abstracts

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• Fats and Oils

PROPOSED ANTIOXIDANT EXHIBITS USEFUL PROPERTIES. W.M. Cort, J.W. Scott and J.H. Harley (Hoffmann-La Roche Inc., Nutley, N.J. 07110) *Food Technol.* **29**, 46–50 (1975). In a continuing program of synthesizing and studying compounds with potential antioxidant activity, 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (Trolox^{TM} C), has been proposed for use as an antioxidant. Toxicity data has been reported and LD_{50} orally is greater than 1,000 mg/kg in mice, rats, and rabbits. Feeding studies with increasing levels to dogs created no changes in blood, urine, and feces chemistry. Trolox C is not released for human consumption at this time. Two-year food additive feeding studies will have to be completed and a food additive petition submitted.

RAMAN STUDIES OF SOME DIUNSATURATED OLEFINIC AND ACETYLENIC FATTY ACIDS AND THEIR DERIVATIVES. J.E.D. Davies, P. Hodge, F.D. Gunstone and M.S.F. Lie Ken Jie (Dept. of Chem., Univ. of Lancaster, Lancaster, LA1 4YA, England) *Chem. Phys. Lipids* **15**, 48–52 (1975). The Raman spectra of CCl_4 solutions of the 6,12; 7,12; 8,12; 9,12; and 10,12 isomers of octadecadiynoic acid and of the octadecadienoic acid methyl esters of both the *cis, cis* and *trans, trans* series are reported. Provided that there are two or more methylene groups between the unsaturated groups, the double and triple bond vibrational wavenumber values are close to those found in monounsaturated derivatives. An attempt has been made to obtain a correlation between the relative intensities of the v(C C) and $\delta(CH_2)$ bands and the ratio of the number of double bonds to methylene groups in the molecule.

MAGNETIC RELAXATION IN THE LECITHIN-D_2O SYSTEM. B.M. Fung and T.H. Martin (Dept. of Chem., Univ. of Oklahoma, Norman, Okla. 73069) *J. Am. Chem. Soc.* **97**, 5719–23 (1975). The proton spin-lattice relaxation time (T_1) for lecithin in the lecithin-D_2O system was studied over the temperature range −65 to +70° and the frequency range 5.2 to 60.0 MHz. For oriented samples in the liquid crystalline phase, T_1 for "all protons" of the lecithin bilayers did not show an angular dependence with respect to the orientation in the magnetic field. It is therefore suggested that spin diffusion may not be the major relaxation mechanism for the methylene protons. When the temperature was lowered, T_1 for the methyl protons showed an inflection at the transition temperature from the lamellar to the gel phase (ca. 10°) and another inflection at ca. −35°. T_1 for the methyl protons is independent of the water concentration in the gel phase but decreases with the decrease of water concentration in the lamellar phase. Quantitative calculation on the methyl T_1 assuming a log-Gaussian distribution of the correlation time was performed, and the results agree well with the experimental data. The dependence of the methyl T_1 upon both temperature and concentration is related to the motion of the lecithin molecules in different phases.

PHOSPHORUS-31 STUDIES ON LECITHIN IN ETHANOL SOLUTIONS. G. Klose (Sektion Physik der Karl-Marx-Univ., Arbeitsgruppe Molekül-NMR, Leipzig, GDR) *Chem. Phys. Lipids* **15**, 9–14 (1975). ^{31}P relaxation times of lecithin in ethanol solutions have been measured in dependence on temperature and water concentration. Trial calculations have been carried out on the assumption of a 2-site exchange model. The results suggest first, the relaxation behavior is determined by various motional and exchange processes; second, at 29 MHz the dipole-dipole interaction between ^{31}P and protons provides the dominant contribution; third, in general we are not concerned with the case of "extreme narrowing." Moreover, there are no negligible intermolecular contributions to relaxation.

REARRANGEMENT OF 3-KETOCERAMIDE. Y. Kishimoto and C. Costello (Eunice Kennedy Shriver Ctr. for Mental Retardation at W.E. Fernald State Schl., Waltham, Mass. 02154) *Chem. Phys. Lipids* **15**, 27–32 (1975). N-Acetyl 3-ketosphingosine was converted under mild alkaline conditions to an unknown nonpolar compound with a good yield. From its mass, infrared and NMR spectra, the structure of the unknown compound was deduced to be 2-tridecyl-5-(N-acetylamino)-tetrahydro-γ-pyrone. This rearrangement occurred by an intramolecular Michael-type addition reaction.

A FACILE SYNTHESIS OF CERAMIDES. Y. Kishimoto (Eunice Kennedy Shriver Ctr. for Mental Retardation at W.E. Fernald State Schl., Waltham, Mass. 02154) *Chem. Phys. Lipids* **15**, 33–6 (1975). A new simple procedure for the synthesis of ceramide from free fatty acid and sphingosine by oxidation-reduction condensation with triphenylphosphine and 2,2′-dipyridyldisulfide has been described. N-lignoceroyl and N-cerebronoyl sphingosine were synthesized with this procedure producing an overall yield of 74% from lignoceric acid and 64% from cerebronic acid.

OXIDATIVE ACETOXYLATION OF METHYL OLEATE WITH PALLADIUM CATALYSTS. E.N. Frankel, W.K. Rohwedder, W.E. Neff and D. Weisleder (Northern Regional Res. Lab., ARS, USDA, Peoria, Il. 61604) *J. Org. Chem.* **40**, 3247–53 (1975). Catalytic acetoxylation of methyl oleate in acetic acid produces allylic acetoxy fatty esters in high yield. These derivatives are related to products of autoxidation. Useful catalyst systems include $PdCl_2$ + NaOAc, $PdCl_2$ or $Pd(OAc)_2$ + $LiNO_3$, Pd/Al_2O_3 or Pd/C + $LiNO_3$, and Pd/C. Esters produced in 50–97% conversion at 70–120° and O_2 at 1 atm pressure or 20–45 psig include acetoxy (20–63%) and diacetoxy (20–47%) octadecenoate. Monooxygenated products characterized by GC-MS of the silyl ether derivatives were mainly a mixture of 8-acetoxy-9(*cis/trans*)-, 10-acetoxy-8(*cis/trans*)-, 9-acetoxy-10 (*cis/trans*)-, 11-acetoxy-9(*cis/trans*)-octadecenoate. Dioxygenated products had both 1,2- and 1,4-diacetoxy allylic structures: $-CH(OAc)CH(OAc)CH{=}{=}CH-$ and $-CH(OAc)CH{=}{=}CHCH(OAc)-$. 1,3-Disubstituted isomers were ruled out by NMR. The Pd-$LiNO_3$ catalyst system proved to be highly selective for the allylic acetoxylation of methyl oleate. A mechanism involving allylic $Pd(Cl/OAc)_x$ complex intermediates explains the formation of allylic acetoxy esters. For diacetoxylation a direct pathway from oleate is invoked that involves interconversion of σ-oxypalladation, π olefin, and π-allyl complex intermediates.

INVESTIGATION OF LIPID + WATER SYSTEMS. PART 6- PROTON MAGNETIC RESONANCE IN ORDERED LYOTROPIC MESOPHASES. M.P. McDonald and W.E. Peel (Dept. of Chem. and Biol., The Polytechnic, Sheffield, S1 1WB, England) *Chem. Phys. Lipids* **15**, 37–47 (1975). P.m.r. measurements have been made on macroscopically ordered samples of the smectic mesophase in two 1-monoglyceride + water systems and the 1-amino-octane + water system. Three doublets have been observed, one from hydroxyl protons, and the remaining two from methylene protons in two sections of the alkyl chain undergoing different types of molecular motion. The protons of the glyceryl residue also contribute to one of the alkyl chain doublets. The magnitudes of the doublet splittings have been measured at a number of different temperatures and compositions in each system. Some correlations have been made between the splittings obtained and the type of head group and the length and conformation of the alkyl chain. The effects of temperature change have been interpreted in terms of the increasing occurrence of gauche configurations in segments of the alkyl chain. Correlations have been made between degrees of order obtained from p.m.r. and d.m.r. spectra.

OSMOTIC PRESSURE INDUCED PORES IN PHOSPHOLIPID VESICLES. C. Taupin, M. Dvolaitzky and C. Sauterey (Lab. de Physique de la Matière condensée and Lab. de Chimie organique des Hormones, Col. de France, 75231 Paris Cedex 05, France) *Biochemistry* **14**, 4771–5 (1975). We report a comparative study of the leakage of hydrophilic molecules from vesicles of egg lecithin (EL) and of dipalmitoyllecithin (DPL). The effect of osmotic pressure differences on leakage is consistent with a model for a statistical pore nucleation process. The major difference in osmotic pressure induced leakage from DPL and EL is that the number of pore creation sites is much greater in DPL. We suggest that the difference in number of these sites also accounts for other differences in the properties of DPL and EL, namely for differences in vesicle fusion and apparent rate of "flip-flop."

QUANTUM-CHEMICAL AND EMPIRICAL CALCULATIONS ON PHOSPHOLIPIDS. II. A CONFORMATIONAL ANALYSIS OF MODEL HEAD-GROUPS OF PHOSPHOLIPIDS OBTAINED BY THE PCILO-PROCEDURE. T. Weller and H. Frischleder (Karl-Marx-Univ. Leipzig, Sektion Physik, Arbeitsgruppe Molekül-NMR, 701 Leipzig, GDR)

Chem. Phys. Lipids 15, 5–8 (1975). The conformational behaviour and the charge distribution of methylphosphorylcholine has been analyzed within the framework of the PCILO method including phosphorus-oxygen σ- and π-bonds. In the global minimum of energy the –O–P–O–C–C– chain has a (-synclinal, -synclinal, -syn/anticlinal, +anticlinal) conformation.

THE PMR ANALYSIS OF NON-CONJUGATED ALKENOIC AND ALKYNOIC ACIDS AND ESTERS. D.J. Frost and F.D. Gunstone (Unilever Res., Vlaardingen, The Netherlands) *Chem. Phys. Lipids* 15, 53–85 (1975). The 220 MHz PMR spectra of 143 non-conjugated alkenoic and alkynoic acids and esters are correlated so as to provide a method for the structural analysis of such compounds in general. The spectral data are explained in terms of long-range deshielding of the double bonds, triple bonds, acid and ester groups in the molecules, and parameters are derived to quantify the influence of these groups on the chemical shifts of methyl and methylene protons up to six carbon atoms distant along an alkyl chain. It is shown that, by the application of these parameters, 220 MHz PMR spectroscopy can be used to determine both the stereochemistry and position of double bonds, and the position of triple bonds, in the majority of fatty acids and esters. The 2- to 9- and 13- to 17-*cis*- and *trans*-isomers of octadecenoic acid may be readily identified in this way, whilst for the octadecynoic acids all positional isomers may be characterized. Examples are also given of the structural analysis of several polyenoic compounds, including methyl *cis*-5, *cis*-8, *cis*-11, *cis*-14, *cis*-5, *cis*-8, *cis*-11, *trans*-14, and *trans*-5, *cis*-8, *cis*-11, *cis*-14-eicosatetraenoates, and methyl *trans*-5, *cis*-9, *cis*-12-octadecatrienoate.

STUDY OF THE MECHANISM OF DOUBLE-BOND ISOMERIZATION IN METHYL 9-OCTADECENOATES. P. van der Plank and H.J. van Oosten (Unilever Research, Vlaardingen, The Netherlands) *J. Catal.* 38, 223–30 (1975). Hydroisomerization experiments were performed with an unlabeled and a ^{14}C-labeled mixture of 50% methyl oleate ($\Delta_9{}^c$) and 50% methyl elaidate ($\Delta_9{}^t$) at 100 and 130°C, using a nickel/silica catalyst. The results were compared with data obtained from the hydrogenation of pure $\Delta_9{}^c$ and pure $\Delta_9{}^t$ with the same catalyst. It was found that the $\Delta_9{}^t$ double bond migrates considerably faster than the $\Delta_9{}^c$ double bond, even in the 50/50 mixture, in contrast with the hydrogenation rate which is independent of the configuration of the double bond. The initial $\Delta_8{}^t/\Delta_8{}^c$ and $\Delta_{10}{}^t/\Delta_{10}{}^c$ ratios appeared to be strongly dependent on the configuration of the double bond in the starting material; higher ratios were obtained from $\Delta_9{}^c$. The results were explained on the basis of a half-hydrogenated intermediate or σ-complex for hydrogenations and for direct *cis-trans* rearrangements as well as on the basis of a π-allyl mechanism operating simultaneously for double-bond migration.

APPLICATIONS OF MOVING-WIRE DETECTORS FOR THE LIQUID CHROMATOGRAPHY OF FATS AND FATTY ACID DERIVED OLEOCHEMICALS. K. Aitzetmüller (Unilever Forschungsgesellschaft GmbH, 2 Hamburg, 50, Germany) *J. Chromatogr. Sci.* 13, 454–60 (1975). Published applications of moving-wire detectors and other transport flame ionization detectors for the liquid chromatography of fats and oleochemicals are briefly reviewed. The usefulness of this detector is illustrated by a number of examples taken from our own work at the Unilever Forschungsgesellschaft Hamburg. The chromatograms shown were chosen in such a way as to give an idea of how broad a range of applications may be covered by this approach.

HIGH-SPEED LIQUID CHROMATOGRAPHIC SEPARATION OF GLYCERIDES, FATTY ACIDS AND STEROLS. K. Kiuchi, T. Ohta and H. Ebine (National Food Research Institute Ministry of Agriculture and Forestry 4-12, 1-chome, Koto-ku, Tokyo, Japan.) *J. Chromatogr. Sci.* 13, 461–6 (1975). The high-speed liquid chromatographic separation and detection of triglycerides, diglycerides, fatty acid and sterols was carried out to permit the analyses of total lipids from soybeans and soybean food. The study was conducted with a Varian Aerograph LC 4200 liquid chromatograph equipped with a hydrogen flame ionization detector. Linear-gradient, solvent-flow programming was used. Separation of the total lipids by the gradient was achieved in 30 minutes and the column prepared for the next analysis by washing with solvents. The detector response curves for authentic compounds were linear and equivalent to within 2.3% error, based on the response to 1-monopalmitin. The minimum detectable amounts of the authentic substances were between 0.1 and 1.4 μg. When a three-stranded wire was used instead of single filament wire, the sensitivity was increased by 37%.

QUALITATIVE AND QUANTITATIVE GAS LIQUID CHROMATOGRAPHY OF TRIGLYCERIDES. R.J. Hamilton (Chemistry Department, The Polytechnic, Byrom Street, Liverpool, England) and R.G. Ackman (Research and Development Directorate, Halifax Laboratory, P.O. Box 429, Halifax, Nova Scotia, Canada.) *J. Chromatogr. Sci.* 13, 474–8 (1975). This article reviews the methodology required for triglyceride analysis by gas liquid chromatography. Compositions of many of the animal and vegetable triglyceride mixtures to which this technique has been applied are summarized.

ANALYSIS AND QUANTIFICATION OF ETHER LIPIDS BY CHROMATOGRAPHIC METHODS. H.H.O. Schmid, P.C. Bandi and K. Lee Su (University of Minnesota, The Hormel Institute, Austin, Minnesota 55912.) *J. Chromatogr. Sci.* 13, 478–86 (1975). Chromatographic methods, especially thin-layer chromatography [TLC] and gas-liquid chromatography [GLC] are widely used in investigations of the occurrence, molecular structure and metabolism of ether lipids. The application of such techniques to structural analysis and quantification, in combination with methods for the degradation and derivatization of ether lipids, is discussed.

APPLICATION OF OPEN-TUBULAR COLUMN/GAS-LIQUID CHROMATOGRAPHY TO THE ANALYSIS OF COMPLEX MIXTURES OF BRANCHED-CHAIN FATTY ACIDS. A. Smith and A.K. Lough (Rowett Research Institute, Bucksburn, Aberdeen, AB29SB, United Kingdom.) *J. Chromatogr. Sci.* 13, 486–90 (1975). Methyl and butyl esters of branched-chain fatty acids of subcutaneous triacylglycerols from barley-fed lambs were subjected to urea-adduction and the resulting fractions were analyzed as methyl esters by gas-liquid chromatography on wall-coated open-tubular columns. The chromatogram of each fraction was less complex than that of the original and there was evidence to suggest that, in the original mixture of branched-chain acids, components resistant to urea-adduction were present, but their occurrence was obscured in chromatograms by the presence of monomethyl-substituted acids.

GLC IDENTIFICATION TECHNIQUES FOR LONG-CHAIN UNSATURATED FATTY ACIDS. G.R. Jamieson (Department of Chemistry, The Paisley College of Technology, Paisley, Renfrewshire, Scotland.) *J. Chromatogr. Sci.* 13, 491–7 (1975). Relationships between GLC behavior and structures of long-chain fatty acids are discussed. These relationships have been developed for mono-olefinic and methylene-interrupted polyolefinic acids and have been made possible by the extensive published retention data on polyester phases and by a rationalization of ideas of stationary phase polarity. The relationships have been extended to nonmethylene-interrupted polyolefinic acids and the concept of fractional chain-length [FCL] values is explored for polyolefinic acids.

