Abstracts

• Fats and Oils

UNUSUAL C_{24}, C_{25},C_{26}, and C_{27} POLYUNSATURATED FATTY ACIDS OF THE MARINE SPONGE MICROCIONA PROLIFERA. R.W. Morales and C. Litchfield (Dept. of Biochem., Rutgers Univ., New Brunswick, N.J. 08003) *Biochim. Biophys. Acta* **431**, 206–16 (1976). Complete characterization of the fatty acids of the marine sponge *Microciona prolifera*, including double bond positional isomers, has identified 95 different acids in amounts of 0.1% or more. Trace amounts of 23 other acids were found. 48% of the fatty acids present have C_{24}–C_{28} chain lengths. These are all saturates, monoenes, dienes and trienes; the tetraene, pentaene and hexaene acids possess the usual C_{18}–C_{22} carbon chains. The numerous C_{24}–C_{28} acids present apparently originate within the sponge itself, indicating a highly active chain elongation system. A new family of C_{24}, C_{25}, C_{26} and C_{27} polyunsaturated acids with isolated double bonds has been discovered. All contain $\Delta^{5,9}$ unsaturation. Specific acids identified were 5,9–24:2; 5,9–25:2; 5,9–26:2; 5,9,17–26:3; 5,9,19–26:3; 5,9,19–27:3 and 5,9,20–27:3.2 Biosynthetic pathways for such acids are proposed, based on intermediates found in our fatty acid analyses.

FATTY ACIDS, PART 5: A STUDY OF THE OXYMERCURATION-DEMERCURATION REACTION OF SOME C_{11}-UNSATURATED FATTY ESTERS AND METHYL OCTADEC-*cis*-10-EN-5-YNOATE. C.H. Lam and M.S F. Lie Ken Jie (Dept. of Chem., Univ. of Hong Kong, Pokfulma Rd., Hong Kong) *Chem. Phys. Lipids* **16**, 181–94 (1976). The methoxymercuration-demercuration reactions of all the methyl *cis*-undecenoates are reported. Oxymercuration reaction of acetylenic esters gives keto- and hydroxy-esters when demercurated with hydrochloric acid and sodium borohydride respectively. Similar reactions are carried out with methyl octadec-*cis*-10-en-5-ynoate, which give the methyl 5(6)-oxooctadec-*cis*-10-enoate and 5(6)-hydroxy-10(11)-methoxyoctadecanoate isomers. Reduction of the methyl 5(6)-oxooctadec-*cis*-10-enoates with sodium borohydride yields the corresponding methyl hydroxy-esters, which on treatment with mercuric acetate (in methanol) and demercurated with sodium borohydride give methyl 5-hydroxy-10(11)-methoxyoctadecanoates and the 2,6-disubstituted tetrahydropyranyl derivative, methyl 6,10-epoxyoctadecanoate.

PHASE TRANSITIONS OF STEROLS AND STEROL-LECITHIN STEROL-LECITHIN MIXTURES. P.G. Barton (Dept. of Biochem., Univ. of Alberta, Edmonton, Alberta T6G,2H7, Canada) *Chem. Phys. Lipids* **16**, 195–200 (1976). Sterols exhibit reversible thermal transitions below their melting points which are dependent on the state of hydration and on the structure of the aliphatic substituent at C_{17}. The endotherm exhibited by cholesterol can be abolished by mixing with hydrated phospholipids at molar rations below 1 : 1 but reappears in a metastable form at molar ratios between 1 : 1 and 2 : 1.

LONG CHAIN MONOETHYLENIC ALCOHOL AND ACID ISOMERS IN LIPIDS OF COPEPODS AND CAPELIN. J.-C. Pascal and R.G. Ackman (Envir. Canada, Fisheries and Marine Service, Halifax, Nova Scotia B3J 2R3 Canada) *Chem. Phys. Lipids* **16**, 219–23 (1976). The 22 : 1 alcohols in wax esters of some North Atlantic copepods, which amounted to 45% of total fatty alcohols, were found by oxidative fission to contain 80% of the ω11 isomer. This isomer proportion is discussed in terms of biosynthesis and the role of copepods in the food of capelin and other fish.

SYNTHESIS OF ERYTHRO-5,6-DIACETOXYHEXADECANOIC ACID, A NOVEL FATTY ACID FROM MOSQUITO EGGS. A.N. Starratt (Res. Inst., Agr. Canada Univ. Sub P.O., London, N6A 5B7, Canada) *Chem. Phys. Lipids* **16**, 215–8 (1976). The synthesis of *erythro*-5,6-diacetoxyhexadecanoic acid, a major component of diglycerides isolated from the eggs of *Culex tarsalis* and related species and reported to influence oviposition of these mosquitoes, is described.

PHASE TRANSITIONS OF PHOSPHOLIPID SINGLE-WALL VESICLES AND MULTILAYERS. MEASUREMENT BY VIBRATIONAL RAMAN SPECTROSCOPIC FREQUENCY DIFFERENCES. R.C. Spiker, Jr. and I.W. Levin (Lab. of Chem. Physics, Natl. Inst. of Arthritis, Metabolism and Digestive Diseases, Natl. Insts. of Health, Bethesda, Md. 20014) *Biochim. Biophys. Acta* **433**, 457–68 (1976). Raman spectroscopic frequency differences between selected carbon-carbon stretching modes of lipid hydrocarbon chains were determined as a function of temperature for use in monitoring lipid phase transition behavior and acyl chain disorder in both multilamellar and single-wall vesicles. Transition temperatures detected by this procedure for pure dipalmitoyl phosphatidylcholine and dimyristoyl phosphatidylcholine multilayers were observed at 39 ± 1 °C and 23 ± 1 °C, respectively. Although the phase transition for unilamellar vesicles of dipalmitoyl phosphatidylcholine occurred at nearly the same temperature as the multilayers, the crystal-liquid crystalline transition for the single-shell vesicles appeared to span a slightly broader temperature, a characteristic consistent with irregularities in the packing arrangement of the hydrocarbon chains. Within the precision of the Raman spectroscopic method, however, the temperature behavior of both the multilamellar and the unilamellar dimyristoyl phosphatidylcholine assemblies appeared nearly identical.

^{19}F NUCLEAR MAGNETIC RESONANCE STUDIES OF LIPID BILAYER SYSTEMS. 1. M.P.N. Gent, I.M. Armitage and J.H. Prestegard (Dept. of Chem. and the Section of Physical Sci. of the Med. Schl., Yale Univ., New Haven, Conn. 06520) *J. Amer. Chem. Soc.* **98**, 3749–55 (1976). A fluorinated lipid, 1-palmitoyl-2-8,8-difluoropalmitoyl-*sn*-glycero-3-phosphorylcholine, has been synthesized and the dynamic properties of lipid bilayer systems containing this molecule have been studied using fluorine-19 NMR. Spin-lattice relaxation rates and nuclear Overhauser effects have been measured over a range of temperatures and the results have been interpreted in terms of correlation times for specific motions involving the *gem*-difluoromethylene group. The correlation times are shown to be consistent with ^{1}H and ^{13}C relaxation data of similar lipid bilayer systems. The data, however, prove to be particularly valuable in characterizing a motion on the time scale of translational diffusion.

CYTOCHROME *c* INDUCED LATERAL PHASE SEPARATION IN A DIPHOSPHATIDYLGLYCEROL-STEROID SPIN-LABEL MODEL MEMBRANE. G.B. Birrell and O.H. Griffith (Inst. of Molecular Biol. and Dept. of Chem., Univ. of Oregon, Eugene, Oregon 97403) *Biochemistry* **15**, 2925–9 (1976). The extrinsic membrane protein cytochrome *c* binds to lipid mixtures containing negatively charged phospholipids such as diphosphatidylglycerol (DPG). In this study the effect of cytochrome *c* on the lipid distribution in a DPG-steroid spin-label (3-doxyl-5α-cholestane) model membrane system is examined. The electron spin resonance (ESR) line-shape changes indicate that cytochrome *c* induces lateral phase separation at room temperature. The resulting two-dimensional lipid distribution is nonrandom, consisting of clusters of phospholipids bound to cytochrome *c* and patches of steroid spin-label molecules. Phase separations are also observed in the three-component system: DPG, phosphatidylcholine, and 3-doxyl-5α-cholestane.

LIGHT SCATTERING AND TURBIDITY MEASUREMENTS ON LIPID VESICLES. C.S. Chong and K. Colbow (Dept. of Physics, Simon Fraser Univ. Burnaby, B C. V5A 1S6, Canada) *Biochim. Biophys. Acta* **436**, 260–82 (1976). The dynamic behaviour of model membranes in the form of sonicated liposomes in excess water was studied by means of 90 °C light scattering and turbidity measurements. Computer calculations based on the Rayleigh-Gans theory of light scattering were used to estimate the average size of lipid vesicles dispersed in water, taking into account the various structures of the vesicles. Normal reversible changes in the scattered light intensity and turbidity with temperature could be accounted for mainly by the change in the refractive index of the lipid and

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irreversible anomalous changes were explained on the basis of fusion of smaller aggregated vesicles.

HYDROGENATION OF OILS AND FATS AFTER 50 YEARS. A.L. Markman. *Maslo-zhir. Promst.* **1975**(9), 16–8. On the occasion of fifty years of the Soviet Review of Fats and Oils (Maslo-zhir Promst.), professor Markman gives a retrospective on the subject of hydrogenation. He points out the importance of the use of the fixed catalyst. He also underlines the importance of nickel catalyst with other elements such as aluminum, copper, titanium, vanadium, zirconium, and others. On the question of hydrogenation temperature, the author mentions that mostly the process is done at 200–240C. The Combinat Tachkent has succeeded in decreasing the temperature to 140–150C. The author's opinion is that the temperature can be decreased even further to 40–50C, if hydrogenation is done in a solvent, such as hexane or heptane. (Rev. Fr. Corps Gras)

ABOUT THE USE OF THE ELECTRIC FIELD FOR THE REFINING OF SUNFLOWERSEED OIL IN THE MISCELLA. V.P. Konoplev et al. *Maslo-zhir Promst.* **1975**(10), 17–8. The development of extraction as a method for obtaining vegetable oils caused further study on refining of the oil in miscella. The method for oil refining in miscella now used needs improvement and the authors elaborated a new one applying the electric field. A similar method is used in petroleum industry, where the electrical field is used for the separation of water solution of soaps and washing water. The experiments have been done with miscella of sunflower oil; concentration of miscella 24.3%, acid value of oil 5.89. The neutralization is effected with the sodium hydroxide solution (20 g/l), the excess of NaOH at 30%, and the temperature at 33–35C. The neutralized miscella is washed with 5% of water in relation to the oil mass. The intensity of the field in electroseparator was 13–15 V/m; the time for the miscella in the electric field is about 7 min for neutralization stage and 5 min for washing stage. (Rev. Fr. Corps Gras)

CORRELATION BETWEEN CATALYST POTENTIAL AND COMPOSITION OF HYDROGENATED PRODUCTS OF SUNFLOWERSEED OIL. L.S. Golodova et al. *Maslo-zhir Promst.* **1975**(10), 18–9. The authors studied the modification of the composition of fatty acids and trans-acids in the process of oil hydrogenation, as a function of the variation of potential value of the stationary catalyst. The study has been done on the refined sunflowerseed oil. The hydrogenation is effected in the presence of a fixed nickel catalyst and palladium on alumina (0.1 and 1% of Pd) in ethanol at 60C and in acetone at 40C. The potentiometric curve with three sectors reflects the variation of the composition of fatty acids of oil submitted to hydrogenation. The first sector is up to an iodine value of 80 and corresponds to the selective hydrogenation of linoleic acid. The second sector of the potentiometric curve corresponds to simultaneous hydrogenation of glycerides with di- and monounsaturated acids. For hydrogenation of linoleic acid, the potential of the catalyst takes on a constant value (third sector). (Rev. Fr. Corps Gras)

