pheromones release the entire repertoire of sexual behavior. Thus a male insect may be attracted to and attempt to copulate with an inanimate object that has sex pheromone on it. It appears that most insects are rather sensitive and selective for the sex pheromone of their species. Insects show far less sensitivity and chemospecificity for alarm pheromones. Alarm selectivity is based more on valatility than on unique structural features. Recruiting pheromones are used primarily in marking trails to food sources. Terrestrial insects lay continuous odor trails, whereas bees and other airborne insects, apply the substances at discrete intervals.

ORIGIN OF SOME DERIVATIVES OF RETINOIC ACID FOUND IN RAT BILE. K. Lippel and J. Olson (Dept. of Biochem., Univ. of Fla. College of Medicine, Gainesville, Fla. 32601). *J. Lipid Res.* 9, 580–86 (1968). After the intraportal injection of retinoic acid-15-^{14}C into rats, all-*trans* methyl retinoate, a *cis* isomer of methyl retinoate, retinoyl β-glucurono-γ-lactone, retinoic acid, and retinoyl β-glucuronide were isolated from methanol extracts of rat bile by chromatography on anion-exchange resin and silicic acid columns and characterized on thin-layer plates of Silica Gel G. On the other hand, when bile was extracted with *n*-butanol or analyzed directly by thin-layer chromatography, only β-glucuronide and a very small amount of retinoic acid could be detected. Butanol extracts of the liver and the intestine, however, still contained a small radio-active nonpolar fraction. When retinoyl β-glucuronide was incubated with an anion-exchange resin in the presence of methanol, several nonpolar products appeared. Apparently the methyl retinoate, retinoyl β-glucurono-γ-lactone and most of the retinoic acid previously found in bile after retionic acid administration are produced from retinoyl β-glucuronide.

ABSORPTION AND LYMPHATIC TRANSPORT OF CHOLESTEROL IN THE RAT. C. Sylven and B. Borgstrom (Div. of Physiolog. Chem., Chemical Center, Univ. of Lund, Lund, Sweden). *J. Lipid Res.* 9, 596–601 (1968). Rats with thoracic duct fistulae were fed triolein and triolein containing various amounts of labeled cholesterol. The analysis of the lymph lipids gave the following results. In the fasting state the cholesterol transported via the thoracic duct was 0.87 μmole/hr. Feeding 800 μmoles of triolein gave a maximum rate of transport of cholesterol of 1.65 μmoles/hr. Addition of cholesterol to the triolein further increased the cholesterol transport to a maximal rate of almost 5 μmoles/hr when 50 μmoles of cholesterol were fed per 800 μmoles of triolein. The exogenous fraction of the cholesterol transported increased linearly with increasing cholesterol load, constituting at the highest dose almost 90% of the total cholesterol transported. An almost constant fraction (about 0.4) of the dietary cholesterol was recovered in the thoracic duct lymph in 24 hr irrespective of the dose fed, from a trace up to 100 μmoles in 800 μmoles of triolein.

DISTRIBUTION AND FATTY ACID COMPOSITION OF PHOSPHOGLYCERIDES IN NORMAL HUMAN BRAIN. L. Svennerholm (Dept. of Neurochem., Psychiatric Res. Center, Univ. of Gothenburg, Gothenburg, Sweden). *J. Lipid Res.* 9, 570–79 (1968). A thin-layer chromatographic procedure for the isolation of tissue phospholipids and their subsequent analysis is described. The method has been applied to the determination of the fatty

acids of phosphoglycerides in human brain from the early fetal stage to old age. The study shows changes in the distribution and fatty acid composition of each phosphoglyceride in normal brain, although they are quite small after early childhood. A lipid-specific fatty acid pattern for each of the four major phosphoglycerides was found. Besides this, the pronounced differences between fatty acids of the lipids from the cerebral cortex and from the adjacent white matter justify speaking of a tissue-specific fatty acid pattern for brain phosphoglycerides. The phospholipids of cerebral white matter contained more monoenoic acid but much less polyunsaturated fatty acid than those of cerebral cortes.

EFFECT OF LONG-TERM ADMINISTRATION OF AY-9944, AN INHIBITOR OF 7-DEHYDROCHOLESTEROL Δ^7-REDUCTASE, ON SERUM AND TISSUE LIPIDS IN THE RAT. D. Dvornik and P. Hill (Dept. of Biochem., Ayerst Res. Lab., Montreal, Canada). *J. Lipid Res.* 9, 587–95 (1968). The effect of long-term administration of AY-9944, a specific inhibitor of cholesterol biosynthesis, was examined in rats maintained on diets with low and high cholesterol and fat content. Sterol and phospholipid levels were determined in the serum, liver, adrenals, lungs and brain after 6 and 12 months of feeding AY-9944 at several dose levels. In all the tissues examined, the cholesterol content was lowered and the cholesterol was partly replaced by 7-dehydrocholesterol biosynthesized instead of cholesterol in the presence of AY-9944. Cholesterol levels were particularly low in the serum and adrenals, while 7-dehydrocholesterol accumulated in the lungs. The fall in cholesterol and appearance of 7-dehydrocholesterol were reversible. Alterations of this type in the brain indicated that sterol metabolism is active in the adult rat brain. Addition of cholesterol to the diet reduced the effect of the inhibitor by eliminating the liver as a site of sterol synthesis.

FORMATION OF A COMPLEX BETWEEN VALINE AND INTESTINAL MUCOSAL LIPID; ITS POSSIBLE ROLE IN VALINE ABSORPTION. S. Reiser and P. Christiansen (Dept. of Med., Indiana Univ. School of Med., Indianapolis, Ind. 46207). *J. Lipid Res.* 9, 606–12 (1968). During intestinal absorption amino acids must traverse the lipid-rich epithelial cell membrane, possibly in a lipid-soluble form. In a search for such a form, we have determined the ability of lipid extracted from intestinal mucosa to bind valine. After incubation in a valine-containing medium this lipid (defined as the heptane-soluble fraction) contained, on the average, 3.63 μmoles of valine per 100 mg of lipid. Cyanide (0.002 M), 2,4-dinitrophenol (0.002 M), and anaerobic conditions had little effect on this process. Valine uptake into the lipid fraction of mucosa was complete after 2.5 min. Of a number of sugars and amino acids tested, isoleucine, methionine, and leucine were the most potent inhibitors of valine uptake into lipid. The inhibition by leucine appeared to be competitive. A similar uptake of glucose into the mucosal lipid was not inhibited by leucine, methionine, or isoleucine but was inhibited by galactose. Various phosphoglycerides (but not sphingomyelin) from other sources, used in place of mucosal lipid, were able to carry 20–150 times as much valine into heptane-soluble fraction as were other lipid classes. Some characteristics of the complex are similar to those of the valine transport system.

THE DISAPPEARANCE RATES OF SEX STEROIDS IN IMMATURE AND MATURE RATS. Renee Ulrich and J. R. Kent (Long Beach Veterans Adm. Hosp., Long Beach, Calif. 90801). *Proc. Soc. Expt. Biol. Med.* 128, 1093–96 (1968). The disappearance curves of testosterone-^{14}C in immature and mature male rats and of estradiol-^{14}C in immature and mature female rats were plotted following intravenous injection of these steroids. Similar curves were found in prepubescent and adult animals. These findings indicate that changes in the rates of utilization of these steroids do not contribute to the initiation of puberty.

OSMOTIC FRAGILITY AND SPONTANEOUS LYSIS OF HUMAN RED CELLS PRESERVED WITH ADDITION OF PROGESTERONE. F. DeVenuto (Biochem. Div. U.S. Army Med. Res. Lab., Ft. Knox, Ky.). *Proc. Soc. Expt. Biol. Med.* 128, 997–1000 (1968). Human red blood cells have been stored at 2C in acid-citrate-dextrose solutions with and without addition of progesterone in physiological concentration. The osmotic fragility and the "late autohemolysis" or spontaneous lysis of the cells during storage have been determined at intervals up to 42 days. As the time of storage increases a progressive loss of osmotic resistance and an increase in the spontaneous hemolysis occur; however, for the cells preserved without progesterone the loss of osmotic resistance as well as the increase in the hemolysis are much higher than those observed for the red cells preserved with progesterone. It is possible that progesterone maintains the structural integrity of the cells by interacting with constituents of the red blood cell membrane.