TECHNOLOGY FOR THE IDENTIFICATION OF UNUSUAL CIS,CIS OCTADECADIENOIC FATTY ACIDS. U. Murawski and H. Egge (Institute of Physiological Chemistry, University of Bonn, D-53 Bonn, Nussallee 11, West Germany.) *J. Chromatogr. Sci.* 13, 497–504 (1975). In this article methods are presented for the separation and identification of unusual *cis,cis* dienoic and polyenoic long chain fatty acids. Special emphasis has been laid on the identification of *cis,cis* octadecadienoic acids. The steps followed are: after transesterification the fatty acid methyl esters are separated by preparative gas chromatography according to chain length followed by argentation chromatography on thin-layer plates. After hydroxylation of the double bonds with osmium tetroxide the polyhydroxy compounds are derivatized to the per-O-trimethylsilyl-ethers. Separation and identification of individual compounds are achieved by combined gas chromatography-mass spectrometry using SCOT columns and low ionization energy.

METHOD OF PREPARING A GRANULAR, FREE FLOWING LECITHIN PRODUCT. T.G. Barker, L.L. Young, and J.G. Endres (Central Soya Co.). *U.S. 3,920,857.* In the process, the lecithin is heated to 100–130 F and immediately blended with a carrier selected from the class consisting of agglomerated nonfat dry milk and agglomerated whey having a particle size in the range of 10–100 mesh. The carrier particle size is such that 10–40% is retained on a No. 20 mesh screen. The amount of carrier in the product is 50–70%.

PREPARATION OF DERIVATIVES OF CHOLESTEROL. Y. Mazur and A. Rotman. *U.S. 3,920,531.* Hydroxylated derivatives of cholesterol and 7-dehydrocholesterol are prepared by subjecting a saturated unsubstituted or substituted derivative of cholestane, dissolved in a suitable solvent, in the presence of peracetic acid, to irradiation with ultra violet light having a wavelength of less than 350 mμ. The products of the reaction are separated and recovered.

Lipophilic cellulose sponges to remove lipids from the surface of immiscible fluids. J. Teng and M.C. Stubits (Anheuser-Busch, Inc.). *U.S. 3,915,855.* A lipophilic cellulose fatty acid ester sponge is placed into the lipid which is drawn into the sponge. The lipid-filled sponge is then removed. The bulk density of the sponge is 0.05–0.3 g/cc, and the degree of substitution is 1.5–2.9. The fatty acid ester is of C_8–C_{18} chain length.

Edible oil in water in oil emulsion. K. Terada, S. Fujita, H. Kohno and H. Sugiyama (Asahi Denka Kogyo Kabushiki Kaisha). *U.S. 3,917,859.* An edible emulsion comprises 20–80% of a continuous oil phase and 20–80% of a dispersed phase which is itself a stabilized oil-in-water dispersion comprising 10–40% fat having an S.C.I. at 0 C of not more than 50 and 10–40% aqueous phase containing 0.05–1.0% water soluble protein. The emulsion contains 0.1–5.0% of a sucrose fatty acid ester having an HLB of at least 10. The ratio of soluble protein to sucrose fatty acid ester ranges from 1:1 to 1:5.

Edible emulsifiers. W.J. Simcox. *Defensive Publication T940,010.* Finely divided edible emulsified compositions having resistance to foaming when used in bread mixes and which are also resistant to lumping, caking, and dusting are prepared by incorporating a small amount of animal fat or vegetable oil into a finely divided emulsifier. The preferred emulsifiers are succinylated monoglycerides.

Foraminous composition for removal of oleophilic material from the surface of water. J. Orban and C.E. Case (Sorbent Sciences Corp.). *U.S. 3,917,528.* The composition comprises a foraminous substrate impregnated with 5–40% halogenated liquid hydrocarbon, 1–10% silicone, and 5–40% drying oil.

Process for obtaining cholesterol. C.H. Krauch, F. Hill, R. Lehmann, H. Preiffer, and J. Schindler (Henkel & Cie). *U.S. 3,919,045.* A process for the preparation of a fraction enriched in cholesterol or cholesterol esters from the residues of the processing of fats comprises emulsifying the residues in an aqueous culture medium, culturing the residues with a microorganism selected from the group consisting of *Nocardia paraffinica, Nocardia salmonicolor, Nocardia opaca, Candida lipolytica,* and *Corynebacterium petrophilum* at 25–55 C and pH 4.0–8.0, separating an enriched sterol fraction from the culture medium by solvent extraction, and recovering the cholesterol or cholesterol esters.

Shortening sparing process for chemically leavened baked and fried products. C.C. Tsen and W.J. Hoover (The Kansas University Research Foundation). *U.S. 3,919,434.* The improved dough or batter composition comprises an admixture of wheat flour, shortening, and other ingredients. The shortening is present at a level 12.5–35% less than would otherwise be required to impart the desired organoleptic properties to the product. In addition, 0.1–3% (baker's weight) of the sodium or calcium salts of the acyl lactylates of C_{14}-C_{22} fatty acids are added.

Tall oil precursors of loblolly pine. D.F. Zinkel. *Tappi* **58**, 118–21 (1975). A newly developed, quantitative, analytical scheme has been applied to the extractives of loblolly pine wood. Data have been obtained for these extractives and for the changes occurring to them during handling, pulping and storage of the pulpwood chips. (World Surface Coatings Abs. No. 398)

Ultrasonics in processing oleaginous seeds. G. Boeru. *Ind. Alimentara* 25 No 1, 13–5 (1974). Achievements in the field of oleaginous seeds processing by ultrasonics are reviewed. The method offers a number of advantages over the standard method of oil extraction by organic solvents, such as *(a)* the preservation of the quality of proteins, *(b)* obtaining an oil/proteins mixture which can be used as such in various foods or fodders, and *(c)* the possibility of processing oily wastes resulting from the tinned food and wine industries (tomato and grape seeds) directly at the place where they are produced. (World Surface Coatings Abs. No. 398)

A modified method of S.F.I. (solid fat index), measurement. K. Suzuki, E. Nakai and Y. Murase, (Food, Oil & Fat Laboratories, Asahi Denka Co., Ltd., 7-1, Higashiogu, Arakawa-ku, Tokyo). *Yukagaku* 24, 615–7 (1975). On measuring Solid Fat Index (S.F.I.) there are many defects in the usual measuring methods such as A.O.C.S. and Japanese Oil Chemists' Society (J.O.C.S.) tentative methods. For example, the operator cannot easily obtain the reliable data with A.O.C.S. method because the fat samples cannot be solidified below 0° C, and mercury employed in J.O.C.S. method is toxic and has a disadvantage of waste water pollution. So, the authors investigated a few measuring methods free from the above-mentioned defects. The modified method that the authors have established employs a $CaCl_2$ aqueous dye solution (30.4 wt%) as a sealing liquid and the same type of dilatometer is used as that in J.O.C.S. method. In this method the disadvantages of water pollution are eliminated.

• Fatty Acid Derivatives

Agents and method for foam control. R. Heydon and M. Eckelt (Henkel & Cie). *U.S. 3,919,111.* The antifoaming composition consists of 5–15% of an ester of hydroxystearyl alcohol. The acid part of the ester is saturated fatty and hydroxy fatty acids having 16–24 carbon atoms. Optionally, another active defoamer may be present in a ratio to the first of 40:60 to 20:80. The other defoamer is an adduct of 2 mols of ethylene oxide and 4 mols of propylene oxide to isotridecyl alcohol and a polyethylene glycol ester with stearic acid, having a molecular weight of 5,000–10,000. The total amount is defoamers is 5–15% of the composition, and the remainder, in which the defoamers are finely dispersed, is an inert organic liquid or water.

Feed additive for poultry from soybean oil soapstocks. R.E. Beal (U.S. Secy. of Agriculture). *U.S. 3,916,031.* An additive for poultry feed comprises the acid neutralized soapstocks from alkali refined nondegummed soybean oil having the following composition: total fatty acids, 50–70%; free fatty acids, 25–35%; unsaponifiables, 2%; phosphorus, 1%; sodium, 1–5%; carotene, 0.02–0.06%, xanthophyll, 0.02–0.03%; and moisture, 4–20%. The additive is a waxy solid at 25 C and has a pH of 6.9–7.1.

Modified polyamide compositions containing a polyethylene glycol derivative and a fatty acid or fatty acid salt. T. Ishicawa, T. Wakabayashi, M. Matsuki, and T. Kusunose (Asahi Kasei Kogyo Kabushiki Kaisha). *U.S. 3,915,912.* A modified homopolyamide composition suitable for melt spinning fibers without causing inter-filamentary adhesion consists of the homopolyamide combined with (a) 0.5–10% of a polyethylene glycol, a polyethylene glycol chemically bonded to the polyamide, or a polymer based on polyethylene glycol; and (b) 0.01–2% of a long chain fatty acid or fatty acid salt having 11 carbon atoms or more and a boiling point of at least 200 C.

Preparation of fatty acid esters. R.L. Carney (Zeocon Corp.). *U.S. 3,917,662.* A process for the preparation of fatty acid esters comprises reacting a fatty acid or an ammonium salt thereof with a titanate of the formula $(R'O)_4Ti$ at a temperature of 110–200 C. The molar ratio of fatty acid to titanate is at least 1.0:0.9. R′ is lower alkyl.

Composition to emulsify mineral oil products in biodegradable form. P. Fusey (Banque pour l'Expansion Industrielle "Banexi"). *U.S. 3,919,112.* The composition consists of a mixture of 100 parts of a vinasse, 6–20 parts of a fatty acid selected from the group consisting of oleic acid, caproic acid, caprylic acid, and octoic acid, and 8–20 parts of a basic substance such as ammonia, potash, lye, soda lye, or basic salt.

Process for preparing linear fatty acids. J.F. Knifton (Texaco Inc.). *U.S. 3,919,272.* A catalytic process for preparing linear saturated fatty carboxylated products from alpha olefins having 3–40 carbon atoms comprises heating a reaction mixture of the following components until the desired products are formed: (1) the alpha olefins to be carboxylated; (2) a catalytic amount of $PdCl_2[As(C_6H_5)_3]_2$—$GeCl_2$; (3) a stoichiometric quantity of an alkanol or water; and (4) a stoichiometric amount of carbon monoxide. The stoichiometry is based on the alpha olefin content of the reaction mixture.

Insecticidal composition. C. Zviak and J. Daeninckx (L'Oreal, Paris). *U.S. 3,919,419.* A stable and long lasting insecticidal composition comprises a homogeneous solution consisting of dimethyldichloro vinyl phosphate and 40–60% of a mixture of dimers and trimers of C_{18} fatty acids selected from linoleic and linolenic acids.

• Drying Oils and Paints

PAINT COMPOSITIONS. P.F. Nicks and W.A. Ryan (Imperial Chemical Industries, Ltd.). *U.S. 3,920,597.* An improvement in the method of producing a nonaqueous paint composition, comprising a pigmented solution in a water insoluble film forming base resin which is a drying oil modified alkyd resin in water immiscible liquid, is described. In the improved process, a portion of the pigment is treated in dispersion in a water immiscible liquid with an auxiliary resin which is a drying oil modified alkyd resin containing more than 50% of a hydrophilic moiety derived from a polyethylene glycol of molecular weight 400–1,500. The auxiliary resin is used in a proportion of not less than 1% of the total weight of resin in the composition. There is also incorporated in the paint composition, after treatment of the pigment with the auxiliary resin, 1–10% of a compound which is soluble in the solution of base resin in water immiscible liquid and which in water has detergent properties. The compound is selected from the group having the chemical structure of the auxiliary resin and synthetic nonionic or anionic surfactants.

ASHLESS ANTIWEAR ADDITIVES FOR LUBRICATING OILS. B.R. Kennedy (Chevron Research Co.). *U.S. 3,915,873.* A lubricating composition comprises a major amount of an oil of lubricating viscosity and an antiwear amount of a cosulfurized C_7–C_{40} alkyl phenol and ester of a C_{10}–C_{30} fatty acid and a C_1–C_{30} alkanol or alkenol. The ester contains at least one site of olefinic unsaturation. The mole ratio of the alkylphenol to the fatty acid ester of 1–2:1.

STAIN RESISTANT AQUEOUS HOUSE PAINT. P.S. Eckhoff. *U.S. 3,919,145.* A composition for the painting or repainting of staining woods contains an aqueous resin binder formed by blending an aqueous alkaline emulsion of a polyurethane resin based on a drying oil and an aqueous dispersion of a film-forming interpolymer useful as a paint vehicle. The mixed resin binder also contains aluminum chlorhydrate.

CAULKING COMPOSITION. W.D. Emmons (Rohm & Haas Co.). *U.S. 3,919,146.* The composition comprises an addition polymer having a backbone of copolymerized ethylenically unsaturated monomers with a Tg below 10 C. One of the monomers is an unsaturated carboxylic acid. The backbone is modified by having pendant ester groups. The polymer is derived from the esterification of some of the carboxylic groups in the backbone with an unsaturated fatty acid glycidyl ester.

THE RHEOLOGICAL BEHAVIOR OF COATING MATERIALS DURING PROCESSING (2C). INVESTIGATION ON LEVELLING. D. Wapler (Federal Inst. for Materials Testing (BAM), Berlin-Dahlem). *Farbe Lack* **81**(10), 924–30 (1975). In previous reports the results of the profile measurements on oils and lacquers during levelling were given and the levelling speed V_o was determined. In addition V_o was theoretically calculated from the material properties. In the present part the calculated and the measured levelling speeds are compared. The theory is incontestably confirmed for oils. For lacquers the evaporation of solvents results in practice in a higher V_o than theory permits because during the levelling especially material displacements by shearing action happen in the lower viscosity deeper layer. For application practice hints are given by means of the theory forecasts for levelling are possible from viscosity and surface tension measurements.

SURFACE COATINGS FOR PROTECTION OF CONCRETE AGAINST ATTACK OF CHEMICAL FERTILIZERS. M. Rai and V.K. Jain (Central Building Res. Inst., Roorkee (U.P.)). *Paintindia* **25**(8), 17–20 (1975). An investigation was undertaken to evaluate the performance of commercially available epoxy, epoxy-coal tar, polyester, rubber latex, cashew nut shell liquid and bitumen based coatings on concrete exposed to aggressive actions of ammonium sulfate, ammonium chloride and ammonium nitrate fertilizers. Epoxy and epoxy coal tar based coatings alone were found to be effective. A coating which preserves 80% of the strength of the concrete, for 4 to 6 months, exposed to 30% solutions of the fertilizers, as compared to the concrete not in contact with any aggressive conditions, can be considered generally suitable.

RESINS FROM EPOXY OILS FOR SURFACE COATING. S.B. Dabhade, P.K. Matai and G.C. Patil (Laxminarayan Inst. Technol., Nagpur Univ., Nagpur, India). *Paintindia* **25**(8), 12–6 (1975). The results obtained from epoxidized oils and dibasic acids, viz. phthalic anhydride, adipic acid, sebacic acid, indicate that 1:1 mole ratio of epoxy equivalent to dibasic acid gave best results, by comparing acid value, molecular weight and oxirane oxygen percent. Among these dibasic acids, the reaction with phthalic anhydride was to a greater extent as compared with others. From the properties of resins prepared from epoxidized oils and dibasic acids, confirmed that epoxidized rubberseed, neem, chaulmoogra oils are much more superior to others for resins.

NEW CASTOR OIL BASED SURFACE COATING. N.A. Ghanem, A.B. Moustafa and B.M. Badran. *J. Paint Tech.* **47**, 25–9 (1975). Dehydrated castor oil (DCO) was lightly maleinised and epoxidised under mild conditions. The product was mixed with a melamine resin precondensate. A small proportion of stannic chloride pentahydrate was added to the mixture, stirred and let stand until complete separation of bubbles occurred. The resulting unpigmented and titania pigmented varnishes were applied to glass and steel plates and stoved at 170–180 C for 1–1½ hr. to polymerise the epoxy oil and the melamine condensate. Glossy films of fair appearance and good physical and mechanical properties were obtained. An outstanding property was the film's excellent resistance to alkalis. Omitting the maleinisation step gave a product of somewhat inferior properties. (World Surface Coatings Abs. No. 398)

LINSEED OIL/METAL ACETYLACETONATE SYSTEMS. I—VISCOSITY CHANGES AND AUTOXIDATION. N. Indicator, A.W. Salotto and N.S. Baer. *J. Paint Tech.* **47**, 36–40 (1975). The effects of 16 metal acetylacetonates on the viscosity and oxygen absorption of raw linseed oil at 30 C are reported, in both the presence and absence of initially added *tert*-butyl hydroperoxide. The effects of the metal acetylacetonates are compared with the effects of metal acetylacetonates in other reaction systems. (World Surface Coatings Abs. No. 398)

COATINGS FROM PARTIALLY EPOXIDISED LINSEED OIL WITH HYDROXYBUTADIENE AND STYRENE/MALEIC ANHYDRIDE RESINS. T.H. Khoe and L.E. Gast. *J. Paint Tech.* **47**, 41–45 (1975). Partially epoxidised linseed oils with various oxirane contents were reacted with low molecular weight hydroxybutadiene polymers and copolymers and with partially esterified styrene/maleic anhydride resins to form higher molecular weight coatings. The products were evaluated for their air-dried and baked film properties. Air-dried films were light-coloured and possessed high gloss. Almost all of the films showed excellent hardness and chemical resistance. Impact resistance of the films with composition of the coating resin, ranging from 160 to 20 in./lb. (World Surface Coatings Abs. No. 398)

• Edible Proteins

PROTEIN FOOD PRODUCT. J.E. Middendorf, D.H. Waggle, and A. Cornell (Ralston Purina Co.). *U.S. 3,920,853.* A method of preparing a structured protein food product having an arrangement of striated protein layers comprises the steps of (a) freezing an aqueous slurry of a protein material having a solids content of at least 5% to form ice crystal layers, thereby compressing and molding the protein material in the slurry into layers and (b) heat setting the protein layers into an insoluble form by heating the slurry to melt the ice crystals and form the structured food product which resembles cooked muscle tissue in appearance and texture.