INFRARED SPECTROSCOPY OF ANIMAL FATS. Ju. A. Lapshev. *Pishch. Tekhnol.* **1976**(1), 35–8. With infrared spectroscopy, it was possible to establish the presence of some oxidation products in the fresh rendered fat. The oxidation of animal fats is accompanied by an increase in the intensity of absorption curves and in the length of the basic lines. The author established the characteristic absorption curves for the fresh rendered animal fats. Pork and beef fat as well as fat from the bones were examined. With the help of the characteristic infrared absorption curves, it seems possible to evaluate the degree of quality modification of animal fats during their production and storage. (Rev. Fr. Corps Gras)

ABOUT THE PROBLEM OF THE EFFECTIVENESS OF TREATMENT OF THE ALMOND OF SUNFLOWERSEED OF LOW HULL CONTENT. Ju. P. Macuk et al. *Maslo-zhir. Promst.* **1975**(10), 10–5. The decrease of the hull content in the almond of sunflowerseed going to treatment improves the oil and meal quality. In this case, the yield of the extraction increases. The decrease of 1% of the hull content in the almond gives an increase in the factory yield of 2.5%. The authors recommend as the best that the hull content in the almond for treatment be about 3%. (Rev. Fr. Corps Gras)

ABOUT THE PROBLEM OF CATALYST SEPARATION IN ELECTROSTATIC FIELD. T.G. Titova et al. *Maslo-zhir. Promst.* **1975**(10), 19–20. In the Institute for food industry research of Krasnodar, a method for catalyst separation in an electrostatic field was elaborated. The authors verified the efficacy of this new method. The catalyst separation under the action of electrostatic field forces is effected with an optimum intensity constant of 100 V/m; the time of action of the field is 2 min at 170C. As a material for electroprecipitation of catalyst on the electrodes, citric acid was used. Of the 74 experiments done with this method, the residual nickel content for sunflowerseed oil was a maximum of 6.8 mg/kg, for cottonseed 6.2 mg/kg, and for soybean 10 mg/kg. (Rev. Fr. Corps Gras)

OBTAINMENT OF PURE STEARIC ACID. N.D. Klocko et al. *Maslo-zhir. Promst.* **1975**(10), 21–4. The authors elaborated a process for obtaining pure stearic acid without the use of solvent and the laborious procedure of recrystallization. The method is based on the following technological stages: complete hydrogenation of cottonseed or sunflowerseed oil, hydrolysis, fractional distillation of fatty acids until C_{16}, and obtainment of the sought after product from the residue by direct distillation. Using coriander oil as a raw material, the stage of rectification is eliminated. This method allows the lowering of the cost of the production of pure stearic acid by 80.5%. (Rev. Fr. Corps Gras)

TREATMENT OF CASTOR SEED IN THE FACTORIES OF MOLDAVIA. G.Ja. Stam et al. *Maslo-zhir. Promst.* **1975**(11), 10–2. From 1973, the treatment of castor seed is being done without hull separation, by the pre-pressing-extraction process. The loss of oil has decreased to 1.03%; hexane consumption is 12.2 kg per ton. Hydration of oil is not done any more; for purifying the oil only warm filtration of crude oil is applied which gives an oil with a phosphatide content up to 0.08% (calculated as stearooleolecithin). (Rev. Fr. Corps Gras)

ABOUT THE PROBLEM OF THE HYDROGENATION OF ACID OILS. N.D. Klocko et al. *Maslo-zhir. Promst.* **1975**(11), 17–20. The results of the work done by the authors show that the hydrogenation of acid oils for technical use can be done at 240C with a nickel-copper catalyst at a 15 kg/cm^2 pressure. Hydrogenation of acid oils without neutralization is economically important because sodium hydroxide and sulfuric acid were not used. The authors recommend this process for industrial application in the production of technical hydrogenated fats. (Rev. Fr. Corps Gras)

ABOUT THE POSSIBILITY OF REGENERATION OF USED VEGETABLE OIL. A.A. Taran et al. *Pishch. Tekhnol.* **1975**(5), 16–9. For this study, different bleaching earths were examined for regeneration of sunflowerseed oil after it was used for fish frying. It was found that used oil must be treated by neutralization (2 parts of used oil and 1 part of light essence with an excess of 400–500% of 10% KOH solution) and by bleaching with bentonite. In this way, it is possible to obtain an oil of edible quality. (Rev. Fr. Corps Gras)

MODIFICATION OF SOME PHYSICO-CHEMICAL VALUES OF MILK FAT DURING HEATING. E.G. Tocilovskaja et al. *Pisch. Tekhnol.* **1975**(6), 29–32. During the heating of milk fat, an increase of peroxide, carbonyl compounds and free fatty acids is observed. Heating for 3 to 24 hours results in maximum accumulation of peroxides and a large increase of carbonyl compounds and increased acid value. The constant decrease of the iodine value indicates a continual saturation of the unsaturated compounds of milk fat. The modifications in the chemical composition of milk fat during heating make the important modifications of the physical properties. (Rev. Fr. Corps Gras)

COMPOSITION OF FATS AND THEIR ABILITY FOR RISING THE DOUGH DURING BAKING OF BREAD. L.I. Poutchkova et al. *Pishch. Tekhnol.* **1976**(1), 55–9. The composition and properties of fats added to the dough have an influence on the quality of bread. The best results are obtained if a mixture of 90% sunflowerseed oil and 10% hydrogenated cottonseed oil whose melting point is 62.5C is added to the dough. The optimal dose is 3–5%. (Rev. Fr. Corps Gras)

COMPARATIVE ANALYSIS OF MARGARINES LOW IN CALORIES OF DOMESTIC AND FOREIGN PRODUCTION. V. Markovic et al. *Bilt. Biljna Ulja i Masti* **1974**(3/4), 13–5. In this paper, the production of margarine low in calories is described. Some principal values of quality for these products of domestic production are discussed and compared with the quality of some similar foreign products. (Rev. Fr. Corps Gras)

THERMOXIDATIVE CHANGES OF FRYING OIL AND DETERMINATION OF NEWLY FORMED COMPOUNDS. B. Ostric-Matijasevic et al. *Hrana Ishrana* 16, 124–30 (1975). Sunflower oil is heated at 175 ± 5C during 48 hours without and with 5 ppm of silicone "Antifoam FD-62." The results show that the additive effectively prevents thermooxidative changes of oil. The iodine value determination, refractive index at 40C, and the Guillaument method for newly formed compounds were used to examine the changes of frying oils. (Rev. Fr. Corps Gras)

STUDIES ON DERIVATIVES OF AROMATIC HYDROXYCARBOXYLIC ACIDS AS ANTIOXIDANT. I. THE PREPARATION OF GALLOYL GLYCEROL DERIVATIVES AND ITS ANTIOXIDANT ACTIVITY. M. Takasagao, K. Horikawa and S. Masuyama (The Osaka Municipal Technical Research Institute) *Yukagaku* 25, No. 1, 16–20 (1976). 1-Palmitoyl-3-(3′,4′,5′-trimethoxybenzoyl) glycerol (IV), 1-palmitoyl-3-galloyl glycerol (VII) and 1-galloyl glycerol (X) were prepared. The structures were confirmed by means of IR, NMR and chemical analysis. The antioxidation effect of these compounds for soybean oil has been evaluated by the A.O.M. and the Shaal Oven Tests. The effect of 1-galloyl glycerol was found to be much larger than that of propyl gallate.

STUDIES ON THE BEHAVIOR OF TRACE COMPONENTS IN OILS AND FATS DURING PROCESSING FOR EDIBLE USE. I. REMOVAL OF ORGANOCHLORINE PESTICIDES AND POLYCHLORINATED BIPHENYLS FROM OILS AND FATS BY PROCESSING FOR EDIBLE USE. H. Kanematsu, T. Maruyama, I. Nhya and M. Imamura (Japan Institute of Oils and Fats, Other Foods Inspection, Foundation, Tokyo) H. Mizutani and Z. Morita (Ueda Oils and Fats Manufacturing Co., Ltd., Kobe), and T. Matsumoto (College of Science and Technology, Nihon University, Tokyo). *Yukagaku* 25, No. 1, 38–41 (1976). Edible oil added with five kinds of organochlorine pesticides and PCB was submitted to deacidification, decolorization and deodorization under laboratory conditions, and the amounts of the organochlorine pesticides and PCB in the oil were determined immediately after each process. Results obtained from these experiments are as follows: (1) Concentration of organochlorine pesticides and PCB in the oil remained almost unchanged after deacidification irrespective of the amount of sodium hydroxide used. (2) Dieldrin concentration in the oil decreased markedly by use of activated clay for decolorization, but the concentration of BHC isomers, DDT related substances and PCB hardly decreased. The use of an absorbent which contains activated carbon gave the result similar to that obtained by the use of activated clay, but the concentration of PCB clearly decreased. (3) The higher the temperature of deodorization treatment, organochlorine pesticides and PCB concentration markedly decreased and deodorization at a temperature usually used in factories would completely remove these chemicals. It was assumed that in this process BHC isomers will be removed from the oil at a lower temperature than DDT related substances. (4) Hydrogenation using nickel catalyst was carried out on some of the oil and this was found to decrease the amount of γ-BHC, pp′-DDT and Dieldrin rather than β-BHC and pp′-DDE, but there was almost no decrease in the amount of PCB.

STUDIES ON THE BEHAVIOR OF TRACE COMPONENTS IN OILS AND FATS DURING PROCESSING FOR EDIBLE USE. II. VARIATION IN THE AMOUNT OF PCB AND ORGANOCHLORINE PESTICIDES DURING HYDROGENATING PROCESS. H. Kanematsu, T. Maruyama, I. Nhya, M. Imamura (Japan Institute of Oils and Fats, Other Foods Inspection, Foundation, Tokyo) K. Suzuki, Y. Kutsuwa, I. Murase (Asahi Electro Chemical Co., Ltd. Tokyo), and T. Matsumoto (College of Science and Technology, Nihon University, Tokyo) *Yukagaku* 25, No. 1, 42–6 (1976). Five kinds of organochlorine pesticides and PCB were added to purified soybean oil and the oil was hydrogenated in a 20 l autoclave under 11 different conditions, varying the amount of the catalyst, reaction temperature, and hydrogen gas concentration, but giving oils with almost the same melting points of ca. 35° C. The amounts of residual organochlorine pesticides and PCB were determined and change of the amount of these chemicals by hydrogenation condition was examined. (1) Amounts of these chemicals decreased markedly by hydrogenation but the degree of decrease was not uniform, there being a selectivity between the kind of catalyst used and the kind of organochlorine pesticide removed. The decrease was larger when the catalyst contained copper or chromium. DDT, Dieldrin and γ-BHC were removed almost completely. (2) PCB also decreased by hydrogenation like the organochlorine pesticides and this decrease was especially great when the catalyst contained copper or chromium. A high residual rate was found when hydrogenation was carried out under a high pressure, using nickel catalyst alone, showing almost no removal of PCB. (3) Taking the decrease of organochlorine pesticides and PCB as a simple first order reaction, reaction rate constants under various hydrogenation conditions were calculated and they were found to be larger under high-pressure than under atmospheric pressure. This result suggested that the decrease of organochlorine pesticide and PCB during hydrogenation was due to the chemical changes such as reduction and dechlorination rather than their evaporation out of the reaction system.