INFLUENCE OF FASTING ON THE FORMATION OF CHOLESTEROL ARACHIDONATE BY THE SERUM CHOLESTEROL ESTERIFYING ENZYME. L. Swell and M. D. Law (Veterans Admin. Hosp., Richmond, Va. 23219). *Proc. Soc. Expt. Biol. Med.* 129, 363–66 (1968). The serum cholesterol ester transferase enzyme is more active in the serum of fasted than fed rats. This increase in activity is associated with principally one cholesterol ester, namely, cholesterol arachidonate. The serum cholesterol esters and phosphatidyl choline of fasted rats contain a higher proportion of arachidonic acid and less linoleic acid than those of fed animals. The findings indicate that the types of cholesterol esters synthesized by the serum enzyme are dependent, in part, on the nutritional state of the animal.

ROLE OF PHOSPHOLIPIDS IN IODINE BINDING. G. A. Dhopeshwarkar, M. Y. Mandlik, R. H. Atmaram and J. F. Mead (Dept. of Biophys., 900 Veteran Ave., UCLA School of Medicine, Univ. of California, Los Angeles, Calif. 90024). *Proc. Soc. Expt. Biol. Med.* 129, 571–77 (1968). After an oral dose of $Na^{131}I$ to rats, sacrificed after 48 hr, liver lecithin had maximum radioactivity compared to other phospholipid components; neutral lipids had more activity than thyroid or plasma lipids. Plasma lipids had negligible activity after intravenous injection of $Na^{131}I$ after periods ranging from 15 min to 6 hr. Plasma lecithin does not seem to be a carrier of iodide in the blood. Liver slice or homogenate experiments failed to show any enzymatic process connected with association of lecithin with iodide. The lecithin iodide complex formed *in vitro*, when degraded by mild alkaline or enzymatic hydrolysis, loses most of the activity to the water-soluble portion rather than to the fatty acids. Lecithin isolated from different sources will form a strong association with iodide in the presence of Fe^{3+}, Mn^{2+}, Ca^{2+} or Mg^{2+}. Further confirmation of this metal ion involvement can be shown by preventing this effect by such chelating agents as EDTA or sodium citrate. A lecithin iodide complex involving two moles of lecithin and one metal ion, and exhibiting a strong affinity towards iodide is proposed.

THE METABOLISM OF GLYCERIDE GLYCOLIPIDS. II. BIOSYNTHESIS OF MONOGALACTOSYL DIGLYCERIDE FROM URIDINE DIPHOSPHATE GALACTOSE AND DIGLYCERIDE IN BRAIN. D. A. Wenger, Joan W. Petitpas and R. A. Pieringer (Dept. Biochem., Temple Univ. School Med., Philadelphia, Pa.). *Biochemistry* 7, 3700–7 (1968). Microsomal enzyme preparations of brain from rats 13 to 20 days of age catalyze the synthesis of 1,2-di-*O*-acyl-3-*O*-(*β*-*D*-galactopryanosyl)-*sn*-glycerol from uridine diphosphate galactose and 1,2-diglyceride. The enzyme requires the 1,2-isomer of the diglyceride and prefers diglycerides with long-chain-saturated fatty acid constituents. Consistent and relatively uniform stimulation of the biosynthesis by exogenous diglyceride was best achieved by adsorbing the diglyceride substrate directly to a lyophilized enzyme preparation. The activity of the enzyme is highest in preparations made from brains of rats 14–18 days old. The age of highest enzymatic activity corresponds to the age during which the concentration of monogalactosyldiglyceride in brain increases most rapidly and to the age during which myelination occurs at maximal rate. This coincidence suggests that the enzyme responsible for the biosynthesis of monogalactosyl diglyceride in brain may function in myelination.

INTERACTION OF EGG LECITHIN WITH CHOLESTEROL IN THE SOLID STATE. J. E. Zull, Susan Greanoff and H. K. Adam (Dept. of Biol. and the Materials Science Labs., Case Western Reserve Univ., Cleveland, Ohio 44106). *Biochemistry* 7, 4172–6 (1968). The attenuated total reflectance technique of infrared spectroscopy has been used to obtain spectra of solid films of egg lecithin-cholesterol mixtures. The presence of lecithin produces a low frequency shift of ~150 cm^{-1} in the –OH stretching absorption of cholesterol. A maximum interaction was observed at a stoichiometry of 2 sterol:1 phospholipid molecules. The interaction is not produced by other lipids containing polar groups similar to those found in lecithin.

PARTITION OF LIPIDS BETWEEN CHYLOMICRONS AND CHYLOMICRON-FREE LYMPH OF THE DOG FED CORN OIL WITH OR WITHOUT CHOLESTEROL. D. B. Zilversmit (Div. of Biol. Sciences, Cornell Univ., Ithaca, N.Y. 14850). *Proc. Soc. Expt. Biol. Med.* 128, 1116–21 (1968). Dogs were fed for 2 days skim milk formulas containing corn oil with or without added cholesterol. Chylomicrons and chylomicron-free lymph, as well as plasma, were examined for triglyceride, phospholipid, and free and esterified cholesterol. None of the plasma lipids or the triglyceride or the phospholipid of chylomicrons or chylomicron-free lymph showed significant changes as a result of cholesterol feeding.

The cholesterol content of lymph chylomicrons increased much more than that of the chylomicron-free lymph. In the chylomicron fraction of the cholesterol-fed animals, the esterified cholesterol was primarily responsible for the increase in cholesterol content, whereas in the chylomicron-free lymph, free and esterified cholesterol increased equally.

ATHEROSCLEROSIS OF CEREBRAL ARTERIES, PATHOLOGICAL AND CLINICAL CORRELATIONS. J. Worm-Petersen and H. Pakkenberg (Dept. of Neurol., Kommunehospitalet, Copenhagen). *J. Gerontol.* 23, 445–49 (1968). In order to elucidate the pathogenetic basis for the clinical diagnosis of cerebral arteriosclerosis, which continues to find wide-spread use in neurology, the occurrence of the most important symptom, dementia, has been examined in 108 Ss, all of whom presented moderate to severe atherosclerosis in the basal cerebral vessels at autopsy. One-half of the brains originated from patients who died in a hospital, the other half from Ss who underwent medicolegal autopsy because of sudden, unexpected or violent death. The majority of the cases showed signs of dementia only if pathological processes were present in the parenchyma of the brain at the same time.

EFFECT OF CHOLESTEROL ON IMMUNOGENICITY OF COMMON ENTEROBACTERIAL ANTIGEN. H. Y. Whang and E. Neter (Dept. of Microbiol., State Univ. of N.Y., Med. School, Buffalo, N.Y. 14222). *Proc. Soc. Expt. Biol. Med.* 128, 956–9 (1968). Cholesterol in amounts of 50–500 μg/ml when mixed *in vitro* with supernates of enteric bacteria, containing both common enterobacterial antigen (CA) and lipopolysaccharide (endotoxin), increases the immunogenicity of CA upon intravenous injection into rabbits. Enhancement of the antibody response does not occur when supernate and cholesterol are injected separately, albeit simultaneously. Since cholesterol does not enhance the antibody response to the isolated, ethanol-soluble CA, it is suggested that the effect of cholesterol on the immune response is due to inhibition of the immunosuppressive lipopolysaccharide.

ACCUMULATION OF LIPOFUSCIN-LIKE PIGMENT IN THE RAT ADRENAL GLAND AS A FUNCTION OF VITAMIN E DEFICIENCY. W. B. Weglicki, W. Reichel and P. P. Nair (Biochem. Res. Div., Sinai Hosp., Baltimore, Md.). *J. Gerontol.* 23, 469–75 (1968). In 4-mo.-old vitamin E deficient female Wistar rats, lipofuscin-like pigment accumulation in the zona reticularis of the adrenal gland was significantly greater than in the same zone in the 4-mo.-old rat on a normal diet. The estimated fraction of intracellular volume in the cells of the zona reticularis was 0.6% in the normal 4-mo.-old rat; 3.5% in the vitamin E deficient 4-mo.-old rat; and 5.5% in the normal 12-mo.-old rat.