APPARATUS FOR TEXTURING PROTEIN. J.R. Flakne (General Mills, Inc.). *U.S. 3,915,081.* A modification of an extruder is described. A rotating plug of a specific size and shape is installed at the outlet.

PROCESS FOR PRODUCING A MIXTURE HAVING THE THERMOPLASTIC PROPERTIES OF CASEIN. S. Kumar and K.S. Ramachandran (Quaker Oats Co.). *U.S. 3,917,879.* The process is as described in *U.S. 3,917,877* through the neutralization step. Thereafter, 1–15 parts of the neutralized slurry is mixed with 1–30 parts of proteinaceous material which has not been modified by treatment with the alkali metal carbonate.

SIMULATED CASEIN FROM PROTEINACEOUS MIXTURES. S. Kumar and K.S. Ramachandran (Quaker Oats Co.). *U.S. 3,917,878.* The process is as described in *U.S. 3,917,877* through the neutralization step. Thereafter the neutralized slurry is dried, and 1–15 parts of the dried, neutralized slurry are mixed with 1–30 parts of proteinaceous material which has not been modified by reaction with the alkali metal carbonate.

PROCESS FOR PRODUCING A LIQUID CASEIN SUBSTITUTE. S. Kumar and K.S. Ramachandran (Quaker Oats Co.). *U.S. 3,917,877.* A process for producing a modified vegetable protein having thermoplastic and forming properties similar to casein and caseinate salts comprises (1) making an aqueous slurry of vegetable protein, such as from oats or oilseeds, containing 3–16% solids of which at least 50% is protein; (2) adjusting the pH to 7.0–10.5 by addition of alkali metal carbonate; (3) heating the slurry to 280–370 F to react the carbonate with the protein; and (4) neutralizing the slurry to a pH of 6.6–7.0 with an edible acid.

Process for production of a simulated meat product. C.C. Harwood and D.W. Quass (Quaker Oats Co.). *U.S. 3,917,876.* A process for preparing a puffed food product comprises subjecting moist protein material containing at least 30% protein to physical conditions sufficient to form a moisture-containing translucent to glassy product in a plastic condition, partly drying it, and then puffing it to resemble meat. There is mixed with the protein material 0.5–3% of a lubricating substance selected from the group consisting of edible fats and oils, edible fatty acids, edible stearates, edible polylactic acid esters of fatty acids, and oil bearing cereals and grains.

Detoxification of jojoba meal. C.A. Elliger, A.C. Waiss, Jr., and A.N. Booth (U.S. Secy. of Agriculture). *U.S. 3,919,432.* A process for reducing the toxicity of jojoba meal comprises treating the meal with 5–10% ammonia and 20–25% water and holding it for 25–35 days in a gas tight container. By this process, the toxic compound is rearranged.

• Detergents

Detergent compositions. L.R. Bonaparte, J.B. Golliday, and H.J. Zeller (Procter & Gamble). *U.S. 3,920,586.* A granular detergent composition consists of (a) 20–70% of spray dry granules comprising 5–40% of an anionic surfactant; and (b) 30–80% of nonionic surfactant-containing carrier granules comprising (i) a water soluble, porous, amorphous sodium silicate carrier material having a ratio of Na_2O to SiO_2 of 1:1 to 1:3.2 and a moisture content of 2–12%, and (ii) a nonionic surfactant derived by the condensation of alkylene oxide with an organic hydrophilic compound having an HLB of 8–15. The nonionic surfactant is adsorbed within the pores of the sodium silicate in an amount sufficient to provide a ratio of nonionic surfactant to carrier of 0.4:1–1.2:1. The spray dry granules and the carrier granules are present in amounts sufficient to provide an anionic surfactant concentration within the composition of 3–15%; a nonionic surfactant concentration of 17–23%, and a nonionic to anionic surfactant weight ratio of 8:1–1.13:1. The ratio of the size of spray dry granules to the size of the carrier granules is 0.5:1 to 2.0:1.

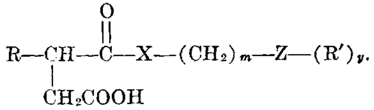
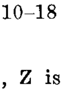
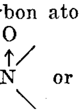
Detergent composition. M. Nagayama and H. Okada (Lion Fat & Oil Co.). *U.S. 3,919,300.* A method for preparing a sulfonated reaction product containing less than 8% of Δ^1-alkenesulfonate comprises (1) flowing a thin film of α-olefin through a reaction zone and therein contacting the olefin with a reactant gas containing 10% SO_3 for 10–60 seconds. The SO_3 is supplied at the rate of 0.9–1.25 moles per mole of olefin. The sulfonation temperature in the reaction zone is maintained at a maximum of 85 C. (2) The entire product from step (1) is held at 20–100 C for 1–5 hours under anhydrous conditions. (3) The product from step (2) is neutralized by adding an aqueous solution of an alkali at the rate of 0.6–1.0 moles equivalent based on the number of moles of SO_3 fed into the reaction zone. (4) The product from step (3) is held at 130–180 C for 5 minutes to 2 hours to hydrolyze the sultones. The sulfonated product resulting has a pH of 7–14 and is comprised of alkenesulfonates and hydroxyalkenesulfonates.

Method of preparing a highly concentrated solution of a higher secondary alcohol ethoxysulfate and such a concentrated solution. Y. Ashina, T. Narita, and H. Murata (Nitto Chem. Industry Co.). *U.S. 3,919,125.* A method of preparing a concentrated solution of one or more sodium salts of higher secondary alcohol ethoxysulfate obtained by adding 1–8 moles of ethylene oxide to 1 mol of higher secondary linear alcohol and sulfating the adduct, having a viscosity of 2,000 cp or less at 25 C comprises feeding an aqueous solution of a caustic soda and ethanol into a vessel to neutralize the higher secondary alcohol ethoxysulfate at pH 8 ± 0.5 so that the percentages of the three components fall within the lines connecting six selected points on a triangular coordinate plot. A detergent composition comprises ethanol, water, and one or more sodium salts of higher secondary alcohol ethoxysulfate prepared as described.

Sulfated alkyl ethoxylate-containing detergent composition. R.M. Wise (Procter & Gamble). *U.S. 3,915,903.* A process for producing a crisp, free-flowing built detergent composition by spray drying an aqueous slurry containing a minor amount of a processing aid to reduce the viscosity of the slurry comprises first forming a slurry consisting of (1) 7–55% of an alkaline detergency builder, (2) 4–35% of a water soluble salt of a sulfated primary alkyl ethoxylate, and (3) a minor amount of the processing aid characterized as acting as a hydrotrope in reducing the viscosity of the slurry. The processing aid is a water soluble salt of an organic compound selected from the group consisting of sulfosuccinic acid, sulfoacetic acid, sulfophthalic acid, and *m*-sulfobenzoic acid present in a ratio to the sulfated alkyl ethoxylate of 1:40–1:2. The balance of the slurry is water.

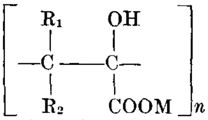
Low-cost, phosphate-free steam cleaners. T.R. Nichols (Materials Engineering Div., Dept. of the Army, Ft. Belvoir, Va.). *Soap/Cosmetics/Chemical Specialties* 51(10), 40–2, 72–4 (October, 1975). This report describes the development of two phosphate-free steam cleaners, either of which is believed suitable as a replacement for the high phosphate (63%) composition of Federal Specification P-C-437A. Water softening ability of the cleaners was the initial basis for evaluation, and corrosiveness to steel was the next. Substitutes for sodium metasilicate in the acceptable price range, such as sodium tetraborate, sodium sulfate, sodium oxalate, sodium formate, sodium acetate, and sodium carbonate and bicarbonate, all had performance limitations. Substituting less expensive organic chelating agents for phosphates while maintaining the sodium metasilicate concentration was unsatisfactory. Certain combinations of sodium metasilicate plus citric acid and sodium citrate were satisfactory as was a composition containing EDTA. For this type cleaner, a nonionic surfactant with a cloud point near 55 C was most effective. Anhydrous sodium metasilicate combined with the hydrated forms of citric acid and sodium citrate gave the most free flowing product. The composition using EDTA was also satisfactory in this regard when anhydrous sodium metasilicate and hydrated sodium citrate were used. Both of these compositions gave satisfactory cleaning performance when tested according to Federal Specification P-C-437A. Based on cost of ingredients and concentrations for use, the citric acid/sodium citrate composition was approximately 10% more expensive, and the EDTA composition approximately 45% more expensive, than the present Federal Specification P-C-437A comparison compound.

Use of radiotracers in fabric softener adsorption studies. L. Hughes, J.M. Leihy, and M.L. Deviney (Ashland Chem. Co., Columbus, Ohio). *Soap/Cosmetics/Chemical Specialties* 51(10), 56–62 (October, 1975). Initial work in a program using radiotracers to investigate basic adsorption phenomena involving quaternary fabric softeners and to study interactions of these softeners with other components of the laundry system is described. These studies were limited to two commercial types of fabric softener, both laboratory-synthesized, and to cotton as the substrate. The radioactive label in each case was carbon-14. Plots of the amount of softener adsorbed per unit weight of cotton versus contact time were made for five different concentrations from 30 to 100 ppm. At concentrations above 70 ppm the two softeners were very close in rate of adsorption. Stripping of residual phosphate from the cloth prior to treatment in softener solution caused decreased rates of adsorption at 30 and 100 ppm concentrations. Sodium carbonate and sodium silicate were found to have little promoting effect in softener adsorption. They were little better than the nonbuilt detergent alone while STP was significantly better. For both softeners tested, the per cent deposition was found to increase with the size of the phosphate molecule, from orthophosphate through pyrophosphate to tripolyphosphate.

Detergent compounds. A.R. Naik (Lever Bros. Co.). *U.S. 3,920,731.* There are claimed chemical compounds of the formula  $R{-}\underset{CH_2COOH}{\underset{|}{CH}}{-}\overset{O}{\overset{\|}{C}}{-}X{-}(CH_2)_m{-}Z{-}(R')_y$. R is alkyl or alkenyl group having 10–18 carbon atoms, X is —O—, *m* is an integer from 2 to 3, Z is  $-\overset{\overset{O}{\uparrow}}{N}\lt$ or  $-\overset{+}{N}\lt$, R′ is an alkyl group having 1–3 carbon atoms, the groups being the same or different, *y* is 2 when Z is amine oxide and 3 when Z is a quaternary nitrogen atom and the salts of the betaines.

LOW FOAM SURFACTANTS RESISTANT TO ALKALIS. W. Kindscher, K.-H. Beyer, and K. Wulz (BASF Ag.). *U.S. 3,920,706.* In the process for the manufacture of surfactants, a polyalkoxylated alcohol is reacted with a vinyl ether in the presence of an alkaline reacting agent.

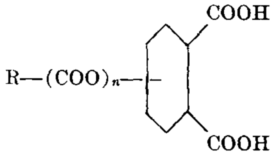
SEQUESTRATION OF METAL IONS BY THE USE OF POLY-ALPHA-HYDROXYACRYLATES. J. Mulders (Solvay & Cie). *U.S. 3,920,-570.* A detergent composition comprises a surface active agent and as builder, a polyelectrolyte with sequestering action toward metal ions. The polyelectrolyte has the formula



$$\left[\begin{array}{ccc} & R_1 & OH \\ & | & | \\ - & C & —C— \\ & | & | \\ & R_2 & COOM \end{array}\right]_n$$

R_1 and R_2 are hydrogen or alkyl with 1–3 carbon atoms. M is alkali metal or ammonium. *n* is a positive integer between 3 and a higher value such that substantial solubility of the polyelectrolyte in aqueous solution is maintained when the composition is added to water.

DETERGENT COMPOSITION. P.A. Carson and P. Tissington (Lever Bros. Co.). *U.S. 3,920,569.* The composition comprises an anionic, nonionic, amphoteric, or zwitterionic detergent compound and, as a builder, a water soluble or dispersible salt of a substituted phthalic acid having the formula



R is a C_{10}–C_{20} alkyl or alkenyl group and *n* is 0 or 1. The ratio of detergent active compound to builder is 10:1–1:10.

FABRIC SOFTENING COMPOSITION. D.R. Morton (Procter & Gamble). *U.S. 3,920,565.* A liquid softener composition consists of (a) 2–15% of a cation active fabric softener; (b) 0.5–4% of an alkali metal salt of fatty acids, at least 50% of which contain 16 or more carbon atoms; (c) 0–2% of an emulsifier selected from the group consisting of (1) the condensation product of 1 mole of alkylphenol with 1–100 moles of ethylene oxide, (2) the condensation product of 1 mole of an aliphatic alcohol with 1–100 moles of ethylene oxide, (3) polyethylene glycol having a molecular weight of 1400–30,000; and (e) the balance water.

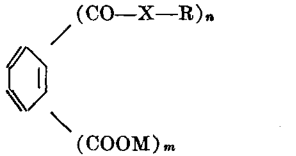
SOFTENER-DETERGENT COMBINATION. J.J. Grecsek (Colgate-Palmolive Co.). *U.S. 3,920,564.* The phosphate-free composition comprises (a) A nonionic or anionic synthetic organic detergent, (b) as the sole fabric softener, a compound selected from the group consisting of quaternary ammonium fabric softeners and N-higher alkyl alkylene diamines; and (c) a builder salt selected from the group consisting of water soluble salts of aminocarboxylic acids, sodium citrate, and mixtures of these.

SOAP-CATIONIC COMBINATIONS AS RINSE CYCLE SOFTENERS. H.E. Wixon (Colgate-Palmolive Co.). *U.S. 3,920,563.* The composition, having improved softening and whitening properties, comprises a cationic quaternary ammonium softener and soap in the ratio of 1:1 to 1:2.

COMPOSITION FOR IMPARTING SOFTNESS AND SOIL RELEASE PROPERTIES TO FARBICS. T.A. DesMarais (Procter & Gamble). *U.S. 3,920,561.* The composition comprises (a) 1–50% of a combined fabric softening and antistatic agent; (b) 0.05–10% of a methyl cellulose ether having a DS methyl of at least 2.1, an average degree of polymerization of greater than 100, a solution viscosity above 20 cp, and a gel point less than 50 C; and (c) the balance of the composition a water dispersible carrier.

PINE OIL-AMMONIA CLEANSING COMPOSITION. G. Sepulveda. *U.S. 3,915,880.* A cleansing composition effective for removal of undesired markings from surfaces comprises 10–40% of pine oil, 0.5–10% of ammonia, 0.1–10% of a bleaching agent, and the balance water.

DETERGENT COMPOSITIONS. P.J. Barnett, W.M. Fox and T. McGee (Lever Bros. Co.). *U.S. 3,915,879.* The composition comprises 1–50% of an organic detergent active compound and 5–60% of a polycarboxylic acid derivative of the following general formula:



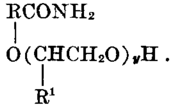
X is 0 or NH, R is a substantially linear primary or secondary alkyl or alkenyl chain with 14–20 carbon atoms, *n* is 1–4, *m* is 2–5, *n* + *m* is 6, and M is H, Na, K, NH_4, trimethyl- or triethylammonium.

FREE-FLOWING NONIONIC SURFACTANTS. J.A. Yurko, P. Ramachandran, B.-D. Cheng and R.E. Dickson (Colgate-Palmolive Co.). *U.S. 3,915,878.* An improvement in the method of preparing a heavy duty detergent by spray drying a detergent slurry to form a free flowing powder comprises adding to the spray dried powder a free flowing premix consisting of 62–85% of a liquid nonionic surface active agent and at least 5% of microsized silica particles. The nonionic surface active agent is chosen from the group consisting of ethoxylated alcohols having a 12–18 carbon atom chain and an average of 10–19 ethylene oxide units. The premix is prepared by mixing the liquid surface active agent with a sufficient quantity of silica particles to solidify the mixture.

DOMESTIC LAUNDRY FABRIC SOFTENER. H.H. Kang, R.G. Peters and E.A. Knaggs (Stepan Chem. Co.). *U.S. 3,915,867.* A self-emulsifying domestic laundry fabric softener agent consists of a mixture comprised of N-alkyl-N-di-(β-C_{14}-C_{18}-acyloxy ethyl), N-β-hydroxy ethyl ammonium compounds and an inert vehicle. The agent is characterized by good fabric softening, whiteness retention, and rewetting properties and by a light color index on the Gardner scale in the range of 1 to 2. The C_{14}–C_{18} acyloxy group is comprised of a mixture of substantial amounts of palmitic, stearic, and oleic radicals.

COMPLEXING ACID PRE-WASH COMPOSITION. P. Ramachandran (Colgate-Palmolive Co.). *U.S. 3,915,633.* An aqueous pre-wash aerosol spray soil release composition for use in conjunction with a detergent or soap in a laundering procedure consists of 1–20% of an organic complexing acid capable of complexing the stain forming metal ions in the soil, 2–30% of a surface active agent, 99–50% water, and an aerosol propellent.

