abstracts

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ABSTRACTORS: N.E. Bednarcyk, J.E. Covey, J.C. Harris, F.A. Kummerow, T. Mares, B. Matijasevic, J.C. Means, D.B.S. Min, and E.G. Perkins

• Fats and Oils

ACETYLENIC ACIDS FROM MOSSES. W.H. Anderson, J.L. Gellerman and H. Schlenk (The Hormel Instit., Univ. of Minnesota, Austin, Minn. 55912) *Lipids* 10, 501–2 (1975). Two new acetylenic fatty acids, 9,12-octadecadien-6-ynoic and 11,14-eicosadien-8-ynoic, were identified from lipids of the moss, *Fontinalis antipyretica.* They resemble the previously identified 9,12,15-octadecatrien-6-ynoic acid by having a methylene interrupted unsaturated system. The C_{20} acetylenic acid shows that the capability of mosses to synthesize polyolefinic acids of this chain length applies, in certain species, also to olefinic-acetylenic acids.

24-METHYLENELANOST-9(11)-EN-3β-OL, NEW TRITERPENE ALCOHOL FROM SHEA BUTTER. T. Itoh, T. Tamura and T. Matsumoto (Col. of Sci. & Tech., Nihon Univ., Tokyo, Japan) *Lipids* 10, 454–60 (1975). A new triterpene alcohol was isolated from shea butter and its structure was shown to be 24-methylenelanost-9(11)-en-3β-ol. Gas chromatographic correlations between this triterpene alcohol and other related compounds are discussed.

OCCURRENCE OF 7-METHYL-7-HEXADECENOIC ACID, THE CORRESPONDING ALCOHOL, 7-METHYL-6-HEXADECENOIC ACID, AND 5-METHYL-4-HEXADECENOIC ACID IN SPERM WHALE OILS. J.C. Pascal and R.G. Ackman (Environ. Canada Fisheries and Marine Ser., Halifax Lab., Halifax, Nova Scotia B3J 2R3, Canada) *Lipids* 10, 478–82 (1975). Two sperm whale oils from the northern hemisphere and two from the southern hemisphere were fractionated. Triglyceride and wax esters were examined for fatty acids and alcohols with monoethylenic unsaturation bearing a methyl branch on an ethylenic carbon. The 7-methyl-7-hexadecenoic acid (0.37–1.37%) was accompanied by the corresponding alcohol (0.28–0.72%), but these materials were not accompanied by shorter chain homologues. The 7-methyl-6-hexadecenoic acid was relatively less important (0.23–0.68%), but was accompanied by 5-methyl-4-hexadecenoic acid (0.10–0.39%), and a partially identified C_{18} compound. Chromatographic properties on siver nitrate impregnated silicic acid TLC and on three GLC liquid phases are reported.

PHENACYL ESTERS OF FATTY ACIDS VIA CROWN ETHER CATALYSTS FOR ENHANCED ULTRAVIOLET DETECTION IN LIQUID CHROMATOGRAPHY. H.D. Durst, M. Milano, E.J. Kikta, Jr., S.A. Connelly and E. Grushka (Dept. of Chem., State Univ. of N.Y. at Buffalo, Buffalo, N.Y. 14214) *Anal. Chem.* 47, 1797–801 (1975). Phenacyl esters of fatty acids have been formed in an essentially quantitative manner using crown ethers as catalysts. These esters absorb UV radiation strongly at 254 nm, allowing the detection of as small a quantity as 1 ng of C_2 acid, and 50 ng of C_{20} acid. The method of synthesis is inexpensive and can be carried out in virtually any aprotic solvent system in a short period of time. Reaction conditions do not require total exclusion of water, thus simplifying the procedure. Liquid chromatographic separations of these esters have been obtained on a 25-cm long column packed with C_8 bonded phase. The implications and uses of such a broad ranging synthesis are discussed.