EFFECT OF UNSATURATED OILS ON RUMEN FERMENTATION, BLOOD COMPONENTS, AND MILK COMPOSITION. P. N. Varman, L. H. Schultz and R. E. Nichols (Dept. of Dairy Science, Univ. of Wisconsin, Madison, Wisc.). *J. Dairy Sci.* 51, 1956–63 (1968). Two lactating cows each of the Guernsey (G), Holstein (H), and Jersey (J) breeds were placed on a normal ration to which 250 ml of safflower oil (S) or cod-liver oil (C) were added once daily. The influence of breed or type of oil on treatment response was minor. Milk fat percentages with respective iodine numbers in parentheses during preliminary, experimental, and post-experimental periods were G-S: 4.3(29), 3.4(40), 3.5(28); G-C: 4.0(31), 3.6(50), 3.1(28); H-S: 2.8(31), 2.6(39), 2.4(28); H-C: 2.9(29), 1.8(49), 2.4(29); J-S: 5.0(30), 4.2(40), 4.0(29); J-C: 4.4(33), 4.1(43), 3.9(27). Changes in milk protein and solids-not-fat percentages, daily yield and body weight were not statistically significant. There was a small but statistically significant drop in the percentage of acetate, as well as increases in the percentages of propionate, butyrate, isovalerate and valerate in the rumen fluid. Changes in rumen fluid pH were not significant. The levels of jugular blood plasma acetate increased significantly. Total levels of plasma phospholipids or cholesterol esters did not show any significant change. The concentrations of plasma free cholesterol and free fatty acids rose, whereas those of total plasma triglycerides dropped. Arteriovenous differences for plasma phospholipids, cholesterol esters, free cholesterol and free fatty acids were small and inconsistent. The major change associated with the depression in milk fat test was a significant decrease in the arteriovenous differences for total plasma triglycerides.

BLOOD LIPIDS OF COWS AT DIFFERENT STAGES OF LACTATION. P. N. Varman and L. H. Schultz (Dept. of Dairy Sci., Univ. of Wisconsin, Madison). *J. Dairy Sci.* 51, 1971–4 (1968). The levels and uptake by the mammary gland of blood lipid components, acetate, ketone bodies and glucose during early or late lactation were compared to the values during the dry period. During the dry period, levels of plasma phospholipids, cholesterol esters and free cholesterol dropped to 38.0, 51.7 and 63.9%, respectively, whereas plasma triglycerides rose to 146% of the late-lactation levels. The only positive arteriovenous difference observed consistently during the dry period was for plasma acetate. During early lactation, levels of total plasma triglycerides were lower, whereas those of phospholipids and cholesterol esters were similar to levels of the same components during the dry period.

THE CARNITINE-INDEPENDENT OXIDATION OF PALMITATE PLUS MALATE BY MOTH FLIGHT-MUSCLE MITOCHONDRIA. E. Stevenson (Central Res. Dept., E. I. du Pont de Nemours and Co., Inc., Wilmington, Del. 19898). *Biochem. J.* 110, 105–10 (1968). Mitochondria isolated from the flight-muscle of the southern armyworm moth, *Prodenia eridania,* can oxidize palmitate + malate very rapidly. Added carnitine had no effect on the rate of oxidation of palmitate + malate by flight-muscle mitochondria from two species of moths, and carnitine palmitoyltransferase could not be detected in *Prodenia* by direct assay. Palmitoylcarnitine was not oxidized by moth mitochondria, but when added in low concentrations it reversibly suppressed the oxidation of palmitate. The evidence indicates that carnitine is not involved in fatty acid degradation by moth flight muscle. Added thiols, including CoA, also suppressed palmitate + malate oxidation. An ATP-dependent fatty acyl-CoA synthetase is present in moth mitochondria.

L-LEUCINE-^{14}C (UL) METABOLISM IN ISOLATED FAT CELLS. M. J. Smith and P. M. Beigelman (Dept. of Med., Univ. of South. California School of Medicine, Los Angeles, Calif. 90033). *Proc. Soc. Expt. Biol. Med.* 129, 621–3 (1968). Effects were studied of insulin and of varying the concentration of glucose upon L-leucine-^{14}C (UL) metabolism by isolated rat epididymal adipose tissue cells. At lower glucose concentrations, insulin increased CO_2 formation and lipid synthesis from labelled L-leucine. At higher glucose concentrations insulin decreased apparent CO_2 formation and lipids synthesis at all levels of glucose concentration studied, but the increment was less at higher glucose concentrations.

EFFECT OF STERCULIA FOETIDA OIL ON WEANLING RAT GROWTH AND SURVIVAL. D. L. Schneider, E. T. Sheehan, M. G. Vavich and A. R. Kemmerer (Dept. of Agr. Biochem., Univ. of Ariz., Tuscon, Ariz. 85721). *J. Agr. Food Chem.* 16, 1022–4 (1968). *Sterculia foetida* oil is a rich source of the cyclopropene fatty acid, sterculic. Feeding this oil to male weanling rats resulted in poor growth at moderate levels of oil in the diet and death at levels of 5% and above. The symptoms leading to death were characteristic of B-vitamin deficiency. Although high dietary levels of pyridoxine, pantothenate and biotin prevented death, growth improved only slightly.

LIPID CHANGES IN THE EYE CONCOMITANT WITH THE DEVELOPMENT OF ATHEROSCLEROSIS IN THE AORTA IN THE RABBIT. H. G. Roscoe and A. W. Vogel (Dept. of Metabolic Chemotherapy, Lederle Lab. Div., Amer. Cyanamid Co., Pearl River, N.Y. 10965). *Circulation Res.* 23, 633–43 (1968). The lipid changes that occur in the eyes and aortas of male Dutch belted rabbits maintained on 1% dietary cholesterol for 1 to 3 months were studied. In the cornea, iris, ciliary body and aorta the most noteworthy lipid change was in tissue cholesterol, which increased with increased time of feeding cholesterol. The phospholipid content of all the tissues increased to a lesser extent but followed the same pattern as cholesterol with respect to time. No changes in tissue triglyceride could be detected during the experimental period. The iris had the capacity to accumulate large amounts of cholesterol. The total iridic tissue (average wet weight, 75 mg/rabbit) accumulated an average of 10.2 mg of cholesterol after the rabbit had eaten a 1% cholesterol diet for 3 months; the average increase was 14.2 mg in aortic tissue (average wet weight = 380 mg/rabbit). The severity of disease graded visually correlated with the cholesterol concentration in the cornea and aorta.

POTASSIUM-DEPENDENT STIMULATION OF RESPIRATION IN BROWN FAT CELLS BY FATTY ACIDS AND LIPOLYTIC AGENTS. Nora Reed and J. N. Fain (Div. of Biol. and Med. Sciences, Brown Univ., Providence, Rhode Island 02912). *J. Biol. Chem.* 243, 6077–6083 (1968). The omission of K^+ from the buffer used for isolation and incubation of rat brown fat cells blocked the large increases in respiration seen after the addition of lipolytic agents. The effect of K^+ was on the activation of respiration by free fatty acids rather than upon the lipolytic action of agents such as theophylline. Rb^+ and Cs^+, but not NH_4^+, could partially substitute for K^+ in the activation of respiration by theophylline. Valinomycin, an antibiotic which activates the uptake of K^+ by isolated mitochandria, markedly stimulated respiration in brown fat cells in the presence but not in the absence of K^+. Nigericin, another antibiotic which blocks K^+ uptake by mitochondria, also blocked the increase in respiration due to valinomycin and theophylline. The effects of lipolytic agents on respiration could be mimicked by addition of albumin-bound free fatty acids to brown fat cells, an effect which was also K^+-dependent. The omission of Ca^{++} and Mg^{++} reduced the activation of respiration by fatty acids or lipolytic agents. These findings indicate that the activation of energy metabolism by fatty acids involves a K^+-dependent process which is influenced by divalent cations. The increased oxygen consumption may be secondary to utilization of high energy intermediates of oxidative phosphorylation for increased K^+ flux across membranes.

UTILIZATION OF CAROTENE, VITAMIN A AND TRIGLYCERIDE FOLLOWING ORAL INTAKE OF TRITON. W. E. J. Phillips and R. L. Brien (Res. Labs., Food and Drug Directorate, Dept. of Natural Health and Welfare, Ottawa, Canada). *J. Nutr.* 96, 505–8 (1968). Triton has been suggested as a nutritional adjunct to modify the absorption of fat. The postulated mode of action implied that metabolism of the fat-soluble vitamins might also be impaired. Experiments were conducted with rats to study the effects of dietary Triton WR-1339 on the utilization of β-carotene, vitamin A, trioleate and oleic acid. The absorption of vitamin A and utilization of the provitamin were not impaired by the prefeeding of Triton. Triton did not alter the radioactivity in blood, liver or depot fat following oral administration of triolein-^{14}C or oleic acid-^{14}C. The data suggest that Triton WR-1339 at levels below 5% has little practical significance for inducing a controllable steatorrhea.