SURFACE ACTIVE AGENTS. H. Suzuki and Y. Tsutsui (Agency of Industrial Science and Technology). *U.S. 3,916,003.* There is claimed a surface active agent of the formula



$$\begin{array}{l} RCONH_2 \\ | \\ O(\underset{\displaystyle R^1}{\underset{|}{C}}HCH_2O)_yH\,. \end{array}$$

R is hydrogen or lower alkyl and *y* is an integer between 1 and 50.

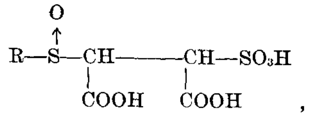
CLEANING COMPOSITIONS. S.J. Ancel, J.O. Gladish and F.L. Mickelson (Chemtrust Industries Corp.). *U.S. 3,915,902.* A stable, nonflammable, water and organic solvent based cleaning composition consists of 40–80% water, 2–15% hexylene glycol, 1–15% monobutyl ether of ethylene glycol, 1–10% sodium decyl diphenyl ether disulfonate, 7–20% triethanolamine dodecyl benzene sulfonate, 0.5–6% sodium silicate, 1–20% kerosene, and 1–25% methylene chloride.

SOAP COMPOSITIONS. J.P. Nirschi and R.A. Gloss (Procter & Gamble). *U.S. 3,915,882.* A fabric laundering composition comprises (1) 75–96% of granular particles which consist of (a) 30–80% of a soap compound and (b) 1–30% of a curd dispersing agent. (2) 4–25% of an impalpable smectite-type clay having an ion exchange capacity of at least 50 meq/100 g attached to the surface of the granular particles; and (3) 0.5–15% of a water-insoluble quaternary ammonium antistatic agent. The ratio of particles to clay is 20:1–3:1, and the ratio of clay to quaternary ammonium compound is 40:1–1:1.

DETERGENT COMPOSITIONS. J.F. Davies, C.R. Gauterin, D.W.L. Griffiths and C.C. Storer (Lever Bros. Co.). *U.S. 3,915,881.* The formulation comprises (a) 10–75% of a builder component consisting of water soluble salts of an alpha-sulfonated fatty acid alone or with other builders; (b) 5–50% of a detergent active material consisting of alkyl benzene sulfonate, an ethoxylated alcohol, or an alkane sulfonate; and (c) 0.2–20% of an alkali metal salt of a long chain fatty acid. The ratios of the detergent active materials to the sulfonated fatty acid salt are 1:6–6:1 for the alkyl benzene sulfonate, 1:13–3:4

for the ethoxylated alcohol, and 1:13–5:2 for the alkane sulfonate.

SULFOSUCCINATE DERIVATIVES AS DETERGENT BUILDERS. V. Lamberti (Lever Bros. Co.). *U.S. 3,917,601.* The builders comprise an α-alkyldilfinyl-β-sulfosuccinic acid having the general formula



$$R-\overset{\overset{O}{\uparrow}}{S}-\underset{COOH}{\underset{|}{CH}}-\underset{COOH}{\underset{|}{CH}}-SO_3H \quad ,$$

wherein R is an alkyl group containing 2–30 carbon atoms, and various salts of the acid.

BUILT DETERGENT COMPOSITIONS CONTAINING DEXTRIN ESTERS OF POLYCARBOXYLIC ACIDS. J.E. Thompson (Procter & Gamble). *U.S. 3,919,107.* The composition consists of 5–95% of a water soluble organic surface active agent selected from the group consisting of anionic, nonionic, ampholytic, and zwitterionic detergents and 95–5% of a water soluble builder consisting of dextrin esterified with a polycarbolic acid selected from mellitic acid, benzene penta-, tetra-, and tricarboxylic acid, oxydisuccinic acid, carboxymethyloxysuccinic acid, furan tetracarboxylic acid, and tetrahydrofuran tetracarboxylic acid. The builder has a degree of substitution of 0.2–3 and a degree of esterification of 1. The ratio of surface active agent to builder is 20:1 to 1:15.

TRICHLOROISOCYANURIC ACID STABILIZED WITH HYDRATED SODIUM DICHLOROISOCYANURATE. S. Berkowitz (FMC Corp., *U.S. 3,919,103.* A chlorine dry bleach contains as its essential ingredients trichloroisocyanuric acid and hydrates of sodium dichloroisocyanurate as a chemical stabilizer therefor in amounts of at least 1% of the composition.

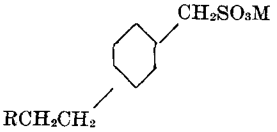
COMPOSITION AND METHOD FOR ACTIVATING OXYGEN. D. Kühling and H. Bloching (Henkel & Cie). *U.S. 3,919,102.* Solid oxidation compositions for bleaching and washing agents consist of 5–90% of an activator N-acylated 2,4,6,8-tetraaza-bicyclo-(3,3,1)-nonan-3,7-dione, 95–10% of an alkaline-reacting builder salt, and 0–10% of percompound stabilizers.

CARPET CLEANING COMPOSITION. R.M. Anstett, C.E. Buck and V.E. Sheaffer (Colgate-Palmolive Co.). *U.S. 3,919,101.* A pressurized aerosol package consists of 85–95% of a concentrate and 15–5% of a liquified gaseous propellent. The concentrate consists of (a) 4–15% of a water soluble anionic, organic surface active agent selected from the group consisting of alkyl sulfates and alkoyl sarcosinates. (b) 0.25–2% of an aliphatic C_{16}–C_{18} fatty alcohol, (c) 0.75–5% of a finely divided water insoluble siliceous material having an average particle size ranging from 0.01 to 2 microns, and (d) 65–95% of water.

FABRIC SOFTENING COMPOSITIONS. H.-W. Eckert, P. Nikolaus and J. Schwarzer (Henkel & Cie). *U.S. 3,919,091.* A liquid or powdery softening agent composition for washed textiles consists of (a) 1–50% of a quaternary allophanolymethylammonium compound, (b) 0–10% of at least one nonionic surface active dispersing agent, and (c) the remainder up to 100% of at least one diluent selected from the group consisting of water and water soluble or dispersible liquid carriers.

SULFATED CASTOR OIL SUBSTITUTE AND ITS USE IN TEXTILE TREATMENT. J.G. Papalos (Diamond Shamrock Corp.). *U.S. 3,918,983.* The composition comprises a sulfated mixture of 10–70% of at least one aliphatic alcohol having 4–30 carbon atoms and 90–30% of at least one unsaturated oil excluding castor oil.

BIODEGRADABLE SULFONATE DETERGENTS. H.S. Bloch (Universal Oil Products Co.). *U.S. 3,919,299.* The detergent has the formula:



M is an alkali metal and R is an alkyl group of 1–14 carbon atoms.

STUDIES ON THE ADSORPTION OF SOME IONIC SURFACTANTS AT BENEZENE-WATER INTERFACE. L.R. Singh, P. Bahadur and S.N. Srivastava (Chem. Dept. B. S. A. College, Mathura, U. P., India). *Colloid Polym. Sci.* 253(9), 769–72 (1975). The role of surfactant concentration on the lowering of interfacial tension of benzene-water system has been observed and from the data obtained, the surface pressure, area and the surface excess of the different surfactants calculated, using Gibb's adsorptions equation. The surface pressure-area isotherms were constructed. Cationic surfactants were more strongly adsorbed at the oil-water interfact than anionic ones, showing their greater efficiencies. The order of efficiencies for cationic detergents was CDBAC>CTAB>CPB>LPC and for anionic detergents it was OSS>SAS>SLS>BSS. The results have been explained on the basis of the chain length and head group size of the surfactant molecules.

EMPIRICAL INVESTIGATIONS TO ASCERTAIN METHODS OF MEASURING ENZYMATIC DETERGENTS. L.M.M. Tijskens. *Seifen, Ole, Fette, Wachse* 101(15), 421–30 (1975). The effect of enzymes in biochemical detergents is determined to ascertain the advantages and disadvantages of these detergents as compared with non-biochemical detergents is given. For this purpose, new and specific washing methods had to be developed. The conclusions are given with regard to usable soils.

APPLICATION OF SURFACE-ACTIVE QUATERNARY AMMONIUM COMPOUNDS. H. Hein (Rewo, Chem. Fab., Steinau). *Seifen, Ole, Fette, Wache* 101(15), 443–5 (1975). Described are water solubility, absorption tendency, anti-microbial effect, conductivity and environment pollution of these products. Reference is made to numerous purposes for which these compounds are used as textile aids, anti-bacterial agents, hair tonics, flotation agents, road construction aids and in the mineral oil industry. The structure of the compounds under review is described.

ON THE THICKENING EFFECT OF WATER-SOLUBLE CELLULOSE ETHERS IN LIQUID CLEANING AGENTS. Up. Höpfner (Tech. Application Alkylose Div., Kalle, Hoechst AG). *Seifen, Ole, Fette, Wachse* 101(15), 446–50 (1975). Where the thickening effect of water-soluble cellulose ethers in cleaning liquids or pastes is concerned, its solubility is the decisive factor. Described is the thickening effect of cellulose ethers in the model systems of hydrate of soda and sodium chloride solutions.

PREPARATION AND PROPERTIES OF POLYMETHYL METHACRYLATE LATEX DISPERSIONS HAVING NO SURFACTANT. H. Ono and H. Saeki (Central Res. Lab., Mitsubishi Electric Corp., Japan). *Colloid Polym. Sci.* 253(9), 744–9 (1975). A series of polymethyl methacrylate latex dispersions has been prepared in the absence of any surfactant using potassium persulfate as an initiator. The modal diameters of these latex dispersions were found to be in the range of 170 to 250 mμ in obedience to the concentration of the initiator. The surface charge density calculated from conductometric titration results increases almost linearly with the increase of the concentration of potassium persulfate. The stability of these latex dispersions against potassium chloride has been investigated using sedimentation method. The critical coagulation concentration (c.c.c.) increases remarkably with the increase of the surface charge density of the latex dispersions. The zeta potential at c.c.c. calculated from the mobility results increases slightly with the increase of the surface charge density of the latex dispersions.

DYNAMIC SURFACE TENSION OF FOAMING SOLUTIONS AND DISPERSIONS. J. Kloubek (J. Heyrousky Inst. Phys. Chem. and Electrochem., Czechlslovak Acad. Sci., Prague). *Colloid Polym. Sci.* 253(9), 754–9 (1975). The way of evaluating the dynamic surface tension, γ_t, by the method of drop weighing described in one of the preceding papers was used for technical surfactant solutions and for water dispersions. This procedure was compared with the maximum bubble pressure method. The results of drop weighing are much more reproducible and the maximum bubble pressure yields incorrect values in many instances. It is shown that neither the equilibrium surface tension nor the viscosity of studied solutions and dispersions have major influence upon their foaming power which, however, is related to the course of dependency on γ_t on the surface age. Furthermore, the results indicate that in dispersions the resulting γ_t determined on the stalagmometer represent a statistical mean of the surface tension of dispersed particles and the dispersion medium while the maximum bubble pressure is rather closer to the value of the dispersion medium.

PREPARATION OF *n*-ALKOXYBENZENE MONOSULFONATES AND THEIR PHYSICO-CHEMICAL PROPERTIES. K. Negoro and N. Kinoshita (Department of Applied Chemistry, Faculty of Engineering, Hiroshima, University, (3-Chome, Sendamachi, Hiroshima-shi). *Yukagaku* 24(9), 604–6 (1975). The four samples of sodium n-alkoxybenzene monosulfonates (alkyl: n-octyl, n-dodecyl, n-hexadecyl and n-octadecyl) were prepared, refined and identified. The physico-chemical studies on the properties of aqueous solution of the above compounds (density, viscosity, surface tension, electric conductivity, wettability, emulsificability and solubilizability) were carried out. From these results, it was concluded that the above compounds were inferior to ordinary surfactants in spite of the structural similarity with p-n-alkylbenzenesulfonates, well known commercial surfactants. This may be due to hydrophilic ether group located near the center of the molecule making the molecule more hydrophilic.

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LIPID COMPOSITION OF PLASMA MEMBRANES FROM HUMAN LEUKEMIC LYMPHOCYTES. J. Hildebrand, D. Marique and J. Vanhouche (Service de Medecine Interne et d'Investigation Clinique de l'Institut Jules Bordet, Centre des Tumeurs de l'Universite Libre de Bruxelles, Bruxelles, Belgique) *J. Lipid Res.* 16, 195–9 (1975). The specific activity of adenosine 5′-monophosphatase and the concentrations of cholesterol, glucosylceramide, lactosylceramide, and phospholipids were compared in the whole homogenates and in plasma membrane fractions in four preparations of human leukemic lymphocytes taken over a 1-yr period from a patient with chronic lymphocytic leukemia. There was a 69.5-fold enrichment of the specific activity of adenosine 5′-monophosphatase in plasma membrane fractions. This enzyme appeared to be the best plasma membrane marker of all compounds studied. The increase in lactosylceramide concentration in the plasma membranes was 34.4-fold. It was significantly higher than that of glucosylceramide. The enrichment of glucosylceramide in the plasma membranes was similar to that of cholesterol and total phospholipids. The pattern of individual phospholipids in the plasma membrane fraction, as compared with the whole homogenate, was characterized by a decrease in phosphatidylcholine and an increase in sphingomyelin.

AUTOMATED MODIFICATION OF DUNCOMBE'S METHOD FOR THE ULTRAMICRO DETERMINATION OF SERUM FREE FATTY ACIDS. M.C. Elphick (Dept. of Paediatric Surgery, Inst. of Child Hlth., Univ. of London, and Dept. of Child Hlth., Univ. of Nottingham, City Hosp., Nottingham NG5 1PB, England) *J. Lipid Res.* 16, 402–6 (1975). An automated continuous-flow method is described for estimating free fatty acids in serum using 25-μl samples. The procedure depends on the formation of copper soaps on the surface of a semipermeable membrane, their transfer into chloroform, and subsequent determination of dissolved copper. The membrane separating copper reagent and chloroform is supported between thin-channel dialysis plates. Chloroform extracts of serum free fatty acids are passed through the dialysis unit, and dissolved copper in the outflow is estimated colorimetrically. The procedure gives values that agree with a standard titrimetric method.

A SIMPLE, RAPID METHOD FOR MEASUREMENT OF ACETATE IN TISSUE AND SERUM. R.G. Richards, C.L. Mendenhall and J. MacGee (Hepatic Res. and Basic Sci. Labs., Vet. Administration Hosp., Cincinnati, Ohio 45220) *J. Lipid Res.* 16, 395–7 (1975). A simple and rapid method is described for determining the free acetate concentration in liver and serum. After extraction, the acetate is converted to its benzyl ester by thermal degradation of its benzyldimethylphenylammonium salt in the vaporizer of a gas chromatograph. Good quantitation is achieved in the range of 0.033–2.5 μmoles of acetate per gram of liver or per milliliter of serum.

MILLIPORE FILTER ASSAY FOR LONG-CHAIN FATTY ACID:CoASH LIGASE ACTIVITY USING ^{3}H-LABELED COENZYME A. M.A. Polokoff and R.M. Bell (Dept. of Biochem., Duke Univ. Med. Ctr., Durham, N.C. 27710) *J. Lipid Res.* 16, 397–402 (1975). A novel radiochemical assay for long-chain fatty acid:CoASH ligase activity (AMP) (EC 6.2.1.3) has been developed based on the conversion of [^{3}H]CoASH to long-chain fatty acyl CoA. Fatty acyl [^{3}H]CoA was quantitatively retained on Millipore filters upon filtration of the acidified reaction mixture under conditions where the [^{3}H]CoASH was not retained. The assay was developed using microsomes derived from isolated fat cells as the source of fatty acid: CoASH ligase activity. The assay performed at 25° C for 10 min was linear with added microsomal protein up to 7 μg. The assay was linear with time up to 24 min when 1 μg of protein was employed. Fatty acid:CoASH ligase activity was strongly dependent on ATP and magnesium, was stimulated by Triton WR-1339, and was two- to fivefold dependent on added fatty acid. The filter assay is easier than existing assays based on incorporation of labeled fatty acid and is equally sensitive.

A SIMPLIFIED PROCEDURE FOR SYNTHESIS OF DI-[^{14}C]ACYL-LABELED LECITHINS. E.L. Pugh and M. Kates (Dept. of Biochem., Univ. of Ottawa, Ottawa, Canada K1N 6N5) *J. Lipid Res.* 16, 392–4 (1975). A simplified procedure for synthesis of 1,2-di-[1′-^{14}C]oleoyl-, 1,2-di-[1′-^{14}C]linoleoyl-, and 1,2-di-[1′-^{14}C]eicosatrienoyl-*sn*-glycero-3-phosphorylcholine is described. The method involves acylation of the $CdCl_2$ complex of glycerophosphorylcholine with a ^{14}C-labeled fatty acid in the presence of trifluoracetic anhydride and pyridine. The ^{14}C-labeled lecithin is isolated in pure form by preparative thin-layer chromatography and alumina column chromatography in an overall yield of 12–24%. No isomerization or peroxidation of the unsaturated acids was detected.