THE PHOTO-INDUCED ADDITION OF ACETIC ACID TO OLEFINS. Y. Suhara (National Chemical Laboratory for Industry, Tokyo) *Yukagaku* 25, No. 2, 75–8 (1976). The photo-induced addition of acetic acid to ethylene gave butyric acid. Small amounts of hexanoic, octanoic, 2-ethylbutyric, and 2-ethylhexanoic acids, and neutral substances were also formed. The presence of a small amount of di-tert,-butyl peroxide was effective to form butyric acid. Main neutral substances were dibutyl and di (2-ethylhexyl) phthalates. A straight-chain saturated fatty acid was also obtained in an excellent conversion of a 1-olefin by the photo-induced addition of acetic acid to the 1-olefin [*acetic acid:1-olefin, 200:1(mol)*]. It was assumed that a ketone and an ester(s) were present in the by-products.

STUDIES ON THE RELATIONSHIP BETWEEN THE NUTRITIVE VALUE AND THE STRUCTURE OF POLYMERIZED OILS. X. Structures AND TOXICITY OF HEAT-POLYMERIZED OILS. 1. M. Saito and T. Kaneda (Dept. of Food Chemistry, Facutly of Agriculture, Tohoku University, (Sendai) *Yukagaku* 25, No. 2, 79–86 (1976). It is known that polymerized oils heated in the inert gas showed toxicity to rats. The toxic components in those oils were presumed to be the monomeric cyclic fatty acids. But little knowledge has been obtained on the exact structure of them. A series of studies was performed to know more detailed structure and biological properties of these cyclic fatty acids. Linseed oil heated in the nitrogen atmosphere was converted to methyl esters and subjected to distillation under reduced pressure. The distillate was treated with urea and fractionated into urea adduct and non-adduct-forming fractions. The latter was found to be toxic in a mouse bioassy. This fraction was converted to Bromo-Mercuri-Methoxy (BMM) adducts and chromatographed by silicic acid. After fractionation, the methoxy and bromo mercury groups were eliminated and recovered the original esters. The toxic study indicated that the fraction eluted with petroleum ether: dioxane (90:10) (Fr. III) was found to be the most toxic to mice. In order to concentrate the toxic substances, BMM adducts were reformed from Fr. III and rechromatographed by successive elution with dioxane in petroleum ether in the ratio of 2:98 (Fr. III-A), 5:95 (Fr. III-B) and 10:90 (Fr. III-C). The results indicated that the Fr. III-B was the most toxic followed by the Fr. III-A and Fr. III-C. Subsequent analysis with the aid of GC-MS indicated that these toxic compounds had the skeleton of methyl 7-(2′-n-propyl-cyclohexyl) nonanoate and methyl 6-(2′-n-butyl-cyclohexyl) octanoate and containing two double bonds.

AN EVALUATION OF DISPERSING AGENTS IN AEROSOL FORMULATIONS. I. SYNTHETIC ESTERS. J.J. Sciarra (Brooklyn Coll. Pharmacy, Long Island Univ., Brooklyn, N.Y. 11216). *J. Soc. Cosmt. Chem.* 27(5), 209–20 (1976). Study is concerned with determining the effect that various dispersing agents have upon the suspension and redispersibility of several solids commonly used in aerosol formulations. Talcum, starch, and aluminum chlorohydroxide were used with various dispersing agents (including isopropyl isostearate, propylene glycol dipelargonate, 2-ethylhexyl pelargonate methyl myristate, propylene glycol monoisosterate, isopropyl myristate, and hexadecyl alcohol). The effect of these materials upon the different formulations was determined by a study of the rate of settling and redispersibility of the product. Further attention was given to the relationship between the overall usefulness of the dispersing agent in these formulations and its chemical structure. The solubility in several commonly used propellants of each of the fluids studied was also observed. In general formulations containing the less polar dispersing agents settle rapidly, redisperse easily, and do not cake, while formulations containing the more polar compounds tend to behave in the opposite manner.

INVESTIGATIONS OF CHANGES IN THE BIOLOGICALLY ACTIVE COMPLEX OF SUNFLOWER OIL, LARD AND BUTTER UNDER THE INFLUENCE OF GAMMA RADIATION. St.A. Ivanov and D.

Stamatov (Plovdiver Univ. "P. Hilendarski," Bulgaria). *Seifen, Ole, Fette, Wachse* 102(6), 145–8 (1976). Points examined are the effect of small, medium and large doses (10^4, 10^6 and 10^7 Rad) of gamma rays (Co^{60}) and the after-effect on the carotenes, tocopherols, sterols and linoleic acid in sunflower oil, lard and butter. Under these conditions, only the carotenes and tocophenols are subjected to changes to the point of destruction. What was found is a good correlative connection between the changes in the tocopherols and the degree of oxidation of the corresponding fats.

SOLUBILIZATION OF ESSENTIAL OILS WITH POLYOXYETHLENE GLYCERYL FATTY ESTERS. IV. THE USE OF SOLVENT COUPLERS IN THE PREPARATION OF PHARMACEUTICALS. K. Thoma and G. Pfaff (Inst. for Galenische Pharmacy, Johann-Wolfgang-Goethe- Univ., D-6 Frankfurt am Main). *J. Soc. Cosmet. Chem.* 27(5), 221–34 (1976). The utility of polyoxyethylene glyceryl fatty esters for the solubilization of essential oils was examined. The results with peppermint, lavender, anise, and clove oils are represented with the aid of phase diagrams. The surfactants' ability to solubilize these oils improves when the carbon chain of the fatty acids is shortened and when the polyoxyethylene chain length is increased.

FRYING GREASE RECLAIMER. K.S. Lee. *U.S. 3,970,558.* The system comprises a number of tanks, valves, and a pump designed to filter the frying oil.

WATER SOLUBLE TRIGLYCERIDE COMPOSITIONS. R.J. Sturwold and F.O. Barrett (Emery Industries, Inc.). *U.S. 3,970,569.* An aqueous lubricating composition comprises an aqueous solution of a water soluble mixed ester product obtained by the single step transesterification of 5–35% of a triglyceride oil, 60–85% of a polyoxyethylene glycol having an average molecular weight of 400–800, and 1–20% of a hydrocarbyl carboxylic acid containing 1 or 2 carboxyl groups and 2–12 carbon atoms. The solution is clear at room temperature but has a distinct cloud point above 95 F.

DETERMINATION OF AMINE OR AMIDE NITROGEN CONTENT OF VEGETABLE OIL. J.C. Kuck (U.S. Secy. of Agriculture). *Defensive Patent T948,011.* Minute amounts of nitrogen in amines or amides in vegetable oils are determined. The oil is subjected to lengthy and multiple refluxes with aqueous ethanol and HCl each followed by separation of the aqueous layer. The collected bottom layers are digested by the Kjeldahl method, titrated with 0.1 N NaOH, and the percentage nitrogen extracted is calculated. The method is useful in detecting and measuring traces of toxic substances in vegetable oils.

WHIPPED SALAD DRESSING. L.P. Goodman (Krafteo Corp.). *U.S. 3,968,261.* A dry, particulate composition which when reconstituted and whipped is adapted for blending with pourable salad dressings to provide a whipped salad dressing comprises a hard fat having an SFI of 50–70 at 70 F, a liquid oil, monoester whipping agent, a proteinaceous film forming agent, and a hydrocolloid. The ratio of hard fat to liquid oil is 1 : 1 to 1 : 2, and both are encapsulated in the proteinaceous film forming agent.

PROCESS FOR PREPARING POLYGLYCEROL. P. Seiden and J.B. Martin (Procter & Gamble). *U.S. 3,968,169.* A process for preparing linear polyglycerol comprises (a) heating glycerol at 110–180 C and pressures below 400 mm in the presence of 0.03–3% sulfuric acid and 0.1–10% of a glyceride compound of the general formula $(R_4COO)_nC_3H_5(OH)_{3-n}$ until 25–75% of the glycerol is polymerized; (b) inactivating the sulfuric acid with a stoichiometric amount of a neutralizing agent; and (c) removing the unreacted glycerol by distillation.

PHOSPHATIDE SEPARATION. R. Aneja and J.S. Chadra (Lever Bros Co.). *Reissue patent Re. 28,903.* A process for separating an N-acylcephalin and a phosphatide without an acylatable amino group from a mixture comprises adding a sufficient amount of an acid to provide the equivalent of pH less than 3.5 under aqueous conditions, extracting the mixture with acetone or methyl acetate, and separating the phases containing the N-acylcephalin and the phosphatide without an acylatable amino group.

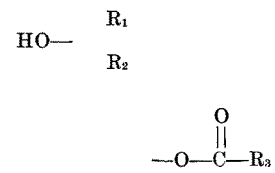
COOKING OIL RECOVERY SYSTEM. A.J. Hunt. *U.S. 3,968,741.* The system comprises the cooking container, circulating pump, filters, acidity adjustment system, and pH monitoring system.

METHOD FOR LOWERING THE MINIMUM POUR TEMPERATURE OF FATTY ACIDS. E.S. Poklacki (Borg-Warner Corp.). *U.S. 3,969,253.* The method comprises mixing into 100 parts of the fatty acids 5–50 parts of at least one 2–18 carbon atom acyclic amine selected from the group consisting of $R_1R_2R_3N$ and $R_1R_2NR_4NR_1R_2$. R_1, R_2, and R_3 are independently selected from the group H and C_1–C_6 lower alkyl, and R_4 is a C_1–C_6 alkalene radical.

FLAME-RETARDANT SOFTENING AGENTS. P.M. Hay (Sandoz, Inc.). *U.S. 3,969,231.* The agents are produced by reacting a phosphate compound of the formula $(BrCH_2CHBrCH_2O)_3PO$ with the reaction product of a fatty acid and a polyamine.

PROCESS FOR THE SIMULTANEOUS HYDROGENATION AND DEODORIZATION OF FATS AND OILS. K. Zosel (Studiengesellschaft Kohle m.b.H.). *U.S. 3,969,382.* The process comprises contacting the fat or oil with carbon dioxide in an amount effective for the deodorization and containing hydrogen in an amount effective for the hydrogenation at 100–250 C, 150–300 atmospheres pressure, and in the presence of a hydrogenation catalyst.

FAT COMPOSITIONS STABILIZED WITH ESTERS OF FATTY ACIDS AND TERTIARY LOWER ALKYL SUBSTITUTED HYDROQUINONES. M. Dexter and J.B. Peterson (Ciba-Geigy Corp.). *U.S. 3,969,383.* There is claimed a compound of the formula



R_1 is an alkyl of 1–8 carbon atoms; R_2 is a tertiary alkyl of 4–8 carbon atoms; and R_3 is alkyl of 11–12 carbon atoms.

APPARATUS FOR DEODORIZING OIL. A. Athanassiadis (Extraction de Smet). *U.S. 3,966,559.* The claimed improvement comprises a series of independently-controlled compartments in which the oil is treated, all within a larger column. In addition to being independently temperature controlled, each compartment can be independently filled and emptied.

VEGETABLE OIL EMULSION. J.A. Colliopoulos and N.S. Yanick (G. D. Searle & Co.). *U.S. 3,966,632.* A water in oil emulsion comprises 91–98% soybean oil, 1–5% water, and 1–4% esters of a mixture of di-, tri-, and tetra-polyglycerols and 12-hydroxy-9-octadecenoic acid. The esters have a saponification value of 165–169.

RECOVERY OF TALL OIL SOAPS. R.V. Gossage (Nalco Chemical Co.). *U.S. 3,966,698.* A method for the separation of tall oil soaps from Kraft black liquor in the manufacture of paper pulp comprises treating the Kraft black liquor with an aqueous solution of sodium lignosulfonate containing sodium hydroxide, rendering the tall oil soaps insoluble, and removing the insoluble soaps by skimming.