INHIBITION OF ENZYME ACTIVITIES BY FREE FATTY ACIDS. S. V. Pande and J. F. Mead (Lab. of Nuclear Med. and Radiation Biol. and Dept. of Biol. and Dept. of Biol. Chem., UCLA School of Med., Los Angeles, Calif. 90024). *J. Biol. Chem.* 243, 6180–5 (1968). The inhibition of several enzyme activities by free fatty acids has been examined. The inhibition of rat liver microsomal linolenate-activating enzyme activity by linolenate was found to be due to the inactivation of enzyme by substrate fatty acid. Stearoyl coenzyme A was also found to inhibit linolenate-activating enzyme. Likewise, microsomal glucose-6-phosphatase was inhibited by oleate; the extent of inhibition by oleate was related to the relative concentration of microsomal material. Citrate synthase from pig heart was inhibited by linoleate and glucose 6-phosphate dehydrogenase of yeast was inhibited by oleate. The inhibition of glucose 6-phosphate dehydrogenase was time-dependent and the presence of glucose 6-phosphate gave considerable protection against inactivation. The marked similarity in the observed inhibition of diverse enzymes by long chain unsaturated fatty acids to that of reported inhibitions by fatty acyl-CoA esters suggests that inhibitory effects are due to detergent properties of these inhibitors. In view of these and other considerations it is suggested that the extrapolation of observed inhibitions *in vitro* of enzyme activities by free fatty acids to regulation of metabolism *in vivo* must be made with caution.

REDUCTION OF ELEVATED PLASMA LIPID LEVELS IN ATHEROSCLEROSIS FOLLOWING EDTA THERAPY. J. H. Olwin and J. L. Koppel (Coagulation Res. Lab., Presbyterian-St. Luke's Hospital, Chicago, Ill. 60612). *Proc. Soc. Expt. Biol. Med.* 128, 1137–40 (1968). In 34 patients exhibiting various clinical manifestations of atherosclerosis (14 diabetic, 20 nondiabetic) abnormally high plasma lipid levels were observed to be depressed, in many instances to the normal range, following the intravenous administration of disodium EDTA. These levels again became elevated after discontinuance of therapy and were again found to be lowered to a similar degree following the reinstitution of therapy. The mechanism responsible for this phenomenon is at present unknown.

THE EFFECT OF CHRONIC ALCOHOL ADMINISTRATION ON ENZYME PROFILE AND GLYCERIDE CONTENT OF HEART MUSCLE, BRAIN AND LIVER. M. Marciniak, S. Gudbjarnason and T. A. Bruce (Dept. of Medicine, Wayne State Univ. School of Medicine, Detroit, Mich. 48207). *Proc. Soc. Expt. Biol. Med.* 128, 1021–25 (1968). The effect of chronic alcohol administration (10 weeks) on the glyceride content and enzyme profile of heart muscle, brain and liver was examined in the dog. A significant increase (2.8-fold) in glyceride content of cardiac muscle was observed in the alcohol consuming animal, without concomitant changes in myocardial enzyme profile. Chronic alcohol administration resulted in a significant increase in activity of glycolytic and oxidative enzymes of the brain, but without parallel changes in the glyceride content of the brain. Ten-week long ethanol administration resulted in a 3.5-fold increase in glyceride content and a significant increase in activity of glycolytic and oxidative enzymes of the liver.

INVOLVEMENT OF PHOSPHOLIPIDS IN Rb^+ TRANSPORT BY KIDNEY CORTEX TUBULES. Amra Malila, F. D. DeMartinis and E. J. Masoro (Dept. of Physiol. and Biophysics, Woman's Med. College of Penn., Philadelphia, Pa. 19129). *J. Biol. Chem.* 243, 6115–22 (1968). The relationship between the phospholipid structure of renal cortical tubules and their ability to sequester Rb^+ was investigated. When the isolated cortical tubules were treated with low levels of commercial phospholipase C from *Clostridium welchii*, there was very little destruction of the tubular phospholipid but the sequestration of Rb^+ was markedly curtailed. Since such treatment does not affect Rb^+ efflux, it appears that phospholipase C treatment acts by inhibiting the uptake of Rb^+. The evidence presented indicates that phospholipase C, rather than a contaminant of the preparation or an inhibitory product of the enzyme reaction, depresses Rb^+ uptake by its action on the cell membrane phospholipids. Evidence is also presented that indicates that the inhibition of Rb^+ uptake is not the result of widespread destruction of the cell. Phospholipase C treatment, which markedly decreases Rb^+ uptake, does not depress galactose and 2-deoxygalactose uptake by the cortical tubules. It is concluded that a phospholipid structure (or structures) on the outer surface of the plasma membrane is involved in the uptake of Rb^+ by renal cortical cells.

INFLUENCE OF ENVIRONMENTAL TEMPERATURE AND DIETARY FAT ON BACKFAT COMPOSITION OF SWINE. W. S. MacGrath, Jr., G. W. VanderNoot, R. L. Gilbreath and H. Fisher (Depts. of Nutr. and Animal Sciences, Rutgers—The State Univ., New Brunswick, New Jersey). *J. Nutr.* 96, 461–6 (1968). Three groups of growing barrows were exposed to environmental temperatures of 0 to 5C and 25 to 30C and fed diets containing either no supplemental fat, 10% corn oil or 10% beef tallow. Food intake was restricted on all treatments to 2 kg/pig per day. In animals fed the unsupplemented diet

and to a lesser extent in those fed the tallow diet at either environmental temperature, there was a temperature gradient from outer to inner backfat layer inversely related to total fat unsaturation (iodine value). With the corn oil-supplemented diets, no clear relationship between temperature gradient of backfat layer and degree of fat unsaturation was established. Although the pigs exposed to the cold temperature exhibited greater backfat unsaturation than those exposed to the warm environment with all dietary treatments, the backfat from pigs fed the unsupplemented diet and exposed to the cold environment nevertheless decreased in total unsaturation. It was concluded that the relationship between depot fat unsaturation and environmental temperature is influenced by the intake of polyunsaturated fatty acids which are not synthesized by the pig.

EFFECTS OF HIGH ALTITUDE ON LIPID COMPONENTS OF HUMAN SERUM. G. J. Klain and J. P. Hannon (Physio. Div., U.S. Army Medical Res. and Nutr. Lab., Fitzsimons General Hosp., Denver, Colorado 80240). *Proc. Soc. Expt. Biol. Med.* **129**, 646–9 (1968). Serum lipid components were measured in eight male subjects exposed to an altitude of 14,000 feet for 14 days. Concentrations of total lipids rapidly decreased after the third day of exposure and a similar, although less pronounced decrease, was observed in cholesterol levels. By way of contrast, phospholipid and FFA levels progressively increased during the period of altitude exposure. High altitude had no effect on serum glucose concentration but caused a slight increase in serum water content. The data indicate that high altitude has a marked effect on lipid metabolism.

LIPID BIOSYNTHESIS BY BOVINE MAMMARY CELLS IN VITRO. J. E. Kinsella (Lipids Lab., Pennsylvania State Univ., University Park, Pa.). *J. Dairy Science* **51**, 1968–70 (1968). Dispersed alveolar cells from lactating bovine mammary glands actively secreted lipids both morphologically and compositionally similar to those isolated from normal milk. Using various radioactively labeled lipid substrates, it was demonstrated that the cells possess the same biochemical capacity as the intact tissue for about three days in fresh culture. Lipogenesis markedly decreased after 48 hours *in vitro*. Whereas, fresh cells incorporated acetate preponderantly into triglycerides, the established proliferating cells markedly incorporated acetate into phospholipids.

HAPTENIC O-ANTIGEN AS A POLYMERIC INTERMEDIATE OF IN VIVO SYNTHESIS OF LIPOPOLYSACCHARIDE BY SALMONELLA TYPHIMURIUM. J. L. Kent and M. J. Osborn (Dept. of Molecular Biol., Albert Einstein College of Med., Bronx, New York 10461). *Biochemistry* **7**, 4419–22 (1968). A mutant strain of *Salmonella typhimurium*, deficient in phosphomannose isomerase, was used to study the kinetics of O-antigen synthesis *in vivo*, these polysaccharides being the sole end products of mannose-^{14}C incorporation. The kinetics of uptake of radioactivity into haptenic O-antigen and lipopolysaccharide were consistent with the prediction of an intermediate with high turnover rate. Pulse-chase studies demonstrated rapid and efficient transfer of O-antigenic radioactivity from antigen-carrier lipid hapten to lipopolysaccharide; at least 80% of the label transferred to lipopolysaccharide during the initial chase period was derived from hapten. The addition of completed O-antigenic polymer to the preformed lipopolysaccharide acceptor represents a unique biochemical reaction whereby two different polymers are covalently joined.