TOCOPHEROL IN HUMAN PLATELETS. A. Nordoy and E. Strom (Dept. of Med., Inst. of Clin. Med., Univ. of Tromso, Tromso, Norway) *J. Lipid Res.* 16, 386–91 (1975). A spectrophotometric method was used to determine the total tocopherol levels in platelets, plasma, and erythrocytes from human subjects. The platelets contained about three times as much total tocopherol per cell as erythrocytes. This difference was not related to the content of polyunsaturated fatty acids in platelets and erythrocytes. In vitro incubation resulted in significant uptake of tocopherol by plasma and RBC, whereas no uptake was observed into platelets. A 3-month period of tocopherol treatment increased the level of tocopherol in plasma and erythrocytes, whereas the platelet level was unchanged. Tocopherol treatment did not interfere with platelet function or platelet lipid metabolism. The tocopherol fractions of platelets, red cells, and plasma were similar, and α-tocopherol was the main fraction.

TISSUE DISTRIBUTION OF CHOLESTEROL FEEDBACK CONTROL IN THE GUINEA PIG. A. Swann, M.H. Wiley, and M.D. Siperstein (Dept. of Internal Med., the Univ. of Tx. Southwestern Med. Schl. at Dallas, Tx. 75235) *J. Lipid Res.* 16, 360–6 (1975). The level of cholesterol synthesis and the activity of the cholesterol feedback system were studied in tissue slices from a number of organs of the guinea pig. In contrast to the tissue distribution of sterol synthesis in the rat, liver slices of the guinea pig have a low rate of sterologenesis, with ileum and lung being the most active sterologenic tissues. More surprising, all tissues studied in the guinea pig, including lung, ileum, and brain, were shown to possess an active cholesterol feedback system. The basis for the widespread organ distribution of cholesterol feedback control in the guinea pig is probably the ability of the various tissues of the guinea pig to take up and concentrate exogenous cholesterol and is not the result of any inherent differences in the lipoprotein composition in this species.

SYNTHESIS OF ETHANOLAMINE PHOSPHOGLYCERIDES BY HUMAN PLATELETS. F.L. Call, II, and M. Rubert (Dept. of Med., State Univ. of N.Y., Syracuse, N.Y. 13210) *J. Lipid Res.* 16, 352–9 (1975). Platelet homogenates contain an ethanolamine-phosphotransferase (EC 2.7.8.1) that catalyzes the synthesis of ethanolamine phosphoglycerides from cytidine-5-diphosphate ethanolamine and 1-radyl-2-acyl-*sn*-glycerols. The enzyme is particulate-bound and requires Mn^{2+} and bile salts for optimal activity. The apparent K_m of the enzyme for cytidine-5-diphosphate ethanolamine is 1.6×10^{-5}M when the concentration of 1,2-diacyl-*sn*-glycerols is 8.8×10^{-4} M. The pH optimum is 8.5 in Tris-HCl or glycine-NaOH buffer. The activity of the enzyme in platelets from normal subjects is 0.24–0.34 nmole/min/mg of protein.

INTERACTION OF RAT PLASMA VERY LOW DENSITY LIPOPROTEIN WITH LIPOPROTEIN LIPASE-RICH (POSTHEPARIN) PLASMA. S. Eisenberg and D. Rachmilewitz (Lipid Res. Lab., Dept. of Med. B, Hadassah Univ. Hosp., Jerusalem, Israel) *J. Lipid Res.* 16, 341–51 (1975). Incubation of ^{125}I-labeled very low density lipoprotein (VLDL) with lipoprotein lipase-rich (postheparin) plasma obtained from intact or supradiaphragmatic rats resulted in the transfer of more than 80% of apoprotein C from VLDL to high density lipoprotein (HDL), whereas apoprotein B was associated with lipoprotein of density less than 1.019 g/ml (intermediate lipoprotein). The transfer of ^{125}I-labeled apoprotein C from VLDL to HDL increased with time and decreased in proportion to the amount of VLDL in the incubation system. A relationship was established between the content of triglycerides and apoprotein C in VLDL, whereas the amount of apoprotein C in VLDL was independent of that of other apoproteins, especially apoprotein B. The injection of heparin to rats preinjected with ^{125}I-labeled VLDL caused apoprotein interconversions similar to those observed in vitro. Whether these same changes occur during the clearance of VLDL in vivo is yet to be established.

STUDIES ON THE METABOLISM OF RAT SERUM VERY LOW DENSITY APOLIPOPROTEIN. N. Fidge and P. Poulis (Dept. of Clin. Sci., John Curtin Schl. of Med. Res., Australian Natl. Univ., Canb a, A.C.T., Australia) *J. Lipid Res.* **16**, 367–78 (1975). There was a rapid transfer of radioactive peptides to other lipoprotein fractions during the first 30 min after the intravenous injection of ^{125}I-labeled rat very low density lipoprotein (VLDL) into rats. After this initial redistribution of radioactivity, label disappeared slowly from all lipoprotein fractions. The disappearance of ^{125}I-labeled human VLDL injected into rats was the same as that of rat VLDL. Most of the radioactivity transferred from VLDL to low density (LDL) and high density (HDL) lipoproteins was associated with two peptides, identified in these studies by polyacrylamide gel electrophoresis as zone IVa and IVb peptides (fast-migrating peptides, possibly analogous to some human C apolipoproteins), although radioactivity initially associated with zone I (analogous to human apolipoprotein B) and zone III (not characterized) was also transferred to LDL and HDL. That the transfer of label from LVDL to LDL and HDL primarily involved small molecular weight peptides was confirmed in studies using VLDL *predominantly* labeled *in* these peptides by invitro transfer from ^{125}I-labeled HDL. We have concluded that, during catabolism of rat VLDL apoprotein, there is a rapid transfer of small molecular weight peptides to both LDL and HDL. During the catabolic process, most of the VLDL is rapidly removed from the circulation, with only a small portion being transformed into LDL molecules.

CONTROL OF STEROL SYNTHESIS AND OF HYDROXYMETHYLGLUTARYL CoA REDUCTASE IN SKIN FIBROBLASTS GROWN FROM PATIENTS WITH HOMOZYGOUS TYPE II HYPERLIPOPROTEINEMIA. J. Avigan, S.J. Bhathena, and M.E. Schreiner (Lab. of Cellular Metabolism, Nat. Heart and Lung Institute, Nat. Institutes of Health, Bethesda, Maryland 20014) *J. Lipid Res.* **16**, 151–4 (1975). In skin fibroblasts grown from four children with a homozygous form of type II hyperlipoproteinemia, the feedback control of sterol synthesis and the inhibitory effect on hydroxymethylglutaryl (HMG) CoA reductase activity by serum or low density lipoprotein were present, though diminished compared with the effects in normal fibroblasts. Stimulation of HMG CoA reductase by insulin and inhibition of acetyl CoA carboxylase by serum lipids were not impaired in these type II cells, indicating a degree of specificity in the abnormal response of the reductase. A rapid and convenient method for isolation of mevalonolactone in the course of the assay of HMG CoA reductase is described.

HEPATIC FINE STRUCTURE IN YOUNG AND AGING RATS TREATED WITH OXANDROLONE: A MORPHOMETRIC STUDY. D.L. Schmucker and A.L. Jones, (Cell Biol. Section, San Francisco Vet. Admin. Hosp., and Depts. of Anatomy and Med., U. of Cal., San Francisco, Cal. 94121) *J. Lipid Res.* **16**, 143–50 (1975). Hepatic fine structural alterations induced by short-term administration of the hypolipidemic drug oxandrolone were evaluated using morphometric techniques. These changes are described in the livers of normolipidemic young adult and hyperlipidemic retired breeder male rats. Retired breeder rats, characterized by hyperlipidemia and a high incidence of arteriosclerosis, are thought to undergo premature aging. However, after oxandrolone administration, the livers of these two animal groups were no longer distinguishable on the basis of these morphometric parameters. Unlike a number of other hypolipidemic drugs, oxandrolone does not induce a marked proliferation of hepatic microbodies. The relationship between (1) aging and hyperlipidemia and (2) aging and the reduced hepatic capacity to metabolize drugs suggests a need to evaluate the effects of lipid-lowering drugs on the livers of old as well as young animal models.

[U-^{14}C]GLUCOSE METABOLISM IN VIVO IN RATS RENDERED OBESE BY A HIGH FAT DIET. M. Lavau and C. Susini (Unité de Recherches Diététiques, I.N.S.E.R.M., Hôpital Bichat, Paris, France) *J. of Lipid Res.* **16**, 134–40 (1975). Estimates of the glucose pool, the glucose space, the turnover rate, and the recycling of glucose were made after the injection of [U-^{14}C] glucose into (a) obese rats fed a high fat diet and (b) rats fed a carbohydrate diet. The specific activity-time curve consisted of two components. Physiological parameters were calculated by using a two-compartment model. The glucose pool and glucose space were the same in both groups of rats. The turnover rate was 1.96 mg $\cdot$ min^{-1} for the carbohydrate-fed rats and 1.55 mg $\cdot$ min^{-1} for the fat-fed rats. There was about 12% recycling in both groups. In the carbohydrate-fed group, another approach based on simultaneous use of [6-^{14}C]glucose and [6-^{3}H]glucose yielded nearly the same values for these parameters. Respiratory excretion of CO_2 and the incorporation of labeled glucose into lipids of some tissues were also measured. The rate of excretion of labeled CO_2 and the conversion of labeled glucose into fatty acids in fat-fed rats were lower than in the carbohydrate-fed rats by 50% and 80%, respectively. More glucose was diverted into glyceride glycerol in the fat-fed group. It is suggested on the basis of the results that glyceride glycerol can serve as a gluconeogenic substrate in these rats where the turnover rate of glucose is much higher than the daily intake of carbohydrates.

DEMONSTRATION OF TWO POOLS OF ALBUMIN-BOUND FATTY ACIDS. C. Soler-Argilaga, R. Infante and J. Polonovski (Unité de Recherches d'Hépatologie et Laboratoire de Biochimie, Faculté de Médicine Saint-Antoine, 75012 Paris, France) *J. Lipid Res.* **16**, 116–22 (1975). The uptakes of albumin-bound nonesterified fatty acids and of [1-^{14}C]palmitic acid complexed to albumin by the isolated perfused rat liver were compared. During perfusion, the rate of uptake of nonesterified fatty acids decreased and became zero when the fatty acid:albumin molar ratio reached 0.3, but the rate of uptake of radioactive palmitic acid remained constant. This finding suggests the existence of two pools of fatty acids bound to albumin with different fractional turnover rates. This view was supported by the fact that when delipidated albumin complexed in vitro to radioactive and nonradioactive fatty acids was used no difference was observed between the uptakes of nonesterified fatty acids and radioactive fatty acids by perfused liver. Similar results were found with albumin-bound radioactive fatty acid in vivo (obtained from rats fed radioactive palmitic acid), showing a homogeneous distribution of the label in both pools. The existence of two nonesterified fatty acid pools in plasma would arise from the differences in the nature of bonds between fatty acid and albumin molecules, which could determine the rate of exchange of fatty acids between the albumin-bound and soluble forms preceding their uptake by the cells.

MECHANISM OF AVIAN ESTROGEN-INDUCED HYPERTRIGLYCERIDEMIA: EVIDENCE FOR OVERPRODUCTION OF TRIGLYCERIDE. D.J. Kudzma, F.St. Claire, L. DeLallo and S.J. Friedberg (Dept. of Med., Div. of Endocrinology and Metab., The U. of Texas Health Science Center at San Antonio, San Antonio, TX 78284) *J. Lipid Res.* **16**, 123–33 (1975). Relying on methods other than the determination of turnover rate of triglyceride from the curve of plasma triglyceride radioactivity after administration of labeled precursor, we have confirmed that the endogenous hypertriglyceridemia induced by estrogenization of the chick is accompanied by increased production of triglyceride. Chicks estrogenized with diethylstilbestrol became grossly hypertriglyceridemic and had elevated levels of plasma free fatty acid. Increased production of plasma VLDL-TG was confirmed by a kinetic study of VLDL-TG metabolism, employing reinjected, endogenously prepared (^{14}C) triglyceride-labeled VLDL. The fractional turnover rate of VLDL-TG in estrogenized hypertriglyceridemic birds was substantially less than that in untreated controls (0.32 ± 0.03 vs. 0.71 ± 0.03/hr), but the total turnover rate was nearly 50 times greater (244 ± 52 vs. 5 ± 1 mg/hr).

STUDIES OF RAT LIVER MICROSOMAL DIGLYCERIDE ACYLTRANSFERASE AND CHOLINEPHOSPHOTRANSFERASE USING MICROSOMAL-BOUND SUBSTRATE: EFFECTS OF HIGH FRUCTOSE INTAKE. H.J. Fallon, J. Barwick, R.G. Lamb and H. van den Bosch (Lab. of Biochem., State U. of Utrecht, Utrecht, Netherlands, and Dept. of Internal Med., Med. Coll. of Virginia, Richmond, Virginia 23298) *J. Lipids Res.* **16**, 107–15 (1975). Radiolabeled phosphatidate and diglyceride were prepared bound to rat liver microsomes. These compounds were used as substrates in studies of diglyceride acyltransferase, cholinephosphotransferase, and CTP:phosphatidic acid cytidylyltransferase. Optimum incubation conditions for these reactions in microsomes from normal male rats are described. High fructose diets were fed to rats for 11 days; this resulted in an increased rate of neutral lipid formation from *sn*-glycerol-3-phosphate by liver microsomal preparations. Such a change should result in preferential triglyceride formation from the increased microsomal diglyceride pool. CTP:phosphatidic acid cytidylyltransferase activity was depressed by the high fructose diet. These combined alterations would lead to an accelerated hepatic triglyceride formation, a result found in vivo during high fructose feeding. The high fructose diet decreased slightly the total microsomal phospholipid content and markedly depressed phosphatidylethanolamine levels.

ANALYSIS OF ANOMERIC CONFIGURATIONS IN GLYCEROGLYCOLIPIDS AND GLYCOSPHINGOLIPIDS BY CHROMIUM TRIOXIDE OXIDATION. R.A. Laine and O. Renkonen (Dept. of Biochem., U. of Helsinki, Helsinki, Finland) *J. Lipid Res.* 16, 102–6 (1975). Acetylation of CrO_3 oxidation in acetic acid was applied to 18 different glyceroglycolipids and glycosphingolipids of known structure. The lipids studied contained from one to five pyranosic monosaccharide units including α- and β-linked glucose, galactose, mannose, and *N*-acetylgalactosamine and β-linked *N*-acetylglucosamine. Monosaccharides bound to the lipids β-glycosidic linkages reacted to the extent of 80–97%, but in the case of α-glycosidic linkages the oxidation proceeded only to the extent of 0–6%. A partial reaction was observed in lipids in which a given monosaccharide unit was present in both anomeric forms. Therefore, oxidation with CoO_3 allows the determination of anomeric configurations in simple glycolipids. Samples of only 100–300 μg are required.

CHARACTERIZATION OF TWO STEROIDAL KETONES ANE TWO ISOPRENOID ALCOHOLS IN DAIRY PRODUCTS. V.P. Flanagan, A. Ferretti, D.P. Schwartz, and J.M. Ruth (Dairy Products Lab., Eastern Reg. Res. Center, Philadelphia, Penn. 19118, and Agricultural Environmental Quality Institute, Beltsville, Maryland 20705) *J. Lipid Res.* 16, 97–101 (1975). Two steroidal ketones, Δ^4-cholesten-3-one and $\Delta^{3,5}$-cholestadiene-7-one, were isolated and identified for the first time in anhydrous milk fat and in nonfat dry milk. Together with these, two isoprenoid alcohols, phytol and dihydrophytol, were identified in anhydrous milk fat. Their identities were established on the basis of chromatographic and mass spectral data and confirmed by comparison with authentic materials.

ISOTOPE DERIVATIVE ASSAY OF MICROSOMAL CHOLESTEROL 7α-HYDROXYLASE. S. Shefer, G. Nicolau and E.H. Mosback (Dept. of Lipid Res. of the Public Health Res. Inst., New York 10016) *J. Lipid Res.* 16, 92–6 (1975). A rapid method was developed to measure cholesterol 7α-hydroxylase activity of hepatic microsomes by the direct determination of the mass of 7α-hydroxycholesterol formed. The method is based on the quantitative acetylation of the incubation mixture with [^{3}H] acetic anhydride and the separation of the biosynthetic 7α-hydroxycholesterol as its diacetate by thin-layer chromatography on alumina. Amounts of 7α-hydroxycholesterol as low as 0.1 nmole could be measured. A comparison of the proposed isotope derivative method with the previously used isotope incorporation method showed that the latter underestimated the enzyme activity by about 20%.

FACTORS EFFECTING THE SOLUBILISATION OF STEAROYL-CoA DESATURASE OF HEN LIVER MICROSOMES. R. Safford, R. Jeffcoat and A.T. James (Basic Studies Unit, Biosci. Div., Unilever Res. Lab., Colworth House, Sharnbrook, Bedford, U.K.) *Biochim. Biophys. Acta* 409, 86–96 (1975). The lipid requirement for maximum desaturase activity was investigated using acetone/water mixtures. It was shown that for maximum stearoyl-CoA desaturase activity of hen liver microsomes neither the total neutral lipid fraction nor 44% of the phospholipid fraction were required. The effect of sodium deoxycholate, Triton X-100, Nonidet P-40 and Bio-solv on the enzyme indicated that the neutral detergents had a milder effect than the ionic detergent but both classes could cause considerable irreversible loss of activity. Treatment of the microsomes with 2.5% (v/v) water in acetone greatly improved the effective solubilising power of Triton X-100. The yield of desaturase in the 100,000 × *g* supernatant obtained by treating the microsomal fraction in this way was strongly dependent upon protein concentration. Maximum solubilisation was achieved with 25 mg protein per ml 1% (w/v) Triton X-100 in 0.1 M potassium phosphate buffer pH 7.4. A comparison of the properties of the solubilised and membrane-bound enzyme was made by an investigation of: the temperature and pH optimum, activation energy and the effect of inhibitors on the enzyme activity.