BIODEGRADABLE INTERNAL COMBUSTION ENGINE LUBRICANTS AND MOTOR FUEL COMPOSITIONS. W.J. Lucas. *U.S. 3,969,253.* A hydrocarbon oil-miscible and water-miscible, biodegradable lubricant composition consists of at least two components selected from groups (a), (b), and (c) and at least one component selected from groups (d), (e), and (f). (a) Higher carboxylic acids selected from fatty acids, rosin acids, naphthenic acids, or tall oil acids. (b) Lower alkyl amines, lower alkanol amines, and hydrocarbyl monocarbocyclic primary amines. (c) Ammonium and amine soaps of the higher fatty acids. (d) Polyloweralkyleneoxy esters of higher carboxylic acids. (e) Polyloweralkyleneoxy esters or ethers of polyhydric alcohols, sugars, or sugar acids. (f) At least 20% of a water-miscible solvent. The motor fuel composition contains 0.1–5,000 gallons of the biodegradable composition per 1,000 barrels of gasoline.

COMPREHENSIVE EVALUATION OF FATTY ACIDS IN FOODS. VII. PORK PRODUCTS. B.A. Anderson (Consumer and Food Economics Inst., A.R.S., U.S.D.A., Hyattsville, Md.). *J. Am. Diet. Assoc.* 69, 44–9 (1976). This paper is another in the series of reports summarizing the results of a critical review of analytical data on lipids and fatty acids in foods published since 1960. Fatty acid data are given for various cuts of meat, organs, and pork sausages and luncheon meats. In addition, mean fatty acid composition data are presented for separable lean tissue, separable fat tissue, brains, heart, kidney, and liver. Of the factors affecting pork lipid com-

position, diet of the animal was found to have a major influence. Few differences were found in the grams fatty acid per 100 g fat in meat from loin, belly, leg, and shoulder. However, the four organ meats contain less total fatty acids per 100 g of fat and are richer sources of polyunsaturated fatty acids than are skeletal muscle or adipose tissue. Some data on fatty acid composition of pork from sources other than the U.S. and Canada and of sausages containing beef and pork are also given.

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INTERACTIONS OF THE CHOLESTEROL SIDE-CHAIN WITH EGG LECITHIN. A SPIN LABEL STUDY. K.E. Suckling and G.S. Boyd (Dept. of Biochem., Univ. of Edinburgh Med. Schl., Teviot Place, Edinburgh EH8 9AG, U.K.) *Biochim. Biophys. Acta* **436**, 295-300 (1976). The effect in egg lecithin liposomes of cholesterol and cholesterol analogues with side-chains of reduced length on the order parameters of two steroid spin labels has been studied. Analogues with side-chains shorter than cholesterol by more than three carbons cause significantly less ordering than cholesterol. Liposomes containing a cholesterol analogue in which the side-chain is absent cause very little increase in the ordering of a new sterol spin label in which the nitroxide is incorporated into the side-chain. The results suggest that the sterol side-chain exerts a great influence on membrane rigidity within its immediate environment.

INTERACTION OF MORPHINE WITH CHOLESTEROL MONOLAYERS. J.P. Huidobro-Toro, M. Canessa and S. Fischer (Dept. of Physio. and Biophysics, Schl. of Med., Univ. of Chile, Santiago, Chile) *Biochim. Biophys. Acta* **436**, 237–41 (1976). It appears that a first step in the pharmacological response to a narcotic drug involves a stereochemical interaction of the opiate to a membrane component. The binding of narcotic drugs to a receptor substance present primarily in the synaptic membrane fraction from brains of different animal species, as first described by Pert and Snyder, has aroused much interest in the molecular mechanism of action of the opiates. To study the effects of morphine on a model membranes system, we investigated the interaction of morphine with cholesterol monolayers. This methodology seemed appropriate since drugs that are thought to produce their pharmacological effect through modification of membrane components have been observed to affect artificial lipid membranes.

LIPID-PROTEIN INTERACTIONS IN MEMBRANE MODELS FLUORESCENCE POLARIZATION STUDY OF CYTOCHROME b_5-PHOSPHOLIPIDS COMPLEXES. J.-F. Faucon, J. Dufourcq, C. Lussan and R. Bernon (Centre de Recherche Paul Pascal, Domaine Univ., 33405, Talence, France) *Biochim. Biophys. Acta* **436**, 283–94 (1976). According to previous authors, cytochrome b_5, when extracted from bovine liver by a detergent method, is called cytochrome *d*-b_5. On the other hand, the protein obtained after trypsin action, which eliminates an hydrophobic peptide of about 54 residues, is called cytochrome *t*-b_5 Fluorescence polarization of the dansyl phosphatidylethanolamine probe inserted into phospholipid vesicles is very sensitive to the binding of proteins, and so is a useful method to study lipid-protein interactions. Phosphatidylserine and phosphatidylinositol do not interact at pH 7.7 with cytochrome *d*-b_5, because electrostatic forces prevent formation of complexes. At low pH, the interaction with the protein occurs, but the binding is mainly of electrostatic nature.

EFFECT OF DIETHYLSTILBESTROL, ASCORBIC ACID AND VITAMIN E ON SERUM LIPID PATTERNS. R.E. Clegg, C.F. Klopfenstein and W.E. Klopfenstein (Dept. of Biochem., Kansas State Univ.) *Poult. Sci.* **55**, 1104–11 (1976). The effects of relatively high concentrations of vitamin C, vitamin E and diethylstilbestrol, and various combinations of cholestyramine and diethylstilbestrol on the lipid composition of chicken serum were studied. After DES injection (at concentrations as low as 1 mg./day for 7 days), levels of triglycerides, phospholipids and cholesterol were much higher, the effect being much more pronounced in the hens. Cholestyramine caused a fourfold decrease in cholesterol in females, a 25% reduction in males. DES consistently caused a redistribution of the esterified fatty acids, increasing the percentage of oleic and reducing percentages of stearic and linoleic acids. Preparative TLC analysis of all constituents showed other variations in fatty acid composition, but there was no other common pattern of change. Vitamin E in the diet caused a significant rise in triglycerides and phospholipids in DES treated birds. When vitamin E and C were fed, triglyceride and phospholipid values decreased. Cholesterol concentration did not vary significantly. With birds receiving both vitamins, diethylstilbestrol seemed to have less effect in causing the shift to increased percentage of oleic acid in the total esterified fatty acids.

ENZYMATIC PROBES OF LIPOPROTEIN STRUCTURE. HYDROLYSIS OF HUMAN SERUM LOW DENSITY LIPOPROTEIN-2 BY PHOSPHOLIPASE A_2. L.P. Aggerbeck, F.J. Kezdy and A.M. Scanu (Depts. of Biochem. and Med., the Univ. of Chicago Pritzker Schl. of Med. and the Franklin McLean Memorial Res. Inst., Chicago, Ill 60637) *J. Biol. Chem.* **251**, 3823–30 (1976). Pure phospholipase A_2 from *Crotalus atrox* is able to hydrolyze all the phosphatidylcholine, phosphatidylserine, and phosphatidylethanolamine of human serum low density lipoprotein (LDL_2). In accord with the substrate specificity of the enzyme, sphingomyelin, other minor lipids and proteins are not hydrolyzed. The enzyme-modified particles remain water-soluble and, upon reisolation, contain all of the lysophospholipids and free fatty acids produced during the reaction. By electron microscopic, circular dichroic, analytical ultracentrifugal, immunologic, and small angle x-ray scattering techniques, the enzyme-modified particles exhibit only modest changes when compared with native LDL_2. Accumulation of negative charges on the lipoprotein during hydrolysis results in the repression of ionization of the free fatty acid products. These results suggest that phospholipase A_2-hydrolyzable phospholipids are located at the surface of the LDL_2 particle and are in a fluid state. Hydrolysis by phospholipase A_2 causes no significant changes in the basic structural features of the particle even after the partial loss of free fatty acids and lysophospholipids to albumin. The availability of stable and well characterized LDL_2 derivatives may be useful for further studies aimed at an understanding of the mode by which proteins and lipids interact in lipoproteins.

STUDIES ON TETRAHYMENA MEMBRANES IN VIVO MANIPULATION OF MEMBRANE LIPIDS BY 1-*O*-HEXADECYL GLYCEROL-FEEDING IN TETRAHYMENA PYRIFORMIS. H. Fukushima, T. Watanabe and Y. Nozawa (Dept. of Biochem., Gifu Univ. Schl. of Med., Tsukasamachi 40, Gifu, Japan) *Biochim. Biophys. Acta* **436**, 249-59 (1976). *Tetrahymena pyriformis* NT-I cells were grown in the medium supplemented with 1-*O*-hexadecyl glycerol which is the precursor for alkyl ether-containing phospholipids; choline phosphoglyceride and 2-aminoethylphosphonolipid, and alterations in the plasma membrane and microsome lipid composition were examined. No incorporation of supplemented 1-*O*-hexadecyl glycerol was seen in ethanolamine phosphoglyceride. The fatty acyl chain composition of phospholipids, especially ethanolamine phosphoglyceride, of the hexadecyl glycerol-fed plasma membranes and microsomes was found to be significantly different from that of the native membranes. These results may indicate that marked alterations in polar headgroup as well as fatty acyl chain composition of membranes induced by glyceryl ether-feeding would be required for maintaining proper membrane fluidity.

POSSIBLE RELATIONSHIP BETWEEN MEMBRANE PROTEINS AND PHOSPHOLIPID ASYMMETRY IN THE HUMAN ERYTHROCYTE MEMBRANE. C.W.M. Haest and B. Deuticke (Abteilung Physiologie, Medizinische Fakultat, Technische Hochschule Aachen, D-51 Aachen, G.F.R.) *Biochim. Biophys. Acta* **436**, 353–65 (1976). After incubation of human erythrocytes at 37° C in the absence of glucose for 24 hr, and for 4 hr with 8 mM hexanol or for 3 hr with SH reagents, phosphatidylethanolamine becomes partly susceptible to hydrolysis by phospholipase A_2 from *Naja Naja*. The presence of glucose during the pretreatments suppresses this effect, except in the case of SH reagents that inhibit glycolysis. After incubation with tetrathionate, up to 45% of the phosphatidylethanolamine is degraded by the enzyme, an amount considerably in excess of the 20% attacked in fresh erythrocytes. It is postulated that disulfide bond formation between membrane protein SH groups leads to an alteration in protein-phospholipid interactions and consequently induces a reorientation of phospholipids between the inner and the outer membrane lipid layer.

PHOSPHATIDIC ACID PHOSPHATASE AND PHOSPHOLIPASE A ACTIVITIES IN PLASMA MEMBRANES FROM FUSING MUSCLE CELLS. C. Kent and P.R. Vagelos (Dept. of Biol. Chem., Div. of Biol. and Biomed. Sci., Washington Univ., St. Louis, Mo 63110) *Biochim. Biophys. Acta* **436**, 377–86 (1976). Plasma membranes from fusing embryonic muscle cells were assayed for phospholipase A activity to determine if this enzyme

plays a role in cell fusion. The membranes were assayed under a variety of conditions with phosphatidylcholine as the substrate and no phospholipase A activity was found. The plasma membranes did contain a phosphatidic acid phosphatase which was optimally active in the presence of Triton X-100 and glycerol. The enzyme activity was constant from pH 5.2 to 7.0, and did not require divalent cations. Over 97% of the phosphatidic acid phosphatase activity was in the particulate fraction. The subcellular distribution of the phosphatidic acid phosphatase was the same as the distributions of the plasma membrane markers, $(Na^+ + K^+)$-ATPase and the acetylcholine receptor, which indicates that this phosphatase is located exclusively in the plasma membranes. There was no detectable difference in the phosphatidic acid phosphatase activities of plasma membranes from fusing and non-fusing cells.