STUDIES ON VITAMIN D AND ITS ANALOGS. VII. SOLUTION CONFORMATIONS OF VITAMIN D_3 AND 1α,25-DIHYDROXYVITAMIN D_3 BY HIGH-RESOLUTION PROTON MAGNETIC RESONANCE SPECTROSCOPY. R.M. Wing, W.H. Okamura, A. Rego, M.R. Pirio and A.W. Norman (Depts. of Chem. and Biochem., Univ. of Calif., Riverside, Calif. 92502) *J. Amer. Chem. Soc.* 97, 4980–5 (1975). The conformations of the A and seco-B rings of vitamin D_3 have been studied by two H NMR methods: correlation of the observed coupling constants with the Karplus equation; and computer analysis of the 300-MHz tris(dipivalomethanato)europium(III) [Eu(dpm)$_3$] shifted spectra. Both methods show that the A ring of vitamin D_3 exists as an approximate equimolar mixture of rapidly equilibrating chair conformers. The torsion angle about the C_6-C_7 bond is essentially the same in solution as previously determined by X-ray diffraction studies. Comparison of the spectra of side chain modified analogs (20,21,22,23,24,25,26,27-octanorvitamin D_3 and vitamin D_2) with that of vitamin D_3 establish that A and seco-B ring conformations are independent of the nature of the side chain.

TAXUS BACCATA SEED OIL: A NEW SOURCE OF CIS-5,CIS-9-OCTADECADIENOIC ACID. R.V. Madrigal and C.R. Smith, Jr. (Northern Reg. Res. Lab., ARS-USDA, Peoria, Ill. 61604) *Lipids* 10, 502–4 (1975). Methyl esters prepared from the seed oil of the conifer *Taxus baccata* L. were found by gas liquid chromatography to contain 12% of a component which, when isolated by preparative thin layer chromatography and characterized by mass spectrometry, ozonolysis and nuclear magnetic resonance, was identified as *cis*-5,*cis*-9-octadecadienoic acid.

EFFECT OF ELECTRONIC COOKING ON FATTY ACIDS IN MEATS. S.J. Myers and N.D. Harris (Dept. of Food and Nutrition, Florida State Univ., Tallahassee). *J. Am. Diet. Assoc.* 67, 232–4 (1975). The effects of cooking beef rib steaks, loin pork chops, chicken thighs, and chicken breasts by microwave energy and by conventional heating on the fatty acids were investigated. No significant changes in fatty acid composition attributable to cooking method were found. As expected, electronic cooking was considerably faster. However, the method of heating did not affect the percentage of weight loss in beef or pork. Poultry lost more weight, due to both drip and evaporation, when cooked conventionally.

SURFACE ACTIVE COMPOUNDS. G. Pusch (Chemische Fabrik Pfersee G.m.b.H.). *U.S. 3,904,661.* A process for producing fatty acid amides containing polyglycol ether residues comprises reacting fatty acid amides with chlorohydrin ethers produced by reacting polyglycol with epichlorohydrin. The fatty acid amides are reacted in the presence of acid treating means. Finally, the pH of the reaction product is adjusted to between 3 and 10.

CARBOXYLATION PROCESS FOR PREPARING ALPHA UNSATURATED LINEAR FATTY ACID DERIVATIVES. J. F. Knifton (Texaco Inc.). *U.S. 3,904,672.* A process for carboxylating 1-alkynes containing 2–22 carbon atoms to their linear, alpha-unsaturated fatty acid derivatives consists of (a) admixing each molar equivalent of 1-alkyne to be carboxylated with at least a molar equivalent of hydroxylated coreactant, at least a catalytic quantity of ligand-stabilized noble metal Group IVB metal halide catalyst complex in the presence of an oxygen-free environment, to form a reaction mixture, and (b) heating the reaction mixture at 20–120 C in the presence of a stoichiometric quantity of carbon monoxide at pressures of 1–200 atmospheres, until the desired fatty acid derivatives are formed.

PREPARATION OF MARGARINE CONTAINING VIABLE BACTERIAL CELLS HAVING ALCOHOL DEHYDROGENASE ACTIVITY. C.T. Verrips and H. Vonkeman (Lever Bros. Co.). *U.S. 3,904,767.* A process for preparing margarine comprises emulsifying 75–85% of a fatty phase containing triglycerides of a polyunsaturated fatty acid with a balance of a milk based aqueous phase, of pH 4.5–7, containing viable bacteria cells of the group consisting of leuconostoes and streptococci. The bacteria have been grown for at least three times in a nutrient medium containing lactose and/or citrate and 1–7% common salt. The aqueous phase of the margarine contains at least 10^6 viable bacteria cells per ml after 12 days storage.