CHEMICAL STRUCTURE OF MONOSIALOGANGLIOSIDE G_{M1b} BIOSYNTHESIZED IN VITRO. A. Stoffyn, P. Stoffyn and M.C.M. Yip (Eunice Kennedy Shriver Ctr., W.E. Fernald State Schl. Waltham, Mass. 02154) *Biochim. Biophys. Acta* 409, 97–103 (1975). The structure of a neuraminidase-labile monosialoganglioside which is formed in vitro from asialoganglioside (galactosyl (β, 1 → 3) *N*-acetylgalactosaminyl (β, 1 → 4) galactosyl (β, 1 → 4) glucosyl (1 → 1) ceramide) and cytidine-5′-monophospho-*N*-acetylneuraminic acid in the presence of young rat brain sialyltransferase has been established. This monosialoganglioside contains a neuraminidase-labile *N*-acetylneuraminyl group which is linked at position C-3 of the terminal galactosyl unit. This result was obtained by ultramicro scale permethylation of radioactive neuraminidase-labile monosialoganglioside biosynthesized from asialoganglioside labeled with tritium in the terminal galactose.

EXCHANGE OF PLASMA RADIOACTIVE CHOLESTEROL WITH ATHEROMA LIPIDS IN SITU AND IMPLANTED SUBCUTANEOUSLY. C.W.M. Adams, J. Knox and R.S. Morgan (Dept. of Pathol., Guy's Hosp. Med. Schl., London SE1 9RT, Great Britain) *Atherosclerosis* 22, 229–40 (1975). Physicochemical exchange of radioactive cholesterol was investigated in mildly hypercholesterolaemic rabbits. Such exchange was examined in erythrocytes and atheroma lipids *in situ* in the aortic wall and in such lipids when implanted subcutaneously. The implanted atheroma lipids gained radioactivity from intravenously injected [^{3}H]cholesterol, even though cholesterol was being resorbed from the implants. Autoradiography showed exchange between plasma cholesterol and both intracellular and dispersed extracellular lipid in these implants. Cholesterol crystals in both implants and atheromatous lesions labelled only sluggishly. The results are consistent with the view that physicochemical exchange is a major factor in cholesterol movement *in vivo.*

FATTY ACID AND KETONE BODY METABOLISM IN THE RAT: RESPONSE TO DIET AND EXERCISE. E.W. Askew, G.L. Dohm and R.L. Huston (Letterman Army Inst. of Res., Presidio of San Francisco, Calif. 94129) *J. Nutr.* 105, 1422–32 (1975). This study was designed to measure the response of key enzymes of ketone body metabolism in heart, skeletal muscle, and liver to diet and exercise, two conditions known to influence ketone body utilization. A 3 (diet: control, high fat, or high carbohydrate) × 2 (kill condition: rested or exhausted) × 2 (training: trained or untrained) factorial design was used to estimate main experimental effects as well as identify significant interactions of the variables. Physical training (treadmill running) was associated with a doubling of the activity of skeletal muscle 3-oxoacid CoA transferase, a key enzyme in extrahepatic ketone body utilization. Feeding a high fat diet, on the other hand, significantly increased the activity of liver HMG CoA synthetase, indicating that the ketosis of fat feeding may be of a different nature than that of exercise. The results of this study indicate that physical training is associated with biochemical adaptations in ketone body metabolism as well as fatty acid oxidation, and that trained individuals are metabolically better endowed to benefit from the ketosis of exercise than untrained individuals.

RAPID MODULATION OF LIPOGENESIS BY CLOFIBRATE IN RAT AND MONKEY HEPATOCYTES. D.M. Capuzzi, R.D. Lackman, J. Alexander, C.M. Intenzo and M.A. Reed (Atherosclerosis Res. Labs., Cardiopulmonary Div., Dept. of Med., Hosp. of the Univ. of Pa., Philadelphia, Pa. 19104) *Biochim. Biophys. Acta* 409, 144–55 (1975). Previous studies have proposed various possible mechanisms for the hypolipidemic actions of clofibrate. In the present study, isolated liver cells freshly prepared from rats and squirrel monkeys were used to investigate the acute effects of sodium clofibrate (sodium chlorophenoxyisobutyrate) on hepatic lipogenesis. Incubation of liver cells with levels of the drug (1mM) known to lower plasma lipid levels in vivo produced a rapid inhibition of [^{14}C]acetate incorporation into cellular lipids. The degree of inhibition caused by the drug was not diminished by preincubation with an excess of unlabeled acetate. Addition of fatty acids to cell incubations stimulated sterol generation from [^{14}C]acetate or from [^{3}H]mevalonate, but did not reverse the inhibitory effects of the drug.

PALMITATE ACTIVATION AND ESTERIFICATION IN MICROSOMAL FRACTIONS OF RAT LIVER. K.A. Lloyd-Davies and D.N. Brindley (Dept. of Biochem., Univ. Hospital and Med. Schl., Clifton Boulevard, Nottingham NG7 2UH, U.K.) *Biochem. J.* 152, 39–49 (1975). Palmitoyl-CoA synthetase activity in the microsomal fraction of rat liver was measured directly by palmitoyl-CoA production, and indirectly by converting the palmitoyl-CoA into palmitoylcarnitine under optimum conditions. Even in the latter system, palmitoyl-CoA accumulated. The rate of palmitoyl-CoA hydrolysis and the inhibition of palmitoyl-CoA synthetase by palmitoyl-CoA were each estimated to be less than 10% of the maximum rate of palmitoyl-CoA production. It is concluded that, at optimum substrate concentrations, the activity of glycerol phosphate acyltransferase is rate-limiting in the synthesis of phosphatidate by rat liver microsomal fractions. The implications of these results in the measurement of palmitoyl-CoA synthetase and in the control of glycerolipid synthesis are discussed.

Plasma lipoproteins in rats with experimental biliary obstruction. I. A chemical study. S. Calandra, M. Montaguti, V. Cartoni and I. Pasquali-Ronchetti (Inst. di Patologia Generale, Univ. delgi Studi di Modena, Modena, Italy) *Biochim. Biophys. Acta* **409**, 1–12 (1975). Acute biliary obstruction in the rat is associated with striking alterations of the plasma level and the physico-chemical properties of plasma lipoproteins. The level of very low density lipoproteins (VLDL) in plasma increases from 2 to 3 fold. The chemical composition of VLDL is characterized by a high content of phospholipids and cholesterol and by a diminution of the relative content of triacylglycerols and protein. On cellulose acetate electrophoresis, VLDL show a β-mobility. The level of high density lipoproteins (HDL) also increases after bile duct ligation. The chemical composition of HDL_2 (1.063–1.125 g/ml) is characterized by a high content of unesterified cholesterol and phospholipids and by a remarkable reduction in the content of cholesteryl esters and protein.

Effects on pyridoxine deficiency on the composition of plasma and liver fatty acids in rats fed low and high fat diets. P.E. Dussault and M. Lepage (Centre de Recherche sur les Maladies Lipidiques, Dept. of Biochem., Faculty of Med., Laval Univ., Quebec City, Canada) *J. Nutr.* **105**, 1371–6 (1975). A study was made of the effect of pyridoxine deficiency on the fatty acids of liver and plasma in rats fed diets containing 1, 10, or 20% fat. Both ad libitum-fed and pair-fed control rats were used. In pyridoxine deficiency, arachidonic acid decreased with a concomitant increase in linoleic acid. Incubations of liver slices with [1-^{14}C]acetate showed no significant alteration of fatty acid synthesis in pyridoxine-deficient rats fed 1 or 10% fat when compared with the ad libitum-fed control rats, but revealed a marked increase in cholesterogenesis compared with either control group. Incubations with [1-^{14}C]linoleate resulted in no differences in the synthesis of arachidonate between the experimental and the ad libitum-fed control rats. Incubations with [5,6,8,9,11,12,14,15-^{3}H]arachidonate showed decreased incorporation of this fatty acid in total liver lipids in pyridoxine-deficient rats compared with ad libitum fed control rats. We concluded that the diminution in arachidonate observed in liver lipids of pyridoxine-deficient rats does not result from a lower conversion of linoleate into arachidonate, but possibly from an increased degradation of this fatty acid.

Correlation of rat liver chromatin-bound free and esterified cholesterol with the circadian rhythm of cholesterol biosynthesis in the rat. S.K. Erickson, A.M. Davison and R.G. Gould (Dept. of Med., Stanford Univ. Schl. of Med., Stanford, Calif. 94305) *Biochim. Biophys. Acta* **409**, 59–67 (1975). Cholesterol has been shown to be present in rat liver chromatin isolated by methods designed to avoid contamination by membrane fragments. Evidence that the cholesterol was actually a component of chromatin includes the constancy of the amount (1.30 ± 0.14 μg per mg DNA), the striking difference in the ratio of free (unesterified) to esterified cholesterol between that in chromatin and that in membranes, and the rapid and marked changes which occurred in this ratio during the circadian cycle in chromatin but not in membranes. Although the total amount of chromatin-bound cholesterol did not change throughout the circadian cycle, the concentration of free cholesterol increased sharply a short time before the peak of cholesterol synthetic activity was reached at about midnight; it reached a basal level about 6 h later at approximately the same time the rate of synthesis returned to its basal level. The data are compatible with the hypothesis that cholesterol biosynthesis is controlled at the nuclear level and suggest that the relative amounts of free and esterified cholesterol association with chromatin may play a role.

Effect of plasma lipoproteins and lecithin-cholesterol dispersions on the activity of 3-hydroxy-3-methylglutaryl-coenzyme A reductase of isolated rat hepatocytes. P.A. Edwards (Dept. of Med., Stanford Univ. Schl. of Med., Stanford, Calif. 94305) *Biochim. Biophys. Acta* **409**, 39–50 (1975). Incubation of rat hepatocytes for 3 h in a medium containing amino acids, salts and albumin resulted in a 2-fold increase in the activity of 3-hydroxy-3-methylglutaryl-CoA reductase. Inclusion of 10% human plasma, rat serum or dialysed rat serum in the medium resulted in an approximate 7-fold increase in reductase activity. These increases were specific since there was little change in the rate of fatty acid synthesis or in the activity of tyrosine aminotransferase. Reductase levels were increased above control values when high density lipoproteins or lecithin dispersions were added to the cells. Lecithin dispersions were also shown to increase the rate of efflux of cell cholesterol to the medium. In contrast, reductase levels were reduced when cells were incubated with low density lipoproteins or cholesterol added as an equimolar cholesterol-lecithin dispersion. This inhibition of the reductase by cholesterol dispersions was dependent on the continued de novo protein synthesis. Our data indicate that in normal rat hepatocytes the relative rates of efflux and influx of cholesterol may be critical to the regulation of 3-hydroxy-3-methylglutaryl-CoA reductase activity and cholesterogenesis.

Inhibition of the proteolytic degradation of low density lipoprotein in human fibroblasts by chloroquine, concanavalin A, and Triton WR 1339. J.L. Goldstein, G.Y. Brunschede, and M.S. Brown (Dept. of Internal Med., Univ. of Tx. Hlth. Sci. Ctr. at Dallas, Dallas, Tx. 75235) *J. Biol. Chem.* **250**, 7854–62 (1975). The proteolytic degradation of ^{125}I-labeled low density lipoprotein by monolayers of cultured human fibroblasts was prevented by exposure of the cells to chloroquine, an agent that has been reported previously to inhibit lysosomal degradative processes. Chloroquine did not inhibit the binding of low density lipoprotein to its cell surface receptor. However, the two regulatory actions that normally follow low density lipoprotein binding to its receptor, namely, suppression of 3-hydroxy-3-methylglutaryl coenzyme A reductase activity and stimulation of cholesteryl ester formation, were both prevented when degradation of the lipoprotein was inhibited by chloroquine. Two other agents affecting lysosomal function, Triton WR 1339 and concanavalin A, also inhibited the proteolytic degradation of low density lipoprotein in intact fibroblasts and simultaneously prevented low density lipoprotein-mediated suppression of 3-hydroxy-3-methylglutaryl coenzyme A reductase activity and stimulation of cholesteryl ester formation. Unlike chloroquine, however, these two agents also affect the binding of low density lipoprotein to the cells. The inhibitory action of chloroquine, concanavalin A, and Triton WR 1339 could each be reversed by removal of the agent from the culture medium.

The effect of external drainage of bile on cholesterolemia. J. Hankiewicz and E. Rudzka (First Clinic of Internal Diseases, Silesian Acad. of Med., ul. Reymonta 8, PL-40-029 Katowice, Poland) *Atherosclerosis* **22**, 313–5 (1975). The cholesterolopenic phenomenon—decrease of up to 30% for total cholesterol and up to 23% for esterified cholesterol—has been obtained as an effect of external drainage of bile from the common biliary duct.

Effects of zinc deficiency on the oxidation of retinol and ethanol in rats. A.M. Huber and S.N. Gershoff (Dept. of Nutr., Harvard Schl. of Public Hlth., Boston, Mass. 02115) *J. Nutr.* **105**, 1486–90 (1975). The zinc metalloenzyme alcohol dehydrogenase was assayed in subcellular fractions of liver and retina from zinc-deficient and control rats using retinol and ethanol as substrates. When the zinc concentrations of these tissues were reduced because of feeding inadequate dietary zinc, alcohol dehydrogenase was significantly lowered, and the retinol-retinal as well as the ethanol-ethylaldehyde conversion was significantly reduced. While in older rats no changes occurred in liver zinc and alcohol dehydrogenase, the retina was more sensitive to the lack of dietary zinc than the liver. Young rats nursed by zinc-deficient dams showed the most severe changes in both tissues. The data suggest that zinc deficiency affects the utilization of vitamin A as well as the catabolism of ethanol.

Intermolecular transacylation of phosphatidylethanolamine by a *Butyrivibrio* sp. G.P. Hazlewood and R.M.C. Dawson (Dept. of Biochem., A.R.C. Inst. Animal Physiol., Babraham, Cambridge CB24AT, U.K.) *Biochem. J.* **150**, 521–5 (1975). Washed cells and supernatant from a culture of a *Butyrivibrio* sp. carry out the intermolecular transacylation reaction 2 phosphatidylethanolamine → *N*-acylphosphatidylethanolamine + lysophosphatidylethanolamine. Washed cells can catalyse the intramolecular transacylation of *N*-(acyl)-glycerylphosphorylethanolamine to lysophosphatidylethanolamine; the culture supernatant is largely devoid of activity.

Surface properties of phorbol esters and their interaction with lipid monolayers and bilayers. K. Jacobson, C.E. Wenner, G. Kemp and D. Papahadijopoulos (Rosewell Park Memorial Inst., New York State Dept. of Hlth., Buffalo, N.Y. 14263) *Cancer Res.* **35**, 2991–5 (1975). The potent tumor-promoting agent 12-*O*-tetradecanoylphorbol-13-acetate (TPA) is surface active and was found to occupy a limiting area of 62 sq Å/molecule in monolayers at the air-water interface. The interfacial tension of aqueous TPA solutions is decreased by increasing the bulk-phase TPA concentrations up to 2 × 10^{-6} M, beyond which no further decreases were observed. This concentration is in agreement with the apparent solubility limit previously obtained. The apparent aqueous solubility limit of the more hydrophobic phorbol-didecanoate is 5 × 10^{-8}M. Several fluorescence polarization probes for membrane fluidity indicate that TPA does not affect this membrane parameter. Further, the presence of TPA includes no measurable change in the cation permeability of phospholipid vesicles, the conductance of planar bilayer membranes, or the electrophoretic mobility of negatively charged liposomes. The lack of a specific effect with bilayers alone, combined with the documented physiological effects at low TPA concentrations, point to the possibility of a specific membrane components as the receptor for TPA at the plasma membrane.

The activation of phospholipase C from Clostridium welchii by quinine: An absolute requirement for calcium ions. R. Klein, N. Miller, P. Kemp and H. Laser (Med. Res. Council, Biochem. Parasitology Unit, Molteno Inst., Univ. of Cambridge, Downing St., Cambridge, CB2 3EE, England) *Chem. Phys. Lipids* **15**, 15-26 (1975). Quinine activates the hydrolysis of phosphatidyl choline suspensions by phospholipase C (E.C. 3.1.4.3) obtained from *Clostridium welchii*. Low levels of calcium are an absolute requirement for this activation: Mg^{2+}, Ba^{2+}, Sr^{2+}, and Zn^{2+} are ineffective. The induction period, or lag phase for this enzyme is dependent upon both calcium concentration and substrate interfacial surface area. At low concentrations (less than 50 μM) calcium ions affect the induction period but not the maximal rate of hydrolysis, whereas quinine predominantly affects the rate of hydrolysis by alterations in the surface charge carried by the substrate.