TRANSBILAYER PHOSPHOLIPID ASYMMETRY AND ITS MAINTENANCE IN THE MEMBRANE OF INFLUENZA VIRUS. J.E. Rothman, D.K. Tsai, E.A. Dawidowicz and J. Lenard (Dept. of Biol. Chem. and the Biophys. Lab., Harvard Med. Schl., Boston, Mass. 02115) *Biochemistry* **15**, 2361–70 (1976). Two phospholipid exchange proteins and two phospholipases C have been employed to determine the phospholipid composition of the outer surface of the membrane of influenza virus. These four protein probes have defined the same accessible and inaccessible pool for each viral phospholipid. Phospholipids which are exchangeable or hydrolyzable are located on the outer surface, whereas the inaccessible pool is located at the inner surface of the viral bilayer. The two pools are unequal in size, with ca. 30% of the total phospholipid accessible to the four proteins, and ca. 70% inaccessible. The membrane is thus highly asymmetric with regard to the amount of phospholipid on each side of the membrane. There is also a marked asymmetry of phospholipid composition. Because animal cells in culture do not incorporate extracellular phospholipid, our results demonstrate that individual cells have the capacity to generate asymmetric membranes.

PURIFICATION AND CHARACTERIZATION OF HUMAN PLASMA LECITHIN:CHOLESTEROL ACYLTRANSFERASE. J.J. Albers, V.G. Cabana and Y.D. Barden Stahl (Dept. of Med., Div. of Metabolism and Gerontology, and Biochem. and Northwest Lipid Res. Clin., Univ. of Washington Schl. of Med., Harborview Med. Center, Seattle, Washington 98104) *Biochemistry* **15**, 1084–6 (1976). A highly purified (approximately 12,000-fold) homogeneous preparation of human plasma lecithin: cholesterol acyltransferase (LCAT) with 16% yield was obtained by a combination of density ultracentrifugation, high density lipoprotein affinity column chromatography, hydroxylapatite chromatography, and finally chromatography on anti-apolipoprotein D immunoglobulin-Sepharose columns to remove apolipoprotein D. This enzyme preparation was homogeneous by the following criteria: a single band by polyacrylamide gel electrophoresis in 8 M urea; a single band on sodium dodecyl sulfate gel electrophoresis with an apparent molecular weight of 68,000 ± 1,600; a single protein peak with a molecular weight of 70,000 on a calibrated Sephadex G-100 column. Its amino acid composition was different from human serum albumin and all other apoproteins isolated from lipoprotein fractions.

THE EFFECT OF SHORT CHAIN FATTY ACIDS ON TRANSMURAL ELECTRICAL POTENTIAL ACROSS RAT SMALL INTESTINE IN VIVO. M.J. Wall, R.J. Declusin, K.H. Soergel and R.D. Baker (Clin. Physio. Section, Dept. of Physio. and Dept. of Med., The Med. Coll. of Wisconsin, Milwaukee, Wisc.) *Biochim. Biophys. Acta* **433**, 654–61 (1976). Short chain fatty acids suddenly produce a phasic increase in transmural electrical potential difference (PD) when placed in the lumen of rat small intestine in vivo. With concentrations of propionate ranging from 50 μM to 1,000 μM the amplitude of the response in jejunum is about 5.5 mV. The concentration giving half this effect is about 20 μM. With 10 mM propionate the duration of the response is 3–5 min; after this, PD again equals the control value and the gut is refractory to further additions. Removing propionate from the mucosal surface produces no change in PD, but does restore responsiveness to subsequent exposure to short chain fatty acids. This effect is independent of a variety of other alterations in PD such as those caused by sugars, amino acids, bile salts, theophylline, prostaglandins, and ATP. Mechanism and significance of this surprisingly sensitive response remain obscure.

THE LIMITED DEPLETION OF CHOLESTEROL FROM ERYTHROCYTE MEMBRANES ON TREATMENT WITH INCUBATED PLASMA. M.H.

Gottlieb (Natl. Inst. of Arthritis, Metabolism and Digestive Diseases, Natl. Insts. of Health, Bethesda, Md. 20014) *Biochim. Biophys. Acta* **433**, 333–43 (1976). About 35% of the cholesterol of human erythrocyte membranes can be removed by the "preincubated plasma" technique, in which erythrocytes are extracted with plasma that has been preincubated to esterify a portion of its lipoprotein cholesterol. The limitation on the cholesterol depletion is shown not to be a result of insufficient plasma capacity to take up additional cholesterol or of changes in the plasma during the extraction. The maximal cholesterol depletion was unaffected by a number of modifications of the extracting preincubated plasma: addition of lysolecithin or albumin, dialysis against isotonic buffer, and variation in pH of the preincubated plasma from 6.0 to 9.0. It is concluded that the limitation on the cholesterol depletion is a result of a firm binding of the remaining cholesterol.

EFFECT OF TRITON X-100 ON THE HYDROLYSIS OF SPHINGOMYELIN BY SPHINGOMYELINASE OF RAT BRAIN. S. Yedgar and S. Gatt (Lab. of Neurochem., Dept. of Biochem., Hebrew Univ.-Hadassah Med. Schl., Jerusalem, Israel) *Biochemistry* **15**, 2570–3 (1976). Mixed dispersions of the nonionic detergent Triton X-100 and sphingomyelin were used as substrate for sphingomyelinase of rat brain. The dependence of the rate of hydrolysis on the concentration of sphingomyelin was measured in two ways: at a fixed concentration of Triton X-100 or at varying concentrations of this detergent, while maintaining a fixed molar ratio of Triton X-100 to sphingomyelin. In either case, the v vs. S curves deviated from the hyperbolic shape predicted by the Michaelis-Menten kinetic theory. These deviations are discussed and interpreted on the basis of the physicochemical properties of the mixed dispersions of detergent and lipid studied in previous papers.

THE INFLUENCE OF TURMERIC AND CURCUMIN ON CHOLESTEROL CONCENTRATION OF EGGS AND TISSUES. K. Keshavarz (Dept. of Animal Sci., College of Agr., Pahlavi Univ., Shiraz, Iran) *Poult. Sci.* **55**, 1077–83 (1976). An experiment was conducted in order to study the hypocholesteremic effect of turmeric and its coloring principle namely curcumin both in the presence and absence of dietary cholesterol. Laying hens were used as the experimental animals and they were fed the experimental diets for a duration of 8 weeks. The results of the experiment showed that turmeric or various levels of curcumin had no adverse effect of egg production, egg weight and feed to egg ratio. Moreover turmeric or various levels of curcumin both in the presence and absence of dietary cholesterol did not reduce the fat or cholesterol levels of plasma, liver or the egg yolk. An interesting finding from this experiment was that the egg yolk cholesterol levels of cholesterol fed groups sharply increased at the beginning of the experiment, and thereafter they gradually decreased and tended to approach the normal levels at the termination of the experiment. The possible reasons for variation in egg yolk cholesterol levels of cholesterol-fed groups with time is discussed.

CHOLESTEROL CONTENT AND STEROL SYNTHESIS IN HUMAN SKIN FIBROBLASTS AND RAT AORTIC SMOOTH MUSCLE CELLS EXPOSED TO LIPOPROTEIN-DEPLETED SERUM AND HIGH DENSITY APOLIPOPROTEIN/PHOSPHOLIPID MIXTURES. O. Stein, J. Vanderhoek and Y. Stein (Lipid Res. Lab., Dept. of Med. B, Hadassah Univ. and Dept. of Experimental Med. and Cancer Res., Hebrew Univ.-Hadassah Med. Schl., Jerusalem, Israel) *Biochim. Biophys. Acta* **431**, 347–58 (1976). Confluent cultures of human skin fibroblasts and rat aortic smooth muscle cells were shown to lose 15–27% of their cellular cholesterol upon replacement of the fetal calf serum with human high density lipoprotein (50 μg cholesterol/ml) or lipoprotein-depleted serum at a concentration equivalent to 40% whole serum. Addition to the latter medium of high density apolipoprotein/phospholipid mixtures resulted in further enhancement of cellular cholesterol loss which was evident by 12 hr of incubation. Human skin fibroblasts that had been enriched in cholesterol by previous incubation with low density lipoprotein lost their cholesterol in the presence of a high density apolipoprotein/sphingomyelin mixture as readily as non-enriched cells. Concomitant with the marked cholesterol depletion there was a stimulation of sterol synthesis from acetate. It is suggested that the native cholesterol "acceptor" in the lipoprotein-depleted serum is an apolipoprotein which under the experimental conditions can form a complex with phospholipids and might also represent the physiological cholesterol "acceptor" in peripheral lymph.

CONTRIBUTION OF INTERMUSCULAR FAT TO LIPOGENESIS FROM DIETARY GLUCOSE CARBON IN MICE. R. Kannan, D.L. Palmquist and N. Baker (Radioisotope Res., Vet. Adm. Wadsworth Hosp. Ctr., Los Angeles, Calif. 90073) *Biochim. Biophys. Acta* **431**, 225–32 (1976). We assessed the contribution of various tissues to the synthesis of fat from glucose carbon in mice during rapid lipogenic activation induced by a glucose test meal. Nibbling and gorging mice were maintained on a 58% glucose, fat-free diet. The mice were fasted 22 hr and refed 5–10 μCi [U-^{14}C] glucose (120 mg/20 g body weight) either by gastric intubation or as a test meal (58% glucose diet). The muscular carcass in both nibblers and gorgers contained more than 75% of the total radioactivity in the fatty acids derived from glucose; liver and epididymal fat pad accounted for only a small percentage. More than half the carcass activity was in the "muscular" tissue as neutral lipid acids. The fatty acid moiety of the triacylglycerols had the major portion of the label in the popliteal fat 2 and 6 hr after ingestion of the glucose test meals. The diacylglycerol pool was active at 2 hr and its activity faded at 6 hr implicating its intermediary role in lipid metabolism similar to published findings in epididymal fat pad.

BIOLOGICAL ACTIVITY OF 24,25-DIHYDROXYCHOLECALCIFEROL IN CHICKS AND RATS. H.L. Henry, A.W. Norman, A.N. Taylor, D.L. Hartenbower and J.W. Coburn (Dept. of Biochem., Univ. of California, Riverside, California 92502) *J. Nutr.* **106**, 724–34 (1976). The ability of 24R,25- and 24S,25-dihydroxycholecalciferol to stimulate intestinal calcium transport and bone calcium mobilization in chicks was measured. Enhancement of intestinal calcium transport by 325 or 130 nmoles of either compound was maximal by 24 hours. The effects of these compounds on bone calcium mobilization were also maximal by 24 to 36 hours. When lower doses were tested, 2 nmoles of the 24R,25-dihydroxycholecalciferol significantly stimulated intestinal calcium transport, whereas 130 nmoles of the S isomer were required for a significant response. Neither steroid had a significant effect on bone calcium mobilization when doses of less than 130 nmoles were given. It is concluded that within the lower ranges (2 to 30 pmoles) the R isomer of 24,25-dihydroxycholecalciferol is more active in stimulating intestinal calcium transport than the S isomer but that neither compound increases bone calcium mobilization at these dose levels. Also, the rat is more responsive in terms of growth and serum calcium, to small daily doses of 24R,25-dihydroxycholecalciferol than is the chick.

EFFECT OF VITAMIN A AND UNDERNUTRITION ON THE SUSCEPTIBILITY OF RODENTS TO A MALARIAL PARASITE PLASMODIUM BERGHEI. S. Krishnan, A.D. Krishnan, A.S. Mustafa, G.P. Talwar and V. Ramalingaswami (All India Inst. of Med. Sci., New Delhi-110016, India) *J. Nutr.* **106**, 784–91 (1976). The ability of vitamin A deficient rats to resist infection with *P. berghei* was investigated. When 10×10^6 erythrocytes bearing the parasite/100 g body weight were given to the vitamin A protein energy undernourished rats, parasitemia developed in these animals at a faster pace than the controls. A high number (60% to 95%) of red blood cells (RBC) carrying the parasite were noticeable within 6 to 7 days after infection, at which time most animals in this group died. The pair-fed controls (protein-energy undernourished but supplemented with vitamin A) fared perceptibly better with an equivalent load of infection. Control ad libitum fed littermates were able to restrict the infection and neither high parasitemia nor death was noted in this group. Oral supplements of retinyl acetate to vitamin A deficient rats enabled the animals to recover from infection. In vitro experiments further suggest a decrease in the capacity of the glass adhering peritoneal exudate cells in vitamin A deficient mice to clear the infection. This capacity was improved by addition of non glass adhering cells from sensitized control mice.