HIGH POLYUNSATURATED NONDAIRY WHIPPED PRODUCTS. N.F. Buide, J.C. Lugay, and R.J. Sims (General Foods Corp.). *U.S. 3,903,310.* A whippable oil-in-water emulsion composition comprises (a) 10–30% of a fat portion having a P/S greater than 0.3, (b) 15–30% carbohydrate, (c) 40–70% water, (d) emulsifier, (e) stabilizer, and (f) 0.005–1.5% of a protein hydrolysate having an average molecular weight of 300–15,000. The amount of the protein hydrolysate is effective to provide a stable whipped topping.

ACIDIFICATION OF TALL OIL SOAP. A.M. Bills (Westvaco Corp.). *U.S. 3,901,869.* The process consists of (a) acidifying tall oil soaps containing 75–200% water per part of tall oil soap with an amount of carbon dioxide sufficient to lower the pH to 7–8 at a temperature from ambient to 120 F; and (b)

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allowing the acidified soap to settle into a soap-acid layer and a bicarbonate brine layer.

SYNTHETIC POLYAMIDES OF A DIMERIC FATTY ACID. M. Drawert and E. Griebsch (Schering Ag.). *Reissue 28,533.* A synthetic polyamide is prepared by cocondensing equivalent amounts of an acid component consisting of (1) a dimeric fatty acid prepared by polymerizing a monobasic acid of an aliphatic hydrocarbon having 8–24 carbon atoms and (2) a monobasic straight chain alkanoic acid having 2–5 carbon atoms; and of an amine component consisting of ethylene diamine and a co-diamine selected from the group consisting of (1) a straight chain alkylene diamine having 6–12 carbon atoms, (2) an aromatic diamine, (3) a cycloaliphatic diamine, and an ether diamine. The equivalence ratio between the dimeric fatty acid and the monobasic acid is between 0.8:0.2 and 0.7:0.3. The equivalence ratio between the ethylene diamine and the codiamine is between 0.8:0.2 and 0.5:0.5.

PRESERVATION OF FOODSTUFFS WITH SYNERGISTIC ANTIOXIDANT COMPOSITION. W. Cort (Hoffmann-LaRoche Inc.). *U.S. 3,903,317.* A process for preserving foodstuffs containing edible oils against oxidation comprises adding thereto an effective amount of an antioxidant composition consisting of rac. 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid and ascorbic acid.

SWEETENED, STORAGE-STABLE PEANUT BUTTER SPREAD. F. W. Billerbeck, L. H. Everett, P. G. McGowan, and P. V. Pettinga (Gerber Products Co.). *U.S. 3,903,311.* The method for preparing the composition, which contains at least 5% of honey, comprises the following steps: (1) combining roasted peanuts with a glyceride stabilizer and a small amount of mono- and disaccharides and salt, to form a peanut composition; (2) milling the composition with peanut oil and 0.15–0.85% of the weight of honey of an emulsifier; (3) adjusting the temperature of the mixture to 140–150 F; (4) heating the honey to 120–140 F; and (5) blending the two components together to form the smooth, homogeneous composition. The roasted peanuts and peanut oil constitute 60–92% of the composition; the stabilizer 1–3%; and the peanut oil itself 6–25% of the final composition.

HYDRATED PAN RELEASE AGENT. I. Gawrilow (SCM Corp.). *U.S. 3,906,117.* A pan release agent, useful for preventing adhesion of a baked product to the pan, comprises a fluid, stabilized glyceride mixture containing 4–14 parts of soft mono- and diglycerides, 2–8 parts of ethoxylated monoglyceride, up to 8 parts of solid stearine, and 40–100 parts of liquid vegetable oil. The mixture is heated to melting and rapidly cooled to a temperature of at least 85 F to initiate Beta crystal formation and produce a chilled blend containing dispersed fat crystals. The chilled blend is worked at temperatures between 82 and 88 F to develop additional Beta crystals and produce a uniform dispersion of fat crystals in the liquid vegetable oil. The dispersion is fluidized by agitating at temperatures of 80–90 F for a time sufficient to complete Beta crystal formation. The pan release agent is then hydrated to form a stabilized oil-in-water emulsion containing 30–70% water. The hydrated emulsion is applied to the baking surface of the pan.