EFFECT OF DIETARY ASCORBIC ACID ON VITAMIN A DEFICIENCY IN CHICKS. J. Kendler and M. Perek (Dept. of Poultry Sci. and Animal Hygiene, Hebrew Univ. of Jerusalem, Rehovoth, Israel). *Poultry Sci.* **47**, 1176–79 (1968). Ascorbic acid treatment increased the concentration of liver vitamin A in chicks receiving sufficient amounts of vitamin A in their diet. On the other hand, when fed a diet devoid of vitamin A, the chicks treated with ascorbic acid showed an enhanced depletion of their stores of vitamin A in the liver. The mean survival time of chicks fed a vitamin A deficient diet was significantly shortened by the ascorbic acid treatment.

METABOLISM OF ANDROST-4-ENE-3,17-DIONE-4-^{14}C BY RABBIT SKELETAL MUSCLE IN VITRO. THE PRESENCE OF A 5α-STEROID

REDUCTASE IN THE PARTICULATE FRACTION. Patricia Z. Thomas (Worcester Found. for Exptl. Biol., Shrewsbury, Mass. 01545). *J. Biol. Chem.* 243, 6110–4 (1968). Incubation of androst-4-ene-3,17-dione-4-^{14}C with rabbit skeletal muscle strips indicated previously that 5α-androstane-3,17-dione-4-^{14}C was formed. Differential centrifugation of whole homogenates showed that quantitatively the greatest conversion to 5α-androstane-3,17-dione-^{14}C by the 600 × g fraction occurred when the incubation was supplemented with a TPNH-generating system. In some incubations with this fraction, DPN^+, DPNH and TPN^+ also resulted in conversions in excess of those occurring without supplementation, although these were uniformly less than that obtained with a TPNH-generating system.

RAT SERUM LIPOPROTEINS AFTER PARTIAL HEPATECTOMY. K. A. Narayan, G. E. Mary and F. A. Kummerow (The Burnsides Res. Lab., Univ. of Ill., Urbana, Ill. 61801). *Proc. Soc. Expt. Biol. Med.* 129, 6–12 (1968). The serum lipoprotein levels in partially hepatectomized rats were determined by ultracentrifugal, disc electrophoretic and chemical methods and were compared with corresponding values obtained with sham operated and nonoperated rats. The results indicated a sharp decline in serum high density lipoproteins and an elevation in low density lipoproteins in rats undergoing liver regeneration. The decrease in high density lipoproteins in partially hepatectomized rats was probably due to its utilization by the liver during regeneration.

PHYSICAL, CHEMICAL AND IMMUNOLOGICAL PROPERTIES OF LIPOPOLYSACCHARIDE RELEASED FROM ESCHERICHIA COLI BY ETHYLENEDIAMINETETRAACETATE. Loretta Leive and Virginia K. Shovlin (Lab. of Biochem. Pharm., National Inst. of Arthritis and Met. Diseases, National Inst. of Health, Bethesda, Md. 20014) and S. E. Mergenhagen. *J. Biol. Chem.* 243, 6384–91 (1968). When *Escherichia coli* 0111:B4 is exposed briefly to ethylenediaminetetraacetate (EDTA) it releases 30 to 50% of its lipopolysaccharide, determined not only by measuring percentage release of colitose, a sugar unique to this polymer, but also by measuring the amount of phenol-extractable lipopolysaccharide remaining with the cell. The fraction released cannot be significantly increased above 50% by several variations in procedure. The high molecular weight material released by EDTA consists of 85 to 90% lipopolysaccharide, 5 to 10% protein, and 5% phospholipid by weight. When compared with lipopolysaccharide obtained by phenol extraction of control cells, this preparation is more immunogenic, and at least as lethal in mice. It yields two fractions on ultracentrifugation. One fraction, containing 40 to 60% of the lipopolysaccharide and most of the protein and lipid, is heterodisperse on ultracentrifugation but changes to a single symmetrical peak with a sedimentation constant of approximately 11 S when the phospholipid is extracted. Its composition is the same as that of control lipopolysaccharide obtained by phenol extraction of normal cells of this strain. The second fraction contains 30 to 40% of the released lipopolysaccharide and yields on ultracentrifugation a hypersharp peak with a sedimentation constant of approximately 5.5 S at infinite dilution. EDTA treatment also releases lipopolysaccharide from two other strains of *E. coli* and two species of *Salmonella*.

THE STEROL ESTERS OF MAIZE SEEDLINGS. R. J. Kemp and E. I. Mercer (Dept. of Biochem. and Agr. Biochem., Univ. College of Wales, Aberystwyth). *Biochem. J.* 110, 111–8 (1968). The composition of the sterol ester fraction of the shoot, root, scutellum and endosperm of 10-day-old maize seedlings was investigated. The scutellum and endosperm together contain 80% of the sterol ester of the seedling. β-Sitosteryl linoleate is the major sterol ester of the scutellum and endosperm. β-Sitosteryl and stigmasteryl palmitate, palmitoleate, oleate and linoleate are the major sterol esters of the root. In the shoot phytosterol linoleate is less abundant than phytosterol myristate, palmitate, palmitoleate and oleate. There is a greater proportion of cholesteryl ester in the shoot than in the other tissues of the seedling.

STUDIES ON THE STEROLS AND STEROL ESTERS OF THE INTRACELLULAR ORGANELLES OF MAIZE SHOOTS. Ibid., 119–25. The composition of the esterified and unesterified sterols of the nuclear, chloroplastidic, mitochondrial and microsomal fractions of 21-day-old maize shoots was examined. The microsomal and mitochondrial fractions contain the bulk of the sterols of the tissue. Only 1% of the sterol isolated from all the organelles is esterified. The nuclear fraction has the greatest proportion of esterified sterol and the microsomal fraction the least. 4-Demethyl sterols constitute the bulk of both esterified and unesterified sterols in all organelle fractions. Cholesterol is the major esterified 4-demethyl sterol of the nuclear and chloroplastidic fractions, but only the nuclear fraction has an appreciable proportion of unesterified cholesterol. Sterol esters of linolenic acid are more abundant in the mitochondrial and microsomal fractions than in the other two fractions.

EVALUATION OF FACTORS AFFECTING LIPID BINDING IN WHEAT FLOURS. Y. Pomeranz, Rita Pi-Chi, Tao, R. C. Hoseney, M. D. Shogren and K. F. Finney (Crops Res. Div., Agr. Serv., U.S. Dept. of Agr., and Dept. of Grain Science and Ind., Kansas State Univ., Manhattan, Kan. 66502). *J. Agr. Food Chem.* 16, 974–9 (1968). The effects of lipid fractions, mixing time, and dough ingredients on lipid binding were studied. Up to 1.5% unsaturated corn oils were bound in dough mixed from petroleum ether-extracted flour; less saturated corn oils and fats were bound. Much more unsaturated oils than saturated fats were bound in bread crumb. Increasing length of dough mixing increased binding of free flour lipids; binding decreased slightly during prolonged overmixing. Adding 2 or 4% sodium chloride to the dough had little effect on the binding of polar wheat flour lipids (added to an extracted flour), but significantly reduced binding of nonpolar lipids. The results suggest that the action of salt was on the gluten proteins and not on salt-like linkages. Presence of nonpolar lipids reduced binding of polar lipids. More bound flour lipids were released by remixing a dough with an NaCl solution than by remixing with water. Practically no added nonpolar lipids were bound by dry-mixing with flour, but substantial amounts of free polar lipids were bound during dry-mixing with a flour containing 4.4% moisture. The binding increased with increased moisture contents and was highest in dough.