THE METABOLISM OF THE PHOSPHONIUM ANALOGUE OF CHOLINE IN VITRO AND IN VIVO, AND ITS DETECTION IN PHOSPHOLIPIDS BY ^{31}P-NMR. R.G. Edwards and A.R. Hands (Dept. of Biochem., Univ. of Oxford, Oxford, U.K.) *Biochim. Biophys. Acta* **431**, 303–16 (1976). The phosphonium analogues of choline, phosphorylcholine, CDPcholine and phosphatidylcholine were synthesized chemically and characterized by ^{1}H-NMR and ^{31}P-NMR; in 1,2-distearoyl-DL-glycero-3-phosphorylphosphocholine, the ^{31}P-NMR chemical shift of phosphonium relative to phosphate was −28.2 ppm. A comparison was made of the rates of reaction of choline kinase, cholinephosphate cytidyltransferase, cholinephosphotransferase and phospholipase C on natural and phosphonium substrates.

Enzyme reaction rates were similar for all but the cytidyltransferase, which exhibited a 3-fold preference for the normal substrate. The results indicated that phosphocholine is a potentially useful ^{31}P-NMR probe for the study of membrane lipids.

NEUTRAL GLYCOSPHINGOLIPIDS OF SERUM LIPOPROTEINS IN FABRY'S DISEASE. J.T.R. Clarke, J.M. Stoltz and M.R. Mulcahey (Depts. of Pediatrics and Biochem., Dalhousie Univ., and The Atlantic Res. Ctr. for Mental Retardation, Halifax, Nova Scotia B3H 4H7, Canada) *Biochim. Biophys. Acta* **431**, 317–25 (1976). The neutral glycosphingolipid compositions of lipoprotein fractions of serum from eight healthy male volunteers and three patients with Fabry's disease were determined. Four fractions were studied: very low density lipoprotein (VLDL, $d < 1.006$); low density lipoprotein (LDL, d 1.006–1.063); high density lipoprotein (HDL, d 1.063–1.21); and ultracentrifugal residue (Residue, $d < 1.21$). All lipoprotein fractions contained the four major neutral glycosphingolipids (glucosylceramide, lactosylceramide, galactosylgalactosylglucosylceramide and N-acetylgalactosaminylgalactosylgalactosylglucosylceramide). The LDL and HDL, however, accounted for most of the total glycosphingolipid (69 and 20%, respectively); only small amounts were demonstrated in the VLDL and Residue. The relative distributions of the glycosphingolipids within the LDL and HDL fractions were similar to the distribution in unfractionated serum.

IS FATTY LIVER INDUCTION A GENERAL FEATURE OF THE ADMINISTRATION OF FOREIGN SULFHYDRYL COMPOUNDS? D. Sabourault, Y. Giudicelli, R. Nordmann and J. Nordmann (Groupe de Recherches de l'INSERM sur le Metabolisme Intermediaire and Lab. de Biochim. Metabolique de l'Ecole Pratique des Hautes Etudes, Hosp. de la Salpetriere, 47, Bd. de l'Hopital, 75013, Paris, France) *Biochim. Biophys. Acta* **431**, 241–8 (1976). The intraperitoneal administration of 2-mercaptoethanol or 2-mercaptoacetate (40 μM/100 g body weight) to the rat induces a fatty liver, a marked and early increase of free fatty acids and a decrease of triacylglycerol and phospholipids in the blood. These changes are accompanied by a decrease of the ketone body level and the β-hydroxybutyrate/acetoacetate ratio in the liver. Under the same experimental conditions, however, administration of 2-mercaptopropionate fails to induce a fatty liver and does not modify the hepatic ketone body level or the blood triacylglycerol and free fatty acid levels. These results led us to conclude that fatty liver induction is *not* a general feature of foreign thiols, and suggest that increased peripheral fat mobilization as well as decreased hepatic lipoprotein synthesis and/or release are responsible for the 2-mercaptoethanol- and 2-mercaptoacetate-induced fatty liver.

LIPID TRANSPORT ACROSS THE INTESTINAL EPITHELIAL CELL EFFECT OF COLCHICINE. C.A. Arreaza-Plaza, V. Bosch and M.A. Otayek (Catedra de Patologia General y Fisiopatologia, Facultad de Med., Apdo. 50587, Sabana Grande, Univ. Central de Venezuela, Caracas, Venezuela) *Biochim. Biophys. Acta* **431**, 297–302 (1976). Rats injected with colchicine (0.5 mg/100 g of body weight) 1 hr before ingestion of a margarine emulsion (1 g in 2 ml of saline) do not show the rise in plasma triacylglycerol concentration found in controls during the subsequent hours. The effect of colchicine is more dramatic when the experiment is performed after prior administration of Triton WR-1339, a substance known to inhibit the catabolism of lipoproteins. Colchicine-treated rats also showed a five-fold increase in the content of triacylglycerol in proximal jejunum, when compared to controls. These results are consistent with the idea that colchicine interferes with the intracellular phase of fat absorption, suggesting that the microtubular-microfilamentous system could be involved in the release of chylomicrons from the intestinal cell into the circulation.

POSITIONAL SPECIFICITY OF CYCLOPROPANE RING FORMATION FROM *cis*-OCTADECENOIC ACID ISOMERS IN ESCHERICHIA COLI. J.B. Ohlrogge, F.D. Gunstone, I.A. Ismail and W.E.M. Lands (The Dept. of Biol. Chem., The Univ. of Michigan, Ann Arbor, Mich. 48104) *Biochim. Biophys. Acta* **431**, 257–67 (1976). An unsaturated fatty acid auxotroph of *Escherichia coli* was grown with a series of *cis*-octadecenoate isomers in which the location of the double bond varied from positions 3 to 17. Each of these fatty acid isomers was incorporated into the cellular lipids, but cyclopropane derivatives were formed to at least a 3-fold greater extent from the *cis*-9 and *cis*-11 isomers than from any other positional isomers. The extent of cyclopropane acid formation was observed to be highly dependent on the rate of shaking of the culture. A culture shaking at 340 rev./min converted 8.7% of its oleate to the cyclopropane derivative at stationary phase, whereas a parellel culture shaken at 110 rev./min converted 66% of the oleate to a cyclopropane acid. In combination with results of previous studies the specificity reported here supports a concept that two different enzymes may participate in cyclopropane ring synthesis. One enzyme activity may recognize ist substrate by the distance from the π-bond to the carboxyl group and the other by the distance to the methyl group.

INFLUENCE OF VALINE DEPRIVATION AND ITS REVERSAL ON FATTY ACID METABOLISM IN HELA CELLS. J.R.B. Slayback, I.M. Campbell and M.H. Vaughan (Dept. of Biochem., Faculty of Arts and Sci., Univ. of Pittsburgh, 605 Parran Hall, 130 DeSoto St., Pittsburgh, Pa. 15261) *Biochim. Biophys. Acta* **431**, 217–24 (1976). The effects that amino acid starvation and re-supplementation have on fatty acid metabolism in HeLa cells have been studied using radio gas chromatographic techniques. Deprivation of valine for 13.5 hr caused fatty acid de novo biosynthesis, elongation and desaturation to cease. This effect was reversed within 5 hr by adding valine back to the culture. During deprivation accumulation of triacylglycerol occurred. The return of valine to the culture caused compositional changes in the triacylglycerols and phosphatidylcholines.

NET CHANGES IN INTERMUSCULAR FAT BEFORE AND DURING RAPID LIPOGENIC ACTIVATION IN MICE. R. Kannan and N. Baker (Radioisotope Res., Vet. Adm. Wadsworth Hosp. Ctr., Los Angeles, Calif. 90073) *Biochim. Biophys. Acta* **431**, 233–40 (1976). We have attempted to measure net changes in lipid content in a discrete "intermuscular" fat pad during rapid lipogenic activation that occurs after a previously fasted mouse nibbles a glucose-rich test meal for several minutes. The *popliteal fat pad* was chosen for the study since it has been shown to be about an order of magnitude more active than the epididymal fat pad in the synthesis of fatty acids from glucose carbon in fasted-refed mice. We found a highly reproducible net loss in the popliteal pad's weight and lipid content during fasting. Net deposition of lipid occurred when 24-hr fasted mice were allowed to eat a fat-free, 58% glucose diet for several minutes. In two out of three experiments lipid repletion was complete after one brief period of nibbling. Significant decreases in the net amounts of each major fatty acid, 16:0, 16:1, 18:1 and 18:2, were found to occur in the popliteal fat pad during a 24-hr fast.

METABOLISM OF BILE ALCOHOLS IN THE PERFUSED RABBIT LIVER. B.I. Cohen, T. Kuramoto, M.A. Rothschild and E.H. Mosbach (Dept. of Lipid Res., Public Health Res. Inst. of the City of New York, Inc., New York, N.Y. 10016) *J. Biol. Chem.* **251**, 2709–15 (1976). The mechanism and sequence of side chain hydroxylation of cholesterol in bile acid synthesis was studied in the isolated perfused rabbit liver. A comparison was made between the importance of 26- and 25-hydroxylation in cholic acid biosynthesis in the rabbit. The formation of [G-^{3}H]cholic acid was observed when the liver was perfused with 5β- [G-^{3}H]cholestane-3α,7α-diol, 5β- [G-^{3}H]cholestane-3α,7α,-12α-triol, and 5β- [G-^{3}H]cholestane-3α,7α,26-triol. No [G-^{3}H]chenodeoxycholic acid was detected in the bile. The experiments indicated that in the rabbit liver 12α-hydroxylation can occur after hydroxylation of the cholesterol side chain at either C-25 (5β-cholestane-3α,7α,25-triol) or C-26 (5β-cholestane-3α,7α-26-triol). Apparently, the rabbit can form cholic acid via the classical 26-hydroxylation pathway as well as via 25-hydroxylation intermediates.

PURIFICATION AND PROPERTIES OF TWO LIPASES FROM PIG ADIPOSE TISSUE. W. Nieuwenhuizen, R.C. Reman, I.A.M. Vermeer and T. Vermond (Gaubius Inst., Health Res. Organization TNO, Herenstraat 5d, Leiden, The Netherlands) *Biochim. Biophys. Acta* **431**, 288–96 (1976). Two lipases were purified from pig adipose tissue after delipidation by a mild and effective procedure using mixtures of chloroform and butanol. This was followed by hydrophobic adsorption chromatography on aminohexyl-Sepharose 4B coupled with octanoic acid, gel filtration on Sephadex G-100, and isoelectric focusing. Two electrophoretically and chromatographically pure enzymes were obtained, which had the same molecular weight (60,000 $\pm$ 3,000) and specific activity, and almost identical amino acid compositions; the isoelectric points, i.e. 5.2 and 5.5, differed.