GEOMETRICAL ISOMERIZATION OF JOJOBA OIL. J. Wisniak and P. Alfandary (Department of Chemical Engineering, Ben-Gurion University of the Negev, Beer-Sheva, Israel) *Ind. Eng. Chem. Prod. Res. Dev.* **14**, 177–80 (1975). Jojoba oil has been isomerized with selenium and NO_2 catalysts under a wide range of conditions. The reaction with selenium is first order in the isomer and ⅓ order in the catalyst, with an activation energy of 35 kcal/mol, yields up to 56% trans isomer, and melting points 36 to 40° C. The reaction with NO_2 is faster, proceeds under milder conditions with a yield of 75% trans isomer, and raises the melting point to 42° C.

STUDY OF THE CONTAMINATION OF SOME VARIETIES OF GROUNDNUT BY ASPERGILLUS FLAVUS. Ch. Zambettakis (C.N.R.S., Paris). *Oléagineux* **30**, 161–7 (1975). Experiments have been carried out at the Museum Laboratory (Paris) and in the field at Darou (Senegal) to attempt to bring out eventual varietal differences on the process of contamination of groundnut by Aspergillus flavus. Differences in varietal behavior have been observed in connection with the rapidity of the spread of the fungus on dry pods in relation to the structure of the shell and with the rapidity of spread on dry seeds. The contamination of the pods and seeds in the soil before harvesting in relation to drought of the end of the cycle is also examined and the obtained results given in the paper.

COMPARISON OF THE COMPOSITION AND GLYCERIDIC STRUCTURES OF THE OILS OF ELAEIS GUINEENSIS, ELAEIS MELANOCOCCA, AND THE GUINEENSIS-MELANOCOCCA HYBRID. M. Naudet, H. Faulkner (Lab. National Matières Grasses, Univ. Aix-Marseille). *Oléagineux* **30**, 171–4 (1975). The palm oils from Guineensis, Melanococca varieties and the Guineensis-Melanococca hybrid have been studied, directly or after fractionating by chromatography on a support impregnated with silver nitrate, for their total fatty acid and internal fatty acid contents. The present results, still preliminary, point to the fact that hybridization influences not only the fatty acid composition but also the glyceridic structure.

THE NEW H. L. S. METHOD OF FRACTIONATING PALM OIL BY TRANSESTERIFICATION. L. Koslowsky (H. L. S. Ltd., Ind. Engineering Co., Petah-Tikva, Israel). *Oléagineux* **30**, 221–4 (1975). The chilled stability of palm oil liquid fraction is limited by the relatively high melting point of the palm oil's two main components: oleodipalmitin and palmitodiolein. Therefore, an efficient fractionating of palm oil is possible only by a new redistribution of the fatty acid radicals in the triglyceride molecules which is obtained by reaction of transesterification between the palm oil and a saturated or unsaturated alkylester. The H. L. S. method described in the paper makes it possible to obtain liquid fractions with good chilled stability at 8C and solid fractions containing over 90% tripalmitin. The new method provides liquid fraction yields of 65%.

INFLUENCE OF CLIMATIC FACTORS ON THE SEASONAL AND ANNUAL FLUCTUATIONS IN COCONUT YIELD. P. Coomans (I.R.H.O. Port-Bouet, Ivory Coast). *Oléagineux* **30**, 153–9 (1975). The available water, temperature, and sunshine have an influence on seasonal fluctuations in coconut yield. Their action intervenes at various moments in the development of the inflorescence and the fruit. The water deficit plays the main role. The comparison of results from four countries leads to the proposal of an approximate curve for the estimation of copra yields in function of the water deficits, when the sunshine and temperature factors are not limiting.

DECOLORIZATION POWER OF ADSORBANTS IN FUNCTION OF THE QUANTITY OF RESIDUAL ACID IN THEM. A.N. Umanskaja et al. *Maslo-zhir. Prom-St.* **1974**(9), 16–17. The presence of free mineral acid in adsorbents used for bleaching of soybean oil has a favorable influence on its efficiency. Decolorization of oil obtained from ripe seeds gives satisfactory results if the bleaching earth contains 0.44% of free acid. In the case of oil obtained from unripe seeds, it is recommended to use the bleaching earth which has less than 0.32% free acid. (Rev. Fr. Corps Gras)