BOVINE MILK LIPASE. II. CHARACTERIZATION. C. V. Patel, P. F. Fox and N. P. Tarassuk (Dept. of Food Sci., Univ. of Calif., Davis, Calif.). *J. Dairy Science* 51, 1879–86 (1968). The enzyme lipase, isolated from skim-milk in a homogenous form as evidenced by a single band in starch gel electrophoresis, was partially characterized. It kept best frozen at −20C and was unstable at 37C. Lyophilization resulted in complete loss of activity. The heat stability of pure lipase was similar to that of the enzyme in skimmilk. The pH of maximum stability was 6.6–7.6. The enzyme was stable to light in the absence of catalyst. Diethyl-*p*-nitrophenyl-phosphate and diisopropylfluoro-phosphate were very potent inhibitors, whereas N-ethylmaleimide, *p*-chloromercuribenzoate, iodine and sodium arsenite were less so, thus suggesting that serine and histidine may be at the active site of the enzyme. Skimmilk powder and isoelectric casein had no inhibitory effect. Glutathione and 2-mercaptoethanol were inhibitory at higher concentrations and stimulatory at lower ones. Lipase hydrolyzed simple short-chain fatty acid triglycerides faster than simple long-chain fatty acid triglycerides. It contained 14.8% N, 0.16% P, and 0.6% sialic acid. Amino acid composition was unlike that of any known milk protein, indicating that lipase is a distinct, separate and minor protein moiety.

STABILIZATION OF CAROTENOIDS BY ETHOXYQUIN IN HARVESTED FRESH ALFALFA. R. E. Knowles, A. L. Livingston, J. W. Nelson and G. O. Kohler (W. Reg. Res. Lab., Agr. Res. Serv., U.S. Dept. of Agr., Albany, Calif. 94710). *J. Agr. Food Chem.* 16, 985–9 (1968). Chopped fresh alfalfa samples were sprayed with aqueous solutions of ethoxyquin sulfate or an aqueous ethoxyquin emulsion, then exposed to the air at 32C for 0 to 49 hours before freeze-drying or oven-drying. Some of the dried samples were subjected to an accelerated storage stability test. Samples were analyzed for total carotene and xanthophyll and three individual xanthophylls, lutein, violaxanthin, and neoxanthin. The ethoxyquin treatment protected carotenoids in fresh alfalfa during the time from cutting to dehydrating and provided additional protection during subsequent storage of the meals.

SOYBEAN SAPONINS. FATE OF INGESTED SOYBEAN SAPONINS AND THE PHYSIOLOGICAL ASPECT OF THEIR HEMOLYTIC ACTIVITY. B. Gestetner, Y. Birk and Y. Tencer (Faculty of Agr., Hebrew Univ., Rehovot, Israel). *J. Agr. Food Chem.* 16, 1031–35 (1968). Biological properties of soybean saponins were studied on chicks, rats and mice kept on soybean saponin-containing diets. Neither soybean saponins nor soybean sapogenins could be found in the blood of these organisms. Ingested soybean saponins were hydrolyzed into sapogenins and sugars by the cecal microflora of chicks, rats and mice. Saponin-hydrolyzing enzyme(s) from the cecal microflora of rats was partially purified by successive column chromatography on DEAE-cellulose and Ca phosphate (hydroxyl apatite) in the presence of 2-mercaptoethanol. The optimal activity of the crude enzyme(s) was at pH 6.5; that of the purified preparation was at pH 6.1. It has shown a low degree of specificity, indicated

by the numerous glycosides, including alfalfa saponins, that it hydrolyzes. The *in vitro* hemolytic activity of soybean saponins on red blood cells was fully inhibited in the presence of plasma or its constituents.

FATTY ACID CHANGES IN LIVER FRACTIONS OF PIGEONS AFTER LETHAL-DOSE RADIATION AND THERAPY. R. A. Chung, E. S. So and D. H. Shaw (Carver Res. Found. of Tuskegee Inst., Tuskegee Inst., Alabama 36088). *Poultry Sci.* 47, 1127–30 (1968). It is suggested that arachidonic acid synthesis from linoleic acid may have decreased and/or that radiation therapy resulted in the selective esterification of phospholipid and cholesterol ester with arachidonic acid.

• Detergents

ALL-PURPOSE SHORTENING COMPOSITION. R. T. Darragh and K. W. Nelson (Procter & Gamble Co.). *U.S. 3,397,996.* An all-purpose, glyceride shortening composition suitable for the preparation of cakes and icings contains a combination of four additives: monoglyceride, polyoxyethylene sorbitan monoester, decaglycerol ester and the half ester of dicarboxylic acid with monoester of a straight chain aliphatic diol.

LOW TEMPERATURE BLEACHING COMPOSITION. B. Das and K. G. vanSenden (Lever Bros. Co.). *U.S. 3,398,096.* A stable dry catalyst powder for enhancing the bleaching action of water-soluble inorganic percompounds at low temperatures (20–50C) is described. It consists of a transition element metal ion and a water-insoluble powdered carrier. Methods of preparation of the catalyst and formulations involving its use are also described.

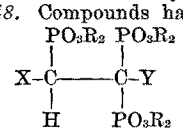
CLEANING COMPOSITION AND METHOD OF CLEANING AND SEQUESTERING METAL IONS. P. W. Kersnar and S. Taormina (Progressive Products Co.). *U.S. 3,398,097.* The reaction product of one mol of ethylene diamine and 2–3.5 mols of propylene oxide is claimed. The product consists essentially of a mixture of mono, bis, tris and tetra (beta hydroxy propyl) ethylene diamine and provides a basis for cleaning and, advantageously, blood stain removing compositions in combination with an organic acid, particularly dodecyl benzene sulfonic acid, in aqueous solution. The product has metal ion sequestering properties.

STABLE GRANULAR SODIUM TRIPOLYPHOSPHATE. J. A. Robertson (FMC Corp.). *U.S. 3,399,959.* The spontaneous structural disintegration of a particulate, granular sodium tripolyphosphate containing Form I crystals and having a size larger than 100 mesh is materially reduced by adding up to about 10 mole percent of a crystal growth inhibitor to the precursor mixture used in preparing the sodium tripolyphosphate which prevents the growth of crystallites of sodium tripolyphosphate larger than about 35 microns. The effective inhibitors are (a) monovalent cations having ionic radii above about 0.95 A, (b) divalent cations having ionic radii below about 1.00 A. and (c) anions selected from the group consisting of fluorides, sulfates, silicates and borates.

OPTICAL BRIGHTENING AND NEW COMPOSITION OF MATTER. I. Okubo and M. Tsujimoto (Mitsui Kagaku Kogyo). *U.S. 3,400,124.* New chemical compounds useful as optical brighteners are claimed. These compounds are chemically defined as styrylnaphthoxazoles, especially outstanding members of the group being those which contain halogen or cyano substituents on the styryl groupings. The optical activity of these compounds is especially useful in the brightening of fabrics.

PROPANEPOLYPHOSPHONATE COMPOUNDS. O. T. Quimby (Procter & Gamble Co.). *U.S. 3,400,176.* The group of compounds consisting of propane-1,1,2,3-tetraphosphonic acid, propane-1,2,2,3-tetraphosphonic acid, propane-1,1,3,3-tetraphosphonic acid, their salts and lower alkyl esters are claimed, as well as a process for their preparation.

PHOSPHONATE COMPOUNDS. O. T. Quimby (Procter & Gamble Co.). *U.S. 3,400,148.* Compounds having the general formula



where X and Y are each H and OH so that when X is H, Y is OH and vice versa, and R is H, alkali metal or lower alkyl radical having 1–6 C atoms. A process for preparing ethane-1-hydroxy-1,1,2-triphosphonic acid is also described.

NOVEL COMPOSITION AND METHOD. LIQUID CONCENTRATES CONTAINING ACTIVE OXYGEN AND HAVING SURFACE ACTIVE PROPERTIES. R. Puchta and W. Fries (Henkel & Cie. G.m.b.H.). *U.S. 3,402,128.* Liquid, storage-stable active-oxygen containing concentrates are disclosed which are composed of water, hydrogen peroxide (free or bound) and a surface active amine oxide of the formula $R_1–X–(R_2–O)_n–N(R_4)(R_5) \rightarrow O$ where R_1 is a C_8 to C_{20} alkyl, X is oxygen, sulfur, selenium or tellurium, R_2 is ethylene, propylene or oxypropylene, n is a whole number from 0 to 18, R_3 is alkyl or alkylol with up to 4 C atoms and R_4 and R_5 are each alkyl or alkylol with up to 5 C atoms, the surface active compound being a stabilizer for the hydrogen peroxide and being present in amounts of 2 to 40% by wt. of the total composition and from 10 to 200% by wt. with reference to the hydrogen peroxide.