THE ENZYMIC CLEAVAGE OF LINOLEIC ACID TO C_9 CARBONYL FRAGMENTS IN EXTRACTS OF CUCUMBER (CUCUMIS SATIVUS) FRUIT AND THE POSSIBLE ROLE OF LIPOXYGENASE. T. Galiard

and D.R. Phillips (Agr. Res. Council, Food Res. Inst., Colney Lane, Norwich NR4 7UA, U.K.) *Biochim. Biophys. Acta* 431, 278–87 (1976). Homogenates and acetone powders of cucumber fruits catalyse the enzymic conversions of linoleic acid to aldehyde and oxoacid fragments in high yield, up to 60% with acetone powder extracts. The major products are *trans* 2-nonenal—a major component of the characteristic odour of cucumber—and 9-oxononanoic acid. The cleavage reaction is a heat-labile, aerobic process, optimal at pH 6 (approx.). Substrate specificity studies indicate that a lipoxygenase-type of reaction is involved in the cleavage process. The acetone powder extracts have lipoxygenase activity and the proportion of linoleic acid hydroperoxide to carbonyl fragments depends upon incubation conditions. Linoleic acid hydroperoxide isomers are also converted to carbonyl fragments by acetone powder extracts; the 9-hydroperoxide is cleaved at the 9–10 position whereas 12–13 cleavage is predominant with the 13-hydroperoxide isomer.

EFFECTS OF FEEDING ETHYL-DIHOMO-γ-LINOLENATE ON PROSTAGLANDIN BIOSYNTHESIS AND PLATELET AGGREGATION IN THE RABBIT. O. Oelz, H.W. Seyberth, H.R. Knapp, Jr., B.J. Sweetman and J.A. Oates (Depts. of Pharmacol. and Med., Vanderbilt Univ., Schl. of Med., Nashville, Tenn.) *Biochim. Biophys. Acta* 431, 268–77 (1976). The ethyl ester of dihomo-γ-linolenic acid (20:3ω6) (1 g/kg/day) was fed to rabbits for 25 days. Plasma lipids and platelet aggregation were analyzed on day 1, 11, 16, 21 and 26. All plasma lipid classes were greatly enriched with 20:3ω6. Arachidonic acid levels were elevated to a smaller extent. The different platelet phospholipid fractions analyzed were also highly enriched with 20:3ω6, whereas the arachidonic acid content in platelet phospholipids was significantly lower than in control animals. The excretion of 7α-hydroxy-5,11-diketotetranorprostane-1,16-dioic acid, the major urinary metabolite of prostaglandin E_1 and E_2 was increased 4.6 fold by the treatment. Platelet aggregation in response to ADP, collagen and arachidonic acid did not differ at any time between 20:3ω6 treated rabbits and controls. It is concluded that prostaglandin E biosynthesis can be increased by enriching the prostaglandin precursor pool. Platelet aggregation in vitro is not altered by feeding ethyl 20:3ω6.

INVOLVEMENT OF A SINGLE HYDROXYLASE SPECIES IN THE HYDROXYLATION OF PALMITATE AT THE ω-1, ω-2 AND ω-3 POSITIONS BY A PREPARATION FROM BACILLUS MEGATERIUM. P.P. Ho and A.J. Fulco (Dept. of Bio. Chem., UCLA Schl. of Med., and Lab. of Nuclear Med. and Radiation Bio., 900 Veteran Ave., Univ. of California, Los Angeles, Calif. 90024) *Biochim. Biophys. Acta* 431, 249–56 (1976). A soluble enzyme preparation from *Bacillus megaterium*, requiring NADPH and O_2 for activity and containing ferredoxin-replaceable and cytochrome *P*-450-type components, was previously shown to catalyze the conversion of palmitic acid to an isometric mixture of ω-1, ω-2 and ω-3 hydroxypalmitate. It has now been shown that the ratio of these three positional isomers in the enzymatic product remains unchanged in spite of partial diminution of total hydroxylase activity by heat treatment, pH change or inhibition by *p*-hydroxymercuribenzoate or carbon monoxide. These findings strongly support the hypothesis that a single hydroxylase with one substrate binding site is responsible for hydroxylation at all three positions of palmitate.

ADDITIVE RISK FACTORS IN ATHEROSCLEROSIS. F.A. Kummerow, B.H.S. Cho, W.Y-T Huang, H. Imai, A. Kamio, M.J. Deutsch and W.M. Hooper (The Burnsides Research Lab., Univ. of Illinois, Urbana, Illinois 61801) *Am. J. Clin. Nutr.* 29, 579–84 (1976). The tissues of human subjects assayed for a higher level of vitamin D than the tissues of 6-month-old swine which had been fed a commercial ration containing 14 times more vitamin D_3 than the National Research Council recommended requirement for growing swine. Bioassays of commercial livestock feeds indicate much higher vitamin D contents than the National Research Council recommendation. High levels of vitamin D activity are demonstrable in tissues from the animals on such livestock feeds. The grossly normal areas of the aorta of weanling swine fed 100,000 IU of vitamin D_3/pound of basal ration during the initial 6 weeks had a higher frequency of degenerated smooth muscle cells than the grossly normal areas of the aorta of swine fed the commercial ration, or 7.43 ± 0.45 and 5.60 ± 0.27/100 cells, respectively, at the age of 3 months. The addition of 13 pounds of hydrogenated fat and 200 g of cholesterol/100 pounds of the commercial ration further increased the frequency of degenerated smooth muscle cells by 0.53 or to 7.96 ± 0.39/100 cells in the grossly normal areas of the aorta of weanling swine fed this fat-supplemented ration to 3 months of age.

MOLECULAR MOTION AND ORDER IN SINGLE-BILAYER VESICLES AND MULTILAMELLAR DISPERSIONS OF EGG LECITHIN AND LECITHIN-CHOLESTEROL MIXTURES. A deuterium nuclear magnetic resonance study of specifically labeled lipids. G.W. Stockton, C.F. Polnaszek, A.P. Tulloch, F. Hasan and I.C.P. Smith (Div. of Biol. Sci., Natl. Res. Council of Canada, Ottawa, Ontario K1A OR6, Canada) *Biochemistry* 15, 954–66 (1976). Deuterium (^2H) nuclear magnetic resonance (NMR) quadrupole splittings and relaxation times have been measured for a variety of specifically deuterated lipids intercalated in lamellar-multibilayer dispersions and single-bilayer vesicles of egg lecithin and lecithin-cholesterol mixtures. The deduced order parameters and relaxation times vary with position of deuteration, acyl chain length, unsaturation, and temperature. The incorporation of cholesterol in lecithin bilayers is shown to increase the degree of orientational order in vesicles and lamellae, and to increase the hydrodynamic radius of vesicles. Thus, single-bilayer vesicles and multilamellar dispersions of phospholipids are equally useful models for biological membranes. They yield equivalent information about the internal organization and mobility of lipid bilayers, when the spectral manifestations of overall vesicle motion are correctly taken into account.

FORMATION OF BILE ACIDS IN MAN. METABOLISM OF 7α-HYDROXY-4-CHOLESTEN-3-ONE IN NORMAL SUBJECTS WITH AN INTACT ENTEROHEPATIC CIRCULATION. R.F. Hanson, P.A. Szczepanik, P.D. Klein, E.A. Johnson and G.C. Williams (Gastroenterology Unit, Dept. of Internal Med. and the Dept. of Biometry, Univ. of Minnesota, Minneapolis, Minn. 55455) *Biochim. Biophys. Acta* 431, 335–46 (1976). The formation of bile acids in man is thought to involve a series of reactions in which the initial steps are the same for both cholic acid and chenodeoxycholic acid. The point of bifurcation of the pathway is postulated to occur after the formation of 7α-hydroxy-4-cholesten-3-one. To test the hypothesis that the entire synthesis of both bile acids proceeds through this intermediate we studied the metabolism of labeled 7α-hydroxy-4-cholesten-one in eight normal subjects with an intact enterohepatic circulation. These results indicate that the production of cholic acid in man may not always involve the intermediate 7α-hydroxy-4-cholesten-3-one.

REGULATION OF MEMBRANE PHOSPHOLIPID SYNTHESIS BY THE RELA GENE: DEPENDENCE ON PPGPP LEVELS. W.D. Nunn and J.E. Cronan, Jr. (Dept. of Molecular Biophys. and Biochem., Yale Univ., New Haven, Connecticut 06510) *Biochemistry* 15, 2546–50 (1976). A series of experiments using a pair of isogenic *rel*$^+$ strains of *Escherichia coli* differing only in the *spoT* locus has demonstrated a quantitative correlation between the inhibition of phospholipid synthesis and the intracellular level of ppGpp. The conditions examined were amino acid starvation; release from amino acid starvation; and balanced growth. We also have been shown the presence of a third gene (in addition to *relA* and *spoT*) concerned with ppGpp metabolism and have found that the level of ppGpp during amino acid starvation is unaffected by an increase in the dosage of the *relA* gene.

ESTROGEN BIOSYNTHESIS AND 1β-HYDROXYLATION USING C_{19} AND 19-NOR STEROID PRECURSORS. M. Ganguly, K.L. Cheo and H.J. Brodie (Worcester Foundation for Experimental Biol., Shrewsbury, Mass. 01545) *Biochim. Biophys. Acta* 431, 326–34 (1976). In order to study the relationship between aromatization (estrogen biosynthesis) and 1β-hydroxylation, the effects of a variety of factors on these processes were evaluated. Using the C_{18} substrate, 4-estrene-3,17-dione, it was found that carbon monoxide, SU-4885, amphenone B, potassium cyanide, 4-androstene-3,17-dione and 1,4-androstadiene-3,17-dione inhibited the above transformations significantly and to varying degrees. However, within a given experiment the inhibition of each process was similar. SKF-525A did not inhibit either transformation. In addition, phosphate, Tris and barbital buffers, as well as pH changes from 6.9 to 7.7, had no stimulatory or inhibitory effect on the production of estrogen and 1β-hydroxy compounds. In contrast, several inhibitors affected the aromatization of C_{19} and C_{18} steroids differently. These include carbon monoxide, SU-4885 and amphenone B. We conclude that while estrogen biosynthesis and 1β-hydroxylation appear to be mediated by the same enzyme system, the same conclusion cannot be drawn for the aromatization of C_{19} and C_{18} substrates.

THE LIPID ENVIRONMENT OF THE GLUCAGON RECEPTOR REGULATES ADENYLATE CYCLASE ACTIVITY. M.D. Houslay, T.R. Hesketh, G.A. Smith, G.B. Warren and J.C. Metcalfe (Dept. of Biochem., Univ. of Cambridge, Tennis Court Rd., Cambridge CB2 1QW, U.K.) *Biochim. Biophys. Acta* **436**, 495–504 (1976). The lipid composition of rat liver plasma membranes was substantially altered by introducing synthetic phosphatidylcholines into the membrane by the techniques of lipid substitution or lipid fusion. 40–60% of the total lipid pool in the modified membranes consisted of a synthetic phosphatidylcholine. Lipid substitution, using cholate to equilibrate the lipid pools, resulted in the irreversible loss of a major part of the adenylate cyclase activity stimulated by F^-, GMP-P(NH)P or glucagon. However, fusion with presonicated vesicles of the synthetic phosphatidylcholines causes only small losses in adenylate cyclase activity stimulated by the same ligands. The breaks in the Arrhenius plots of adenylate cyclase activity are attributed to lipid phase separations which are shifted in the modified membranes according to the transition temperature of the synthetic phosphatidylcholine. Coupling the receptor to the enzyme by glucagon or des-His-glucagon renders the enzyme sensitive to the lipid environment of the receptor. Spin-label experiments support this interpretation and suggest that the lipid phase separation at 38.5 °C in the native membrane may only occur in one half of the bilayer.