Lead poisoning in vitamin E-deficient rats. O.A. Levander, V.C. Morris, D.J. Higgs and R.J. Ferretti (Nutr. Inst., ARS, USDA, Agr. Res. Ctr., Beltsville, Md. 20705) *J. Nutr.* **105**, 1481-5 (1975). Weanling male rats were fed either a vitamin E-deficient Torula yeast diet or the same diet supplemented with 100 ppm vitamin E for a period of 3 months. One group of animals fed each diet received 250 ppm lead in the drinking water, whereas another group of animals fed each diet received no lead in the water. Vitamin E deficiency per se had little or no effect on hematocrit value, reticulocyte count, spleen weight, or erythrocyte mechanical fragility in rats not poisoned with lead. On the other hand, the decreased hematocrit, increased reticulocyte count, and splenic enlargement due to lead poisoning were much more pronounced in vitamin E-deficient rats than in rats supplemented with vitamin E. The resistance to mechanical trauma of red blood cells from vitamin E-deficient lead-poisoned rats was much less than that of red cells from vitamin E-adequate lead-poisoned rats. Dietary vitamin E status had no significant influence on the increased mechanical fragility of erythrocytes from nonpoisoned rats caused by exposure to lead in vitro. These results suggest that vitamin E deficiency enhances the susceptibility of animals to the in vivo hemolytic effect of lead poisoning.

Steroidogenesis of the fetal adrenal gland in vitro: Influence of Metopirone applied in vivo and in vitro. R. Klepac, K. Milkovic, J. Paunovic, and S. Milković (Inst. of Biol., Schl. of Med., and Lab. for Exptl. Med., Univ. of Zagreb, 41000 Zagreb, Salata 3, Yugoslavia) *Proc. Soc. Exp. Biol. Med.* **150**, 249-53 (1975). *In vitro* conversion of 4-^{14}C-progesterone into corticosteroids in the adrenal glands of rat fetuses treated with Metopirone (Su 4885) on the last day of intrauterine development was studied. After a 1-hr incubation of the adrenal glands of fetuses injected with Metopirone, hydroxylation of progesterone into corticosterone (B), 18-hydroxycorticosterone (18-OH-B) and 18-hydroxy-11-deoxycorticosterone (18-OH-DOC) decreased and the synthesis of 11-deoxycorticosterone increased. Following preincubation of the fetal adrenal glands and 1-hr incubation with Metopirone hydroxylation of progesterone into DOC increased and the synthesis of B decreased. Preincubation and a 2-hr incubation with Metopirone caused a decrease in the synthesis of B, 18-OH-B and 18-OH-DOC and an increase in DOC. The results constitute direct evidence of the ability of the fetal adrenal glands to synthesize all corticoids and indicate that most probably corticoids are synthesized by the fetal adrenal glands in the same way as in the adrenals of adult animals.

Properties of rooster serum high density lipoproteins. A.W. Kruski and A.M. Scanu (Depts. of Med. and Biochem., Univ. of Chicago Pritzker Schl. of Med. and The Franklin McLean Memorial Inst., Chicago, Ill. 60637) *Biochim. Biophys. Acta* **409**, 26-38 (1975). The physical and chemical properties of normolipemic rooster serum high density lipoproteins (HDL) were determined and compared with human HDL. Rooster HDL was found to be composed of essentially one class of particles, as determined by flotational analysis at *d* 1.21 g/ml in the analytical ultracentifuge. On a weight-percentage basis, it contained 44, 29, 16, 5 and 6% protein, phospholipid, cholesteryl ester, cholesterol, and triacylglycerol, respectively. This distribution resembled that of human HDL_2 more closely than that of HDL_3. The HDL protein gave several bands by polyacrylamide gel electrophoresis. The main component, representing almost 90% of the total protein, had a molecular weight of about 26,000, an amino acid composition and an electrophoretic mobility similar to those of human apolipoprotein A-I. A component of mol. wt 15,000 and a group of fast-migrating peptides, resembling the human apo C peptides, were also found. It is concluded that the structure of rooster HDL, although showing similarities to human HDL, can be distinguished from the latter by some physical parameters, but particularly by its polypeptide distribution.

Increased hepatic triacylglycerol secretion in fasted rats with ventromedial hypothalamic lesions. A. Løvø and B. Hustvedt (Inst. for Nutr. Res., Med. Schl., Univ. of Oslo, Blindern, Norway) *Biochim. Biophys. Acta* **409**, 51-8 (1975). Adult female rat with lesions in the ventromedial hypothalamic area and sham-operated controls were given Triton WR 1339 intravenously after 24 h without food for measurement of liver triacylglycerol secretion rate. Tritiated water was injected for measurement of lipogenesis in liver, perirenal and subcutaneous adipose tissues in vivo. The experiments were performed on unrestrained animals with a chronically implanted venous heart cannula after 24 h without food. By the use of this technique, anesthesia and handling of the animals during the experiments was avoided. The following differences in the lesioned animals compared to the sham-operated controls were found: relative hypertriglyceridemia. A significant increase of triacylglycerol accumulation in the plasma. Increased incorporation of ^3H from ^3H_2O into liver fatty acids. The experiments demonstrate that hepatic lipid synthesis during fasting is greater in the lesioned than in the control animals, but not high enough to account for the increased triacylglycerol secretion. A shift in the hepatic metabolism of fatty acids, leading to greater triacylglycerol formation at the expense of other processes is therefore suggested. The possible role of insulin in these metabolic changes is discussed.

Structure of the human erythrocyte blood group P_1 glycosphingolipid. M. Naiki, J. Fong, R. Ledeen, and D.M. Marcus (Depts. of Microbiol. and Immunol., Neurol., Biochem., and Med., the Albert Einstein Col. of Med., Bronx, N.Y. 10461) *Biochemistry* **14**, 4831-7 (1975). A glycosphingolipid with blood group P_1 activity was extracted from an acetone powder of human erythrocyte stroma with chloroform-methanol. It was purified by chromatography on columns of silicic acid and by preparative thin-layer chromatography of the fully acetylated and deacetylated glycolipid. The purified glycolipid contained galactose, *N*-acetylglucosamine, and glucose in a molar ratio of 3:1:1. Treatment of the P_1 glycolipid with fig α-galactosidase released a single galactosyl residue and destroyed the blood group activity, and the α-galactosidase product had the same chromatographic mobility as paragloboside. Substitution sites on the neutral sugars of the P_1 glycolipid and the α-galactosidase product were established by identification of methylated alditol acetates, and substitution on *N*-acetylglucosamine was determined by identification of methyl glycoside derivatives. The terminal nonreducing disaccharide of the P_1 glycolipid is Gal (α, 1 → 4) Gal. *N*-Acetylglucosamine was identified as the next sugar in sequence by mass spectrometric analysis of the permethylated P_1 glycolipid. On the assumption that the glucose residue is linked to ceramide, we propose the following structure for the P_1 glycolipid: Gal (α, 1 → 4) Gal (β, 1 → 4) GlcNAc (β, 1 → 3) Gal (β, 1 → 4) Glc-Cer.

Effects of dextrothyroxine on hyperlipidemia and experimental atherosclerosis in beagle dogs. R. Nandan, J.D. Fisher, E.P. Towery, D.R. Brown, C.E. Ganote and R.B. Jennings (Baxter Labs. Inc., Morton Grove, Ill. 60053) *Atherosclerosis* **22**, 299-311 (1975). Beagle dogs, 24 ± 6 months old, fed a thiouracil-free synthetic diet containing hydrogenated coconut oil and cholesterol (SS diet) for 12 months, developed marked hyperlipidemia and severe atherosclerosis. SS diet produced a marked elevation of serum cholesterol, triglyceride, phospholipid, and β-lipoprotein and severe atherosclerosis in large and small arteries. Intimal fatty lesions were always present in the abdominal aorta and many of its branches. Large and small coronary arteries showed similar lesions. The degree of atherosclerosis was directly related to circulating lipid levels. Dextrothyroxine, at dose levels of 0.1 (equivalent to normal human dose) and 0.5 mg/kg body weight, produced a significant dose related lowering of serum lipids and was associated with a markedly decreased severity of aortic and coronary artery lesions. Untreated control dogs that were maintained on purina dog meal developed neither hyperlipidemia nor atherosclerosis.

Removal of plasma cholesterol by adsorption chromatography. M.R. Malinow, P. McLaughlin and L. Papworth (Oregon Regional Primate Res. Ctr., Beaverton, Ore. 97005) *Atherosclerosis* 22, 293–7 (1975). Batch and column chromatography with porous glass decreased the plasma concentration of cholesterol. Extracorporeal circulation of blood through a column filled with porous glass, as well as exchange transfusion with blood made hypocholesterolemic by passage of its plasma through a column filled with porous glass, temporarily reduced plasma cholesterol concentration in rats.

Relationships between the exchange of calcium and phosphate in isolated fat-cells. B.R. Martin, T. Clausen and J. Gliemann (Inst. of Physio., Univ. of Aarhus, 8000 Aarhus C, Denmark) *Biochem. J.* 152, 121–9 (1975). The uptake and the washout of $^{45}Ca^{2+}$ and $^{32}P_i$ is described in free fat-cells and whole epididymal fat-pads from fed rats. In isolated fat-cells, the uptake of $^{45}Ca^{2+}$ proceeds with an initial rapid phase of about 1 min duration, followed by a slower subsequent accumulation. In contrast with the rapid phase, the slow phase is inhibited by 2,4-dinitrophenol, warfarin, oligomycin and verapamil, shows saturation, and presumably represents transport across the plasma membrane. It is concluded that in free-cells, the uptake and release of Ca^{2+} and P_i take place by closely interrelated processes, which are dependent on mitochondrial energy production.

Influence of dietary lipids on iron and copper levels of rats administered oral contraceptives. H.K. Onderka and A. Kirksey (Dept. of Foods and Nutr., Purdue Univ., West Lafayette, Ind. 47907) *J. Nutr.* 105, 1269–77 (1975). Interrelationships between oral contraceptives and dietary lipids on iron and copper levels in plasma and tissues were investigated in rats. Diets containing either 20% (by weight) safflower oil or hydrogenated coconut oil with and without cholesterol (0.5%) were fed to weanling, female, Wistar-strain rats for a period of 19 weeks. Three types of oral contraceptive agents differing in estrogen/progesterone ratios were administered during weeks 16 through 19 of the experiment. Control rats received the dietary treatments without oral contraceptives. Hemoglobin concentration, hematocrit, red blood cell counts, mean cell hemoglobin and hemoglobin concentration, and mean cell volume values were similar among the various dietary and drug treatment groups. Elevated levels of copper were found in livers of drug-treated animals fed diets containing cholesterol and safflower oil, whereas levels of copper in iron in spleen and kidney were not influenced by oral contraceptives. Dietary safflower or coconut oil had no influence on levels of iron or copper in plasma.

Plasma lipoproteins in rats with experimental biliary obstruction. II. An ultrastructural study. I. Pasquali-Ronchetti, S. Calandra, M. Baccarani-Contri and M. Montaguti (Inst. di Patologia Generale, Univ. delgi Studi di Modena, Modena, Italy) *Biochim. Biophys. Acta* 509, 13–25 (1975). Acute biliary obstruction in the rat is associated with abnormalities of the ultrastructure of plasma lipoproteins. The *d* < 1.006 g/ml fraction contains two types of particles: vesicles having a mean diameter of 42.0 nm and spheroidal particles which have a mean diameter of 80.0 nm. The latter show surface irregularities which make these particles appear as spherical bodies with holes. The *d* 1.019–1.063 g/ml fraction is heterogeneous. Gel filtration on 2% agarose allows the characterization of three components designated subfraction I, II and III respectively. Subfraction I is composed of large aggregates of spherical and vesicular particles. Subfraction II consists of 50.0–80.0 nm vesicles which show strong similarities to artificially prepared emulsions of phospholipids in water. Subfraction III contains particles which have a mean diameter of 20.0 nm and resemble low density lipoproteins of normal rats. The *d* 1.063–1.125 g/ml fraction contains 35.0 nm discoidal particles which tend to form ruleaux with a periodicity of 4.9 nm. This fraction also contains a few vesicles and 10.0 nm spherical particles similar to those found in the corresponding fraction of normal rat.

The arterial acyl-CoA:cholesterol acyltransferase and cholesterol hydrolase activities. In vitro effect of substrates with fatty acid of different chain length and saturation. J. Patelski, B. Pniewska, M. Piorunska and Obresbska (Dept. of Biochem., Med. Acad., Poznań, Poland) *Atherosclerosis* 22, 287–91 (1975). Cholesterol acyltransferase and cholesterol esterase activities of protein extracts from pig aortas have been examined and the ratios of synthesis/hydrolysis rates in the presence of substrates with different fatty acids estimated. The values obtained were in the numerical order: cholesteryl oleate > palmitate ⩾ linoleate > linolenate > staerate. The results are discussed in relation to the known different accumulation of cholesterol esters in the arterial wall.

In vivo chemotaxis of rat leukocytes in the presence of circulating chylomicrons. R.J. Perper, A.L. Oronsky, M. Sanda and V.J. Stecher (Res. Dept., Pharmaceuticals Div., CIBA-GEIGY Corp., Ardsley, N.Y. 10502) *Atherosclerosis* **22**, 257–69 (1975). Dietary-induced chylomicronemia was produced in rats to determine its effect on the chemotactic activity of ^{51}Cr-labelled adoptively transferred isologous leukocytes. Rats fed a low protein high fat diet for 2 months had normal total plasma cholesterol and triglyceride levels, but increased amounts of chylomicrons. Circulating neutrophils and monocytes from animals on a normal diet were able to phagocytose chylomicrons from plasma of those animals on the special diet. Peritoneal exudate cells from the latter animals contained intracellular chylomicrons demonstratable both histologically and biochemically. Neutrophils and mononuclear cells from normal or special fed animals, when transferred to chylomicronemic recipients, had a reduced ability to accumulate at the site of a complement-dependent inflammatory reaction but circulated normally.

Zinc bacitracin and added fat in diets of growing turkeys. L.M. Potter, J.R. Shelton and L.G. Melton (Dept. of Poultry Sci., Virginia Polytechnic Inst. and State Univ., Blacksburg, Va. 24061) *Poult. Sci.* 53, 2072–81 (1974). Diets varying in bacitracin from zinc bacitracin and in animal and vegetable fat were fed to female and male Large White turkeys from hatching to 20 and 24 weeks of age, respectively. By adding bacitracin to the diets, body weights were significantly improved in excess of 3% throughout the experiment. At 20 weeks of age, average body weights of all turkeys fed diets containing 0, 16.5, 33.0, 49.5 and 66.0 p.p.m. bacitracin were 9.23, 9.48, 9.38, 9.77 and 9.58 kg., respectively. Added fat significantly depressed body weight gains to 6 or 8 weeks, but significantly increased body weight gains after 10 weeks of age. By feeding diets containing 0, 5 and 10% added fat, body weights and feed efficiencies of 24-week old males were 13.30, 14.14 and 14.45 kg., and .273, .313 and .342, respectively. For the 20-week old females, the values were 7.68, 7.67 and 7.73 kg. and .285, .318 and .347, respectively.

Incorporation of ortho[^{32}P]phosphate into phosphatidylcholines and phosphatidylethanolamines in rat skeletal muscle. F.A. Shamgar and F.D. Collins (Russell Grimwade Schl. of Biochem., Univ. of Melbourne, Parkville, Victoria 3052, Australia) *Biochim. Biophys. Acta* 409, 104–15 (1975). The specific radioactivities of individual molecular species of muscle phosphatidylcholine and phosphatidylethanolamine have been measured by a combination of argentation thin-layer chromatography and countercurrent distribution. The specific radioactivities of individual molecular species of muscle phosphoglycerides have been determined 3 h after intraperitoneal injection of ortho[^{32}P]phosphate. Under these conditions the specific radioactivities of the species present in rat muscle were found to be measures of the relative turnover times of these molecules. The specific radioactvity of phosphatidylcholine was approx. three times that of phosphatidylethanolamine. The 1-palmitoyl-2-oleoyl and 1-oleoyl-2-linoleoyl phosphatidylcholines had the fastest turnover and the 1-palmitoyl-2-arachidonoyl the slowest. Of the phosphatidylethanolamines, the linoleoyl and the docosahexaenoyl species showed the fastest turnover and 1-stearoyl-2-arachidonoyl the slowest. The results indicate that phosphoglycerides in muscle turn over more slowly and more evenly than do liver phosphoglycerides.

Studies on the role of insulin in the regulation of glyceride synthesis in rat epididymal adipose tissue. S.R. Sooranna and E.D. Saggerson (Dept. of Biochem., Univ. Col. London, Gower St., London WC1E6BT, U.K.). *Biochem. J.* **150**, 441–51 (1975). When rat isolated fat-cells were incubated with fructose and palmitate, insulin significantly stimulated glyceride synthesis as measured by either [^{14}C]fructose incorporation into the glycerol moiety or of [^{3}H]palmitate incorporation into the acyl moiety of tissue glycerides. Under certain conditions the effect of insulin on glyceride synthesis was greater than the effect of insulin on fructose uptake. In the presence of palmitate, insulin slightly stimulated [^{14}C] pyruvate incorporation into glyceride glycerol of fat-cells and $^{3}H_2O$ incorporation into glyceride glycerol of incubated fat-pads. At low extracellular total concentrations of fatty acids (in the presence of albumin), insulin stimulated [^{14}C]fructose, [^{14}C]pyruvate and $^{3}H_2O$ incorporation into fat-cell fatty acids. Increasing the extracellular fatty acid concentration greatly inhibited fatty acid synthesis from these precursors and also greatly decreased the extent of apparent stimulation of fatty acid synthesis by insulin. These results are discussed in relation to the suggestion that the tissue may contain a specific acyl-binding protein which is subject to regulation. It is suggested that an insulin-sensitive enzyme component of the glyceride-synthesis process may play such a role.