FLUOROCHLOROALKANE SULFONATES. H. R. Nychka (Allied Chemical Corp.). *U.S. 3,402,197.* Saturated fluorocarbon sulfonic acid compounds are claimed, having the formula RSO_3H where R is an alphahydro perfluorochloroalkyl or perfluorochloroalkyl radical containing an average of 5–20 C atoms and a ratio of fluorine to chlorine of about 3:1, and the corresponding metal and ammonium salts. These compounds have surface active properties rendering them useful as surface tension reducing agents, wetting agents, dispersing agents and emulsifying agents.

BUOYANT SOAP CAKE AND PREPARATION THEREOF. J. R. Story, M. G. Norman and E. Jungermann (Armour & Co.). *U.S. 3,403,106.* A contoured, buoyant cake of soap is described, having a distinctive top side when the cake is floating in water, an elongated plastic hollow capsule mounted within the soap cake and a movable object within the capsule and freely slidable from one end of the capsule to the other to tilt the mobile object while floating in the water.

PRODUCTION OF NON-IONIC SURFACTANT COMPOSITIONS. R. C. Myerly (Union Carbide Corp.). *U.S. 3,403,107.* Non-ionic detergents containing a straight-chain, non-ionic surfactant are spray dried in the presence of a phenolic or amine compound to reduce smoke formation in the spray drier.

ACIDIC LIPID ALKYL CARBONATES. J. E. Thompson (Procter & Gamble Co.). *U.S. 3,405,148.* New acidic lipid alkyl carbonates are described, having the formula R'–OCO–OR where R is an alkyl group and R' is an acidic lipid acyl residue derived from a condensation product of a fatty acid and a hydroxy carboxylic acid containing 3–6 C atoms, or a condensation product of a dicarboxylic acid containing 3–6 C atoms having no hydroxyl groups and fatty alcohol or fatty ester with free hydroxyl groups. The compounds are useful as bakery additives and have wetting, emulsifying and detergent properties.

A STUDY OF THE INFLUENCE OF SEVERAL POPULAR PERFUMES ON THE STABILITY OF SOAPS. M. Grudev *et al. Mashlozhir. Prom.* 4(3), 1–25 (1968). The properties and the behavior of several popular perfumes used for scenting toilet soaps have been studied. Trials were carried out using four methods: 1) a rapid method, by determining the peroxides formed on irradiation with ultraviolet light; 2) by irradiation with ultraviolet light for 36 hours and organoleptic evaluation of the odor of the soap; 3) by prolonged storage of the samples at 37C and 80% relative humidity; and 4) by storage of the soaps in diffuse light at ambient temperature. The perfumes studied are not suitable for scenting toilet soaps. Some perfumes lost their odor completely but did not change the color of the soap. Those which retain the odor for a long time alter the color of the soap and are only suitable for scenting dark colored soaps. Stabilizers (antioxidants and complexing agents) increased by several fold the time during which the soaps retain freshness of scent. (Rev. Franc. Corps Gras)

PROCESS FOR CLEANING NATURAL AND SYNTHETIC FIBROUS MATERIALS. H. Hoffmann and W. Melloh (Rewo Chem. Fabrik GmbH). *U.S. 3,401,007.* Natural and synthetic fibrous materials, especially carpets and floor coverings, are cleansed with an aqueous solution containing a detergent composition which consists of 70–30% of a fatty alcohol sufate or alkyl benzene sulfonate, and 30–70% of a derivative of sulfosuccinic acid. Such an aqueous solution dried to a powdery residue which can be separated from the fibrous material by a mechanical procedure.

ABRASIVE DETERGENT COMPOSITIONS. P. T. Vitale (Colgate-Palmolive Co.). *U.S. 3,406,116.* A substantially dry abrasive scouring powder, highly effective in cleansing solid ceramic

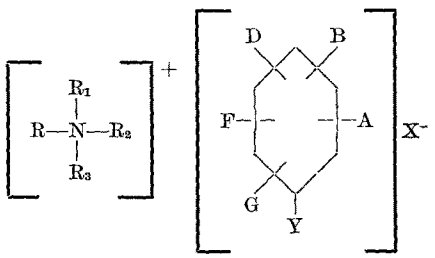
(Continued on page 179A)

(Continued from page 177A)

surfaces and in polishing tarnished copper surfaces, consists essentially of at least about 50% by wt. of a water insoluble inorganic siliceous abrasive material having particle size of from 40 to 400 mesh, about 0.1 to 10% by wt. of a heterocyclic N-chloro imide, and about 0.5 to 15% by wt. of an organic detergent compound stable in the presence of the imide.

POLYGLYCEROL ETHERS SUITABLE FOR DETERGENT PREPARATIONS AND PROCESS FOR PREPARING SAME. B. Blaser and H. Rutzen (Henkel & Cie. GmbH). *U.S. 3,406,208.* Non-ionic surface active polyglycol ethers soluble in water at temperatures of 5C and higher are prepared by the addition of alkylene oxide onto higher molecular weight saturated aliphatic hydrocarbon 1,2-glycol having 8–26 C atoms in the molecule at temperatures of 50–200C and under atmospheric pressure. The surfactants obtained have turbidity points between 20 and 105C.

DETERGENT GERMICIDAL COMPOSITION. T. R. Baravalle (Gerdau Chemical Corp.). *U.S. 3,408,298.* A detergent germicidal composition is claimed, consisting essentially of an organic detergent selected from a wide variety of anionic, cationic or nonionic materials and a germicidally effective amount of a quaternary ammonium complex of the formula:



where R is selected from the group consisting of C_8–C_{24} alkyl, dodecylbenzyl and octyl phenoxy ethoxy ethyl; R_1 alone is selected from the group consisting of alkyl, phenyl, chloro-, bromo- and alkylphenyl, benzyl, alkyl-, dialkyl-, chloro-, dichloro- and dibromobenzyl, naphthyl-lower alkyl and alkyl naphthyl ammonium chloride, the alkyl having 8 to 24 C atoms; R_2 and R_3 alone are lower alkyls; R_1 together with one of the groups R_2 and R_3 is selected from the group consisting of morpholino, methylmorpholino and piperidino, and R_1, R_2 and R_3 together are selected from the group consisting of pyridino quinolino and isoquinolino; A, B, D and F are each selected from the group consisting of hydrogen, lower alkyl, chlorine, bromine, iodine, phenyl, lower alkyl-, lower alkoxy-, chloro- and bromophenyl, benzyl, lower alkyl-, lower alkoxy-, chloro- and bromobenzyl; G is selected from the same group as A, B, D and F but it cannot be hydrogen; Y is selected from the group consisting of oxygen and sulfur and X is selected from the group consisting of chlorine, bromine and iodine.

PROCESS FOR PREPARING SOAP BARS. W. G. Henry (Procter & Gamble Co.). *U.S. 3,408,299.* A process for preparing a soap bar containing an abrasive material comprises the steps of (1) forming a molten soap composition; (2) adjusting its temperature to between 170 and 220F; (3) cooling the soap composition to effect partial solidification; (4) mixing and working the soap composition; (5) extruding the soap composition while annularly rotating it; (6) forcing the soap composition into an expansion zone, and (7) extruding the soap composition in blank bar form.

STABLE, ALKALINE, NON-FOAMING CLEANSING AGENTS. H. J. Schlüssler, H. V. Freyhold, H. Groschopp and K. H. Worms (Henkle & Cie. GmbH). *U.S. 3,408,300.* Solid, alkaline, water soluble cleansing agents which are stable on prolonged storage and substantially non-foaming are described. They consist of essentially 40–95% caustic alkali and of a foam suppressant which is an ethylene, propylene or ethylene-propylene oxide adduct having a cloud point of 10–60C in 1% aqueous solution. These adducts are deposited on finely divided silica, which prevents their deterioration on aging. An acid reacting salt and/or customary cleansing aids may also be present, such as phosphates, gluconates, soda or potash.

HALOGENATED PHENYL DIPHENYL PHOSPHINIC ACIDS AND SALTS THEREOF. E. Jungermann and A. T. Guttmann (Armour and Co.). *U.S. 3,408,390.* Halogenated phenoxy diphenyl phosphinic acids and their salts are disclosed and claimed to be useful as bacteriostatic agents. The disclosed compounds, such as [p-(p-bromo-phenoxy)phenyl]-phosphinic acid and its alkali metal and ammonium salts, are especially useful as the active ingredients in germicidal detergent compositions.