PHOSPHATIDYLSERINE SYNTHETASE MUTANTS OF ESCHERICHIA COLI. GENETIC MAPPING AND MEMBRANE PHOSPHOLIPID COMPOSITION. C.R.H. Raetz (Lab. of Biochem. Pharmacol., Natl. Inst. of Arthritis, Metabolism, and Digestive Diseases, Natl. Insts. of Health, Bethesda, Maryland 20014) *J. Biol. Chem.* **251**, 3242–9 (1976). Mutants of *Escherichia coli* K-12 defective in CDP-diglyceride:L-serine phosphatidyltransferase (phosphatidylserine synthetase) can be isolated by a rapid autoradiographic screening assay described previously. Four organisms of this kind have now been characterized. The gene (designated *pss*) which is altered in these mutants is closely linked to the *nadB* locus near minute 49 on the *E. coli* chromosome. Strains carrying the *pss-8* mutation do not grow at elevated temperatures and have low levels of an altered synthetase in cell extracts. An analysis of several hundred transductants and temperature-resistant revertants reveals that the *pss-8* mutation is responsible both for the enzyme defect and for the phenotype. When a *pss-8* mutant is shifted to the nonpermissive temperature, the cells stop dividing and form long filaments. After 3 hours at 44° the level of phosphatidylethanolamine drops from 66 to 32% (percentage of the total lipid phosphorus), while the combined levels of phosphatidylglycerol and cardiolipin rise from 34 to 68%.

BIOLOGICAL VALUE OF EDIBLE FATS CONTAINING TRANS-ISOMERS OF UNSATURATED FATTY ACIDS. B.I. Kadikov et al. *Vopr. Pitania* **1975**(6), 15–21. The observations have been made on white rats during their growth for 12–13 weeks on a diet with 30% of the calories from hydrogenated oils with a known degree of isomerization. It was found that the biological value of hydrogenated fats was determined principally by the presence of linoleic acid and no correlation was found with their content of trans-isomers. (Rev. Fr. Corps Gras)

• Detergents

QUANTITATIVE ANALYSIS OF CATIONIC SURFACTANTS WITH METHYL ORANGE. M. Nishida, M. Kanamori, S. Ooi and S. Miyagishi (Dept. of Industrial Chemistry, Faculty of Technology, Kanazawa University) *Yukagaku* 25, No. 1, 21–3 (1976). The cationic surfactants were determined spectrophotometrically with methyl orange in the presence of nonionic or amphoteric surfactant. The cationic surfactants react with methyl orange to decrease the absorbance of methyl orange solution. The maximum decrease is observed at 462 nm which is the absorption band in alkali region, and the absorbance is constant in the pH range of 6.0 ~ 8.0. The calibration curve for the determination of the cationic surfactants was obtained from the decrease of absorbance at 462 nm in the presence of 3.0×10^{-5}M methyl orange at pH 6.90. Cetyl pyridinium chloride and myristyl benzyl dimethyl ammonium chloride could be determined in the presence of excess amount of polyoxyethylene lauryl ether or N-lauryl betain hydrochloride.

DENATURING ACTION OF TYPICAL ANIONIC SURFACTANTS ON SEVERAL PROTEINS. G. Imokawa and M. Katsumi (Industrial Research Laboratories, Kao Soap Co., Ltd.) *Yukagaku* 25, No. 1, 24–30 (1976). The denaturing action of typical anionic surfactants, alkyl sulfate (AS), alkyl benzene sulfonate (LAS), α-olefin sulfonate (AOS) and sodium alkane sulfonate (SAS), on four different proteins keratin, albumin, enzyme and lysosome membrane has been investigated by measuring liberation of sulfhydryl group and by enzyme inhibition. The results indicate that in general these surfactants have high denaturing potency for such proteins in the decreasing order of LAS $\geqq$ AS $>$ AOS $\geqq$ SAS, although the potency varies considerably with the alkyl-chain length of the surfactants. Moreover, a relationship between the denaturing potency and the skin irritating action of these surfactants has been discussed.

SULPHO-POLYCARBOXYLIC BUILDERS FOR PHOSPHATE FREE DETERGENTS. F. Smeets, r. van Oppen and E. Froyen. *Tenside Deterg.* 13(2), 83–9 (1976). The main advantage of sulphopolycarboxylate (SPC) builder over phosphate-based systems is the indifference of compositions containing this compound to water hardness. This demonstrates that stoichiometric sequestration is not an absolute necessity as has hitherto been believed. Another advantage arises from the fact that the greater the complexing power of a substance, the greater the tendency for corrosion and toxicity through metal uptake, SPC-builder having considerably less tendency for dissolving toxic metals, e.g. cadmium and mercury, compared STPP or NTA. As a result of evaluation, SPC-builder has all the characteristics of a successful and desirable replacement for phosphate-based components of detergent compositions. Thus deposit build-up is not prohibitive, and cumulative properties such as chemical wear, greying and yellowing are not greater than phosphate-based detergents. Additionally is ecological acceptability.

SYNTHETIC PHOSPHOGLYCERIDES. M. Ranny, J. Silhanek, R. Seifert, A. Bradikova and M. Zbirovsky. *Tenside Deterg.* 13(2), 77–82 (1976). Shown that despite unquestionable relations with the analogous natural phosphonic lipids, the synthetic phosphonic glycerides form a group of substances of their own with a specific range of problems both synthetic and analytical, but also with new possibilities of application. In the subsequent information specific aspects of the problems raised by this group of surfactants will be studied in more detail.

ON THE ECOLOGICAL BEHAVIOR OF CATIONIC SURFACTANTS. 3. ON THE BEHAVIOR OF DISTEARYL DIMETHYL AMMONIUM CHLORIDE IN PLANTS OF ACTIVATED SLUDGE. A. May and A. Neufahrt (Hoechst A.G.). *Tenside Deterg.* 13(2), 65–9 (1976). Activity of the biosludge has not been impaired by the cationic substance. Reductions of COD of 85% and MBAS in the range of 89–94 were determined. Long-term dosing of 3 ppm DSDAC in these tests did not interfere with the anaerobic digestive properties of the biosludge.

MILDNESS ADDITIVE. R. Kelly and E.J. Ritter (Cincinnati Milacron, Inc.). Reissue patent *Re. 28,913*. A detergent composition consists of a skin irritating detergent and 0.005 to 10 parts by weight of the detergent of a mildness additive comprising the substituted polymerized product of 2–4 molecules of a monomeric C_{12} to C_{26} fatty acid. The product contains a cyclohexene moiety and instead of 2 to 4 carboxyl groups from the fatty acid, hydroxy or hydroxy methyl groups.

LIQUID PEROXYGEN BLEACH. J.H. Barrett, Jr. (Purex Corp.). *U.S. 3,970,575*. An acidic stabilized bleach product consists of 1–8% stabilized hydrogen peroxide, 0.5–10% water soluble nonionic surfactant, and 0.0002–0.002% color stable phthalocyanine blue dye pigment powder. The surfactant is a condensate of polyethylene oxide and alkyl phenol, secondary alcohol, linear primary alcohol, polyoxypropylene glycol, fatty alcohol, or fatty acid partial ester of polyhydric alcohol. The product has a clear blue appearance.

HEAVY DUTY ALKALINE LIQUID SURFACTANT CONCENTRATE. M.E. Ginn and I. Liebman (Alberto Culver Co.). *U.S. 3,970,595*. The concentrate comprises a stable homogeneous mixture containing less than 10% water and consists of the following ingredients as an unreacted mixture: (a) a liquid water soluble nonionic surfactant, (b) a liquid water soluble ethanolamine salt of an anionic surfactant, and (c) an aqueous alkali solution selected from the group consisting of potassium hydroxide and ammonium hydroxide having hydroxyl concentrations of at least 8% based on the alkali solution.

NON-GELLING ALPHA-OLEFIN SULFONATE LIQUID DETERGENT. S.C. Klisch and C.A. Martin (Colgate-Palmolive Co.). *U.S.*

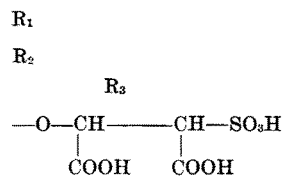
3,970,596. The detergent consists of 12–22% water soluble olefin sulfonate salt, 10–20% water soluble alcohol ethoxylate sulfate, a foam stabilizer, an anti-gelling proportion of a halide and a nitrate, and water. The proportion of halide is 2–8%, and the proportion of nitrate is 1–15% which is sufficient to inhibit corrosion of ferrous metals brought into contact with the detergent.

SULFOSUCCINATE DERIVATIVES AS DETERGENT BUILDERS. V. Lamberti (Lever Bros. Co.). *U.S. 3,970,653.* There is claimed an α-carboxyalkylthio-β-sulfosuccinic acid and its alkali metal, ammonium, and substituted ammonium salts.

POLYPHOSPHATE-FREE DETERGENT COMPOSITION. F. Smeets (Citrex, Societe Anonyme). *U.S. 3,968,046.* The composition comprises (a) 1–30 parts of a sodium, potassium, ammonium, or triethanolamine salt of an organic polycarboxylic acid selected from the group consisting of an unsaturated tetracarboxylic acid and the sulfotetracarboxylic acid obtained by sulfonating the aforementioned acid, and (b) 99–70 parts of sodium or potassium sulfate. The unsaturated tetracarboxylic acid is the pyrolysis product of an alkaline earth metal salt of citric acid.

DETERGENT COMPOSITIONS. F. Smeets (Citrex, Societe Anonyme) *U.S. 3,968,047.* A phosphate-free detergent composition comprises (a) 1–30 parts of a salt of an organic sulfocarboxylic acid, the carboxyl groups of which are at least partially esterified with a nonionic compound containing at least one hydroxyl group, and the sulfonic acid group of which is salified with a sodium, potassium, or triethanolamine cation; and (b) 99–70 parts of sodium or potassium sulfate. The sulfopolycarboxylic acid is obtained by sulfonating and acidifying the pyrolysis product of an alkaline earth metal salt of citric acid. The nonionic compound may be alkoxylated alphatic alcohols or alkoxylated alkylphenols.

SULFOSUCCINATE DERIVATIVES AS DETERGENT BUILDERS. V. Lamberti (Lever Bros. Co.). *U.S. 3,968,110.* The builder is an α-substituted phenyl-β-sulfosuccinic acid having the general formula:



or its alkali metal, ammonium, and substituted ammonium salts. R_1, R_2, and R_3 are selected from the group consisting of hydrogen, alkyl containing 1–4 carbon atoms, and COOH. When COOH is present, the other two substituents must be hydrogen.

METHOD FOR THE ANALYSIS OF IONIC SURFACTANTS. L.K. Wang (Calspan Corp.). *U.S. 3,969,076.* The method comprises adding to an aqueous solution of the surfactant a standard, cationic, nonaromatic quaternary ammonia solution to ensure a cationic character to the sample; adding buffer, indicator, and chloroform; and titrating the sample with a standard solution of sodium tetraphenylboron. The actual concentration of ionic surfactant is given by the difference between the amount of quaternary ammonia compound added to the sample and that found by titration with the standard solution of sodium tetraphenylboron.

SOAP SAVER. H.A. Hadley and G. Spector. *U.S. 3,969,256.* A bar of soap comprises a hollow plastic shell with soap molded about it. The surface of the shell is made up of irregularly shaped teeth. Transverse and longitudinal channels intersect the surface of the shell and connect with the outer surface of the bar, thereby generating turbulence for improved lathering purposes.

TRANSPARENT SOAP BAR. R.E. Lages (Lever Bros. Co.). *U.S. 3,969,259.* A transparent soap bar, prepared by use of a transparency aid selected from sucrose, sorbitol, glycerol, or potassium soap or by conversion of mechanical energy into heat energy is rendered germicidal by the steps of: (i) preparing a clear solution of 1 part of the germicide 2,4,4′-trichloro-2′-hydroxy diphenyl ether in 0.7–25 parts of a liquid, pleasantly odorous substance, and (ii) incorporating the clear solution into the soap prior to the completion of plodding. In the finished soap, the germicide comprises 0.15–6% and the solvent 0.15–4%.