The effect of carbon monoxide on lipid metabolism of human coronary arteries. J.S.M. Sarma, H. Tillmanns, S. Ikeda and R.J. Bing (Huntington Memorial Hosp. and the Calif. Inst. of Technol., Pasadena, Calif.) *Atherosclerosis* **22**, 193–8 (1975). Human coronary arteries were perfused under sterile conditions in vitro with blood containing high or low concentrations of carbon monoxide. Lipid synthesis in the arterial wall was investigated by incorporating [^{14}C]acetate; synthesis of the following lipids was measured: cholesterol, cholesterol ester, di- and triglycerides and phospholipids. Cholesterol uptake by the arterial wall was studied by using [^{3}H] cholesterol as a tracer. No influence of CO on lipid synthesis in the arterial wall could be demonstrated. In contrast, arteries which were exposed to CO showed a higher uptake of cholesterol as compared to their corresponding control. The concentration of CO in the perfusate did not alter the degree of cholesterol uptake. These results are in general agreement with those of others, who found that CO significantly increases the permeability of endothelial membranes.

Effects of a high fructose diet on lipogenic enzyme activities in some organs of rats fed ad libitum. W. Sugawa-Katayama and N. Morita (Dept. of Food and Nutr., Faculty of the Sci. of Living, Osaka City Univ., Sugimotocho, Sumiyoshi-ku, Osaka 558, Japan) *J. Nutr.* **105**, 1377–83 (1975). The effect of a high fructose diet on lipogenesis was studied in rats. Male and female rats were divided into three groups and were fed a high carbohydrate diet ad libitum for 4 days; group 1 was fed a high cornstarch diet, group 2 was fed a high fructose diet without starvation, and group 3 was fed a high fructose diet after 2 days of starvation. The activities of lipogenic enzymes, i.e., glucose-6-phosphate dehydrogenase and malic enzyme were assayed in liver, adipose tissue, and small intestine. The lipid content of liver was also determined. On day 4, the lipid content of group 1 was about 45 mg, that of group 2 was about 70 mg, and that of group 3 was about 115 mg (female) and 145 mg (male) per gram of wet weight. Groups 2 and 3 showed significantly higher activity of hepatic malic enzyme than group 1. The activity of intestinal malic enzyme was highest in group 1 and not significantly different between groups 2 and 3. The malic enzyme activity in adipose tissue of females of group 3 was higher than that in either sex of the other groups.

Vitamin K requirement and Warfarin tolerance in the hamster (38987). D.V. Shah and J.W. Suttie (Dept. of Biochem., Col. of Agr. and Life Sci., Univ. of Wisc., Madison, Wisc. 53706) *Proc. Soc. Exper. Biol. Med.* **150**, 126–8 (1975). A dietary deficiency of vitamin K has been demonstrated in the Syrian hamster. This species has also been shown to be relatively resistant to the action of the indirect anticoagulant Warfarin, and very sensitive to the anticoagulant action of the vitamin K antagonist chloro-K. These observations, and the hamster's apparently high requirement for the vitamin, indicate that it responds to vitamin K and vitamin K antagonists in the same fashion as Warfarin-resistant strains of rats.

Effects of high carbohydrate, high fat, or high protein diets on glucose oxidation by isolated intestinal epithelial cells of the chick. K.L. Raheja, J. Tepperman and H.M. Tepperman (Dept. of Pharmacol., State Univ. of N.Y. Upstate Med. Ctr., Syracuse, N.Y. 13210) *J. Nutr.* **105**, 1433–9 (1975). A parallel study of 3-*O*-methyl glucose transport by everted intestinal sacs and [U-^{14}C]glucose oxidation by isolated, dispersed intestinal cells was done in chicks adapted to a high carbohydrate (HC), high fat (HF), or high protein (HP) diet for 2 weeks or fasted up to 5 days. HF and HP diets significantly decreased both serosal:mucosal (S:M) distribution ratios of 3-*O*-methyl glucose by everted sacs and glucose oxidation by dispersed cells. The effects were more pronounced in HF diet-fed chicks. Fasting significantly increased the S:M ratio throughout a 5-day fasting period, whereas glucose oxidation was increased after a 1-day fast and was decreased after a 5-day fast. Feeding HC diet for 1 week to chicks adapted to HF diet restored both functions to control levels. Refeeding fasted chicks for 3 days also restored S:M ratio to control levels. Histological examination of tissues from various treatment groups revealed no obvious morphological differences. These results suggest that the functional changes described represent adaptive changes at the cellular level and that these changes are readily reversible.

Effects of dietary carbohydrate source on growth, plasma metabolites and lipogenesis in rats, pigs and chicks (39006). R.A. Waterman, D.R. Romsos, A.C. Tsai, E.R. Miller, and G.A. Leveille (Dept. of Food Sci. and Human Nutr. and Dept. of Animal Husbandry, Mich. State Univ., East Lansing, Mich. 48824) *Proc. Soc. Exper. Biol. Med.* **150**, 220–5 (1975). Rats, chicks, and pigs were fed diets containing fructose or glucose. Plasma triglyceride levels were elevated in rats but not in chicks or pigs fed diets containing fructose. The rate of fatty acid synthesis in rat liver but not in chick liver was elevated when fructose-containing diets were fed. Conversely, the rate of fatty acid synthesis in rat adipose tissue but not in pig adipose tissue tended to be depressed when fructose-containing diets were fed. These results indicate that there are species-specific as well as organ-specific metabolic responses to various dietary carbohydrates.

Vitamin A deficiency and fetal growth and development in the rat. Y.I. Takahashi, J.E. Smith, M. Winick and D.S. Goodman (Inst. of Human Nutr. and Dept. of Med., Columbia Univ., Col. of Physicians and Surgeons, New York, N.Y. 10032) *J. Nutr.* **105**, 1299–310 (1975). Studies were conducted to examine in detail the effects of vitamin A deficiency on fetal growth and development in the rat. The gradations of deficiency were examined in two studies. The first included total vitamin A depletion followed by retinoic acid supplements, and the second included three different levels of restricted intake of retinyl acetate (42, 16, or 8 μg of retinol equivalents/day/kg of body weight) in vitamin A-depleted rats. In the first study, extensive fetal resorption and death were observed in retinoic acid-fed females after day 14 of gestation. These findings confirmed the morphological studies of Thompson and associates who found the earliest detectable histological lesions to be in the placentas at days 15–16 of pregnancy. Analyses were carried out of the total weight, the DNA, RNA, and protein contents of fetuses and placentas of different gestational ages in retinyl ester-fed and retionic acid-fed females. The effects of vitamin A deficiency on fetal growth and development might reflect primary effects on the placenta, with secondary effects on the fetus, or primary effects on the fetus itself. The mechanisms of the observed effects remain to be explained.

Phospholipase C from Clostridium novyi type A. I.R. Taguchi and H. Ikezawa (Faculty of Pharmaceutical Sci., Nagoya City Univ., Mizuho-ku, Nagoya 467, Japan) *Biochim. Biophys. Acta* **409**, 75–85 (1975). Phospholipase C (EC 3.1.4.3) from *Clostridium novyi (oedematiens)* type A was purified 2000-fold by $(NH_4)_2SO_4$ precipitation, DEAE-Sephadex treatment in a batchwise system and Sephadex G-100 column chromatography. The purified preparation had a specific activity of 95 μmol per min per mg protein toward phosphatidylcholine. This preparation was free from protease, lipase and oxygen-labile δ-hemolysin. Phosphatidylcholine was hydrolyzed at the highest rate, while sphingomyelin and lysophosphatidylcholine were hydrolyzed at much lower rates. Sodium deoxycholate and divalent cations such as Mg^{2+} and Ca^{2+} were extremely effective in stimulating phosphatidylcholine-hydrolyzing activity of this enzyme. This enzyme hemolyzed horse red cells by hydrolyzing phosphatidylcholine, sphingomyelin and phosphatidylethanolamine.

Inhibition of rat liver cholesterol esterase by local anaesthetics. J.R. Traynor and H. Kunze (Dept. of Biochem. Pharmacol., Max-Planck-Instit. for Exp. Med., Hermann-Rein-

Strasse 3, 34 Göttingen, G.F.R.) *Biochim. Biophys. Acta* 409, 68–74 (1975). A number of local anaesthetics was shown to inhibit rat liver cholesterol esterase activity towards radioactively labelled cholesterol oleate. The anaesthetics inhibited in the order dibucaine > chlorpromazine > tetracaine > benzocaine > procaine > lidocaine > cocaine. The mode of inhibition was seen to be non-competitive with respect to the substrate and is probably independent of any involvement of Ca^{2+}. The inhibition by tetracaine is partially reversed by sodium deoxycholate. However, all ionic and nonionic detergents studied, sodium deoxycholate, sodium taurocholate, Triton X-100, and cetyltrimethylammonium bromide are capable of inhibiting the rat liver cholesterol esterase in a concentration dependent manner. Only sodium taurocholate stimulates enzymic activity.

LIPID COMPOSITION OF ISOLATED EPIPHYSEAL CARTILAGE CELLS, MEMBRANES AND MATRIX VESICLES. R.E. Wuthier (Depts. of Biochem. and Orthopaedic Surgery, Col. of Med., Univ. of Vt., Burlington, Vt. 05401) *Biochim. Biophys. Acta* 409, 128–43 (1975). Intact cells, cell fragments (membranes) and matrix vesicles were isolated from the proliferating and calcifying layers of epiphyseal cartilage by sequential hyaluronidase and collagenase digestion and differential centrifugation. Lipids were extracted and analyzed for various lipid classes and their fatty acid composition by column, thin-layer, paper and gas-liquid chromatography. Fatty acid patterns of the matrix vesicles were distinctive from those of isolated cells, being generally richer in 18:0 and 18:2, and lower in 16:1 and 18:1 fatty acids. Monoacyl forms were similarly increased in 16:0 and/or 18:0, and reduced in 16:1, 18:1 or 20:2 fatty acids, depending on the lipid class. The fatty acid composition of diphosphatidylglycerol from cells and matrix vesicles was markedly different, providing evidence that the cardiolipin in the vesicles was not from mitochondrial components. Based on the fact that the matrix vesicles were significant enriched in free cholesterol, sphingomyelin, glycolipids and serine-phosphoglycerides, it is concluded that they are derived from the plasma membrane of the cell, supporting earlier conclusions based upon morphological and enzymological evidence.

BIOSYNTHESIS OF PHOSPHOGLYCERIDES IN SKELETAL MUSCLE IN CONTROL RATS AND IN RATS DEFICIENT IN ESSENTIAL FATTY ACIDS. F.A. Shamgar and F.D. Collins (Russell Grimwade Schl. of Biochem., Univ. of Melbourne, Parkville, Victoria 3052, Australia) *Biochim. Biophys. Acta* 409, 116–27 (1975). The specific radioactivities of individual molecular species of phosphoglycerides in the skeletal muscles of control rats and of rats deficient in essential fatty acids have been determined 3 h after intraperitoneal injection of ortho[^{32}P]phosphate. It has been demonstrated that the high average specific radioactivity of phosphoglycerides in muscles of rats deficient in essential fatty acids is due to both increased amounts and increased turnover of 1-palmitoyl-2-oleoyl phosphatidylcholine and phosphatidylethanolamine. The 1-stearoyl-2-arachidonoyl phosphatidylcholine was found to turn over faster than the 1-palmitoyl-2-arachidonoyl species. In rats deficient in essential fatty acids, the 1-stearoyl-2-(5,6,11-eicosatrienoyl) phosphatidylcholine turned over more rapidly than the 1-palmitoyl-2-(5,8,11-eicosatrienoyl) species. Both findings are in contrast with similar findings for liver.

PRIMARY HYPERLIPOPROTEINEMIAS AS RISK FACTORS IN PERIPHERAL ARTERY DISEASE DOCUMENTED BY ARTERIOGRAPHY. K.H. Vogelberg, P. Berchtold, H. Berger, F.A. Gries, H. Klinger, W. Kubler and T.H. Stolze (Diabetes Res. Inst., First and Second Med. Dept., and Dept. of Statistics, Univ. of Dusseldorf, W. Germany) *Atherosclerosis* 22, 271–85 (1975). In a controlled study on 121 patients with peripheral vascular disease (PVD) (75 patients with primary hyperlipoproteinemia, 15 diabetics, 31 patients without metabolic disease) the relationship between risk factors (hyperlioproteinemia, obesity, hypertension, abnormal glucose tolerance, smoking) and the degree and localisation of sclerotic lesions was investigated by angiography. The degree was directly related in all patients to the number of risk factors, in Type IIa to cholesterol levels, in diabetics and Type IV with abnormal glucose tolerance to age. The latter patients were 5–10 years older than patients with Type IIa and showed 2 or more additional risk factors. The sclerotic lesions affected in Type IIa, less in Type IIb, predominantly the pelvic vessels. Diabetics and Type IV patients showed a distal arterial involvement. The difference was significant. The degree of sclerotic lesions in arteries of the pelvis and the distal lower limb was positively correlated with the cholesterol-triglyceride ratio. Smoking aggravated the pelvic lesions in Type IV. Hypertension lead to more pronounced lesions of the distal lower limb in Type II. S-shaped tortuosities of the big vessels were shown to be typical, independent of localisation or degree.

TRANSMUCOSAL TRIGLYCERIDE TRANSPORT RATES IN PROXIMAL AND DISTAL RAT INTESTINE IN VIVO. A-L. Wu, S.B. Clark and P.R. Holt (Div. of Gastroenterology, St. Luke's Hosp. Center, New York, NY 10025) *J. Lipid Res.* 16, 251–7 (1975). Transmucosal transport rates for triolein in proximal and distal intestine were compared in unanesthetized rats. Emulsified [1-^{14}C]triolein together with bile and pancreatic juice from donor rats was infused for 6 hr into either the duodenum or the midpoint of the small intestine at such a rate that absorption was essentially complete in both regions of the intestine. Lymph was collected from the thoracic duct during triolein infusion and for an additional 6-hr period. The decrease in the rate of lymphatic output of labeled fat was found to follow a simple exponential function in all animals. This rate of decrease (decay rate) was used to calculate the half-times of lipid turnover through the intestinal wall and the fractional output rates. Distal intestine transported lipid 40% more slowly than proximal intestine, and the difference was associated with a greater accumulation of triglyceride in the distal intestinal wall. Chylomicron synthesis and/or release is the rate-limiting step for distal lymphatic fat transport in vivo, whereas fat uptake from the lumen is rate limiting for proximal intestine.

CHOLESTEROL CATABOLISM IN THE RABBIT IN FASTED AND FED STATES. H.C. Klauda and D.B. Zilversmit (Div. of Nutr. Sci. and Section of Biochem., Mol. and Cell Biol., Div. of Biol. Sci., Cornell Univ., Ithaca, N.Y. 14853) *J. Lipid Res.* 16, 258–63 (1975). Urinary and fecal endogenous steroid excretion of fed or fasted New Zealand white rabbits was determined by the isotopic steady state method after subcutaneous implantation of radioactive cholesterol. While plasma cholesterol was increasing during a 9-day fast, fecal steroid excretion decreased to 10% of the excretion rates in the fed state. Refeeding the fasted rabbits led to a decrease in plasma cholesterol and an increase in fecal endogenous steroid excretion. Urinary steroid excretion, which represented 18% of total endogenous steroid excretion for fed animals, decreased during fasting and increased during refeeding, but these changes were relatively small. The small intestine, cecum, and colon of fed or fasted rabbits had similar endogenous steroid contents. The predominant form of fecal endogenous steroid was acidic steroid. During attempts to alter the circulating bile acid concentration by supplying deoxycholate (200 mg/day) to fed rabbits or cholestyramine (2 g/day) to fasted rabbits, plasma cholesterol concentration did not change to the same extent as during fasting or refedding, respectively. The decreased cholesterol catabolism and the hypercholesterolemia that are seen in the fasting rabbit may result from decreased clearance of plasma cholesterol.

EFFECTS OF GLUCAGON AND DIBUTYRYL ADENOSINE 3′,5′-CYCLIC MONOPHOSPHATE ON OXIDATIVE DESATURATION OF FATTY ACIDS IN THE RAT. I.N.T. de Gómez Dumm, M.J.T. de Alaniz, and R.R. Brenner (Inst. de Fisiología, Facultad de Ciencias Médicas, Univ. Nacional de La Plata, Calle 60 y 120, La Plata, Argentina) *J. Lipid Res.* 16, 264–8 (1975). The present work was undertaken to study the effect of anti-insulinic and glycogenolytic factors on the oxidative desaturation of fatty acids. The effects of glucagon and dibutyryl cyclic AMP on the desaturation of linoleic acid to γ-linolenic acid, α-linolenic acid to octadeca-6,9,12,15-tetraenoic acid, stearic acid to oleic acid, and eicosa-8,11,14-trienoic acid to eicosa-5,8,11,14-tetraenoic acid by rat liver microsomal preparations were investigated. Fasted rats had low desaturating activity, but refeeding a fat-free diet enhanced the activity. Administration of glucagon or dibutyryl cyclic AMP abolished the increased of the 6-desaturase activity elicited by refeeding. However, a similar effect on the 9-desaturase and 5-desaturase activity was not observed. The relationship between these effects and glucose metabolism is discussed. ■

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