SULFONATING OLEFINS WITH GASEOUS SULFUR TRIOXIDE AND COMPOSITIONS OBTAINED THEREBY. R. D. Eccles, J. E. Yates and T. P. Matson (Continental Oil Co.). *U.S. 3,409,637.* An improved method for preparing surface active compositions comprises the steps of: (a) contacting a linear C_{12}–C_{20} monoolefin at up to 50C with a gaseous mixture of 0.1–10 parts by volume of sulfur trioxide and 99.9 to 90 parts by volume of an inert carrier gas until not in excess of about one mol of sulfur trioxide per mol of olefin is reacted; (b) hydrolyzing the reaction product of step (a); (c) neutralizing the hydrolyzed reaction product with a water-soluble base, and (d) recovering as the surface active composition the sulfonate content of the neutralized mixture.

ESTERS AND ETHERS OF TRIMETHYL PENTYL SULFATES AND THEIR PREPARATION. A. E. Blood and J. D. Heller (Eastman Kodak Co.). *U.S. 3,409,657.* Water-soluble surface-active compounds are prepared by sulfating 2,2,4-trimethylpentane-1,3-diol monoesters and monoethers. The surface-active compounds obtained are efficient wetting agents, particularly in alkaline solutions.

BENZYL SULFONIUM SALTS. W. G. Lloyd (Dow Chemical Co.). *U.S. 3,409,660.* New benzyl sulfonium salts have been prepared which are active cationic surfactants and readily and irreversibly convert into an inert, hydrophobic residue by heating or drying.

CLEANING COMPOSITIONS AND METHOD OF USING THE SAME. E. N. Walsh (Stauffer Chemical Co.). *U.S. 3,410,804.* A cleaning composition inhibited against attack on glass and glazed ceramic and porcelain surfaces contains 80–99% by wt. of at least one ingredient selected from the group consisting of caustic alkali, alkali metal carbonate, phosphate, silicate, borate, sulfate and chlorinated cyanurate, chlorinated cyanuric acid and chlorinated trisodium phosphate, and between 0.5 and 20% by wt. of at least one alkali metal aluminum orthophosphate.

PREPARATION OF ALIPHATIC AMINE OXIDES. P. W. Solomon (Phillips Petroleum Co.). *U.S. 3,410,903.* N-oxides of saturated teritary aliphatic amines and alcohols are prepared by reacting a saturated, tertiary aliphatic amine with hydroperoxide at 20 to 100C. An improvement to this process consists in choosing water and a primary alcohol as the reaction medium.

GERMICIDAL DETERGENT COMPOSITION. K. S. Karsten and W. S. Taylor (R. T. Vanderbilt Co.). *U.S. 3,412,033.* A hydrophilic skin cleansing composition consists essentially of at least one synthetic organic detergent selected from the group consisting of nonsoap anionic, nonionic, cationic and amphoteric detergents and fatty acid soaps and a germicide selected from the group consisting of 1-hydroxy-2-pyridinethione, 2,2'-dithiopyridine-1-dioxide, and inorganic metal salts of 1-hydroxy-2-pyridinethione having as cation one of the following: sodium, zinc, titanium, iron, manganese, zirconium, tin, cadmium and barium. The germicide is present at a level of from 0.01 to about 10% by wt. in the skin-substantive, germicidally active composition.

DIAMINE SOAP AS DISPERSANT IN MAGNETIC TAPE FORMULATIONS. L. Graubart (Ampex Corp.). *U.S. 3,412,044.* In making magnetic tapes and the like it is necessary to first form a dispersion of the magnetic particles in an organic solvent. The invention relates to the use of a long chain fatty acid diamine soap as the dispersing agent. This can be used alone or in admixture with lecithin.

FATTY BRANCHED AMINE DIOXIDES. E. J. Miller, Jr. and A. Mais (Armour Industrial Chemical Co.). *U.S. 3,412,155.* Fatty branched amine dioxides are made by oxidizing the fatty diamine precursor with a strong oxidizing agent such as H_2O_2. These compounds are useful as detergents.

WASH AGENTS. E. Gotte, W. Stein and H. Weiss (Henkel & Cie., GmbH). *U.S. 3,413,221.* Washing compositions containing 20–90% by wt. α-sulfonated C_{10}–C_{20} fatty acid esters and 80–

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(Continued from page 179A)

10% by wt. C_{10}–C_{20} sulfated fatty alcohol or C_9–C_{15} alkyl benzene sulfonate have improved washing properties and versatile low foaming capacity and can be formulated with other foam improvement agents, alkali, phosphates, perborate and other soil removing agents.

PULSED COLUMN APPARATUS FOR SOAP MAKING. P. Godet and J. L. Joux (Colgate-Palmolive Co.). *U.S. 3,413,236.* An apparatus for producing soap and glycerine lye comprises a vertical packed column with means for introducing at one end fatty material in aqueous solution and means for introducing caustic, at the same end of the column. The column is also provided with means for imparting an alternative pulsating motion to the liquid contained in it and with means for extracting at the other end of the column the reaction products of the caustic and fatty material. The column is divided into two sections separated by a middle decantation section, void of packing and having a wider diameter than the remainder of the column. Alkali solutions can be introduced immediately above the decantation section and the glycerine aqueous phase is withdrawn from the bottom of the same section.

SULFATION OF A MIXTURE OF PRIMARY AND SECONDARY ALCOHOLS. A. L. Beiser and P. Leenders (Standard Chemical Products, Inc.). *U.S. 3,413,331.* A process of direct sulfation comprises the steps of reacting a mixture of (1) 0.15 to 0.9 mol equivalents of an alcohol selected from the group consisting of polyethylene glycol alkyl- and alkylaryl ether, and (2) 0.1 to 0.85 mol equivalents of an alcohol selected from the group consisting of a secondary alkanol and a secondary alkanol ethoxylate, with about 1 mol equivalent of anhydrous chlorosulfonic acid and recovering a mixture of sulfated alcohols having a sulfation degree of at least 80%.

DETERGENT COMPOSITION. F. R. M. McDonnell (Lever Bros. Co.). *U.S. 3,414,520.* A spray-dried soap powder having a reduced tendency to form scum when used in hard water and a reduced tendency to form clots when added to water consists essentially of: 30–60% soap, 2.5–20% sodium tripolyphosphate and 1–10% of a neutralized sulfation product of an ethylene oxide adduct, containing a polyethylene oxide chain of up to 20 units, of a C_{10}–C_{22} aliphatic alcohol, the neutralizing cation being an alkali metal, ammonium or substituted ammonium ion.

ALPHA-SULFO PEROXY FATTY ACID DETERGENT COMPOUNDS. P. Robson (Procter & Gamble Co.). *U.S. 3,414,593.* Novel alpha-sulfo peroxy fatty acid compounds are claimed as detergents and bleaching agents; examples of detergent compositions containing these compounds are given.

DETERGENT COMPOSITIONS. H. R. Browning and P. Carter (Lever Bros. Co.). *U.S. 3,415,752.* A detergent composition is claimed, containing a water-soluble organic anionic (soap or non-soap) or nonionic detergent compound, a water-soluble inorganic oxygen-releasing percompound, a fluorescer which is a derivative of 1,3-diphenyl-Δ^2 pyrazoline, and diethylene triamine pentaacetic acid to reduce substantially the loss of fluorescer due to the oxidative degradation by the percompound.

LIQUID AND PASTE DETERGENT CONCENTRATES. W. Stein, W. Umbach and H. Baumann (Henkel & Cie., GmbH). *U.S. 3,415,753.* A novel method is disclosed for reducing the viscosity of liquid and/or paste detergent concentrates containing an olefin monosulfonate. The process is based on the finding that by incorporating into the paste and/or liquid detergent concentrate a surface active olefin disulfonate the viscosity of the concentrate is significantly reduced and in addition the wetting and cleansing activity of the wash active materials present in the detergent are enhanced. The invention also includes the resultant concentrates characterized by reduced viscosity.

DETERGENT SPOTTING STICK. W. A. Di Salvo (Colgate-Palmolive Co.). *U.S. 3,417,023.* A detergent composition in stick form is described, suitable for treating heavily soiled areas of textile materials. The composistion contains a gel-forming salt or soap, a synthetic detergent and an optical brightener.

TREATED PHOSPHATES. S. Goldwasser (Lever Bros. Co.). *U.S. 3,417,024.* The invention is concerned with a detergent tablet having strength after compression. This detergent tablet contains a synthetic organic nonionic detergent, a phosphate, 2–11% water and 0.48 to 2.6% sodium hydroxide, potassium hydroxide or silicates having a strength in aqueous solution equivalent to at least 23.5% as NaOH.