USE OF ANIMAL FATS IN MARGARINE PRODUCTION. I.M. Tovbin et al. (VNIIZ) *Maslo-zhir Prom-St.* **1974**(9), 18–21. The margarine consumption in USSR increases constantly; in 1960 it was 2 kg/year per capita, in 1970 3.1, for 1975 the plan forecasts 4.3 kg. Up to now, the raw material was vegetable oil used natural or after hydrogenation. The experiments done in 1972 show that animal fats can also be used for margarine production if some modification in structure is done. A new technique was elaborated in which the process of hydrogenation of vegetable oils is completed with transesterification of animal fats. These two processes are made in only one technological operation called hydrotransesterification. The process was first done in "Salolin" factory in Leningrad in 1972. In the paper, the composition and the characteristics of some hydrotransesterified fats are given. To produce these fats 40% of animal fats were used. The comperative biological studies with hydrotransesterified fats and with a mixture of corresponding hydrogenated vegetable fats and natural animal fats have been done. The results show that both fats have the same biological value. (Rev. Fr. Corps Gras)

WASHING OF MISCELLA WITH A SALT SOLUTION. D.F. Agarysev et al. *Maslo-zhir Prom-St.* **1974**(9), 41–2. To obtain a better quality of filtered miscella, it is proposed to wash it with a 5% solution of sodium chloride. The experiments have been done in the horizontal cylindrical recipient of $14m^3$ capacity. The salt solution layer was 300mm high and the quantity was $3m^3$. Miscella layer over this salt solution was 600–700mm. The frequency of the replacement of salt solution was 4–5 times per month. (Rev. Fr. Corps Gras)

STUDY OF DRYING OF SUNFLOWERSEED WITH VIBRATOR TRANSPORTER. V.P. Starceus et al. *Maslo-zhir Prom-St.* **1974**(9), 8–10. The study has been done with sunflowerseed which had 20–30% moisture, 34–44% oil, and 22–24% hull content. Drying with the vibrator system allows the increase of temperature of drying agents which is not possible in fixed systems. The increase of temperature to 85C in the first period of drying with the oscillation of 20Hz and the amplitude of oscillation of 1.2mm, accelerates the drying. (Rev. Fr. Corps Gras)

THE INFLUENCE OF "FLOUR" HUMIDITY ON ITS APTITUDE FOR EXTRACTION. L.A. Tarabariceva et al. *Maslo-zhir Prom-St.* **1974**(10), 6–8. The oil content in extraction meal obtained from sunflowerseed "flour" grows as its moisture increases. These results were obtained by different methods of extraction. The increase of oil content in meal with the moisture variation from 3.5–4.5% to 8–9% is insignificant, but if the percentage of moisture is higher the content of residual oil in meal significantly increases. (Rev. Franc. Corps Gras)

PROBLEMS OF MASS AND HEAT TRANSFER AND TECHNOLOGY OF EXTRACTION OF VEGETABLE OILS. V.V. Beloborodov (Polytechnical institut of Krasnodar) *Maslo-zhir Prom-St.* **1974**(10), 8–13. Extraction of vegetable oils is essentially diffusion and thermal phenomena based on the mass or mass and heat transfer in a solid-liquid system (extraction), a solid-vapor system (elimination of hexane from meal), and a liquid-vapor system (distillation of miscella). The author studied the extraction of cottonseed and sunflowerseed. It was found that it is very important for a high yield of oil to have a good ratio solvent-raw material. The oil content in meal is about 1% if this ratio is 3:1 or 5:1. Regarding oil quality, the experiments have shown that it is not dependent on the degree of extraction. Contrary to that the hull content in the raw material is very important. If it is high, the quality of oil, especially the color, is much worse. Direct extraction of cottonseed in extractor ND-1000 and sunflowerseed in extractor MEZ-350 didn't give good results. (Rev. Fr. Corps Gras)

A CHARACTERISTIC OF INDUSTRIAL LOTS OF ASKANITE. B. Ja. Sterlin et al. *Maslo-zhir Prom-St.* **1974**(10), 13–15. In USSR, askanite is used for bleaching soybean, linseed, and rapeseed oil. Askanite shows some selectivity regarding coloring matters; first, carotenoids are adsorbed, then chlorophyll. Comparing with some imported bleaching earths like Actisil T-2 (Italy), Terrafine (Yugoslavia), and NKH-1 (Japan), askanite has some technological advantages like the filtration capacity and retention of oil. (Rev. Fr. Corps Gras)

SPECIAL KIND OF MARGARINE. I.V. Mirajlova et al. (VNIIZ) *Maslo-zhir Prom-St.* **1974**(10), 16–18. The authors made studies concerning the margarine formulation destined for nutrition of persons of age 7–11 and over 60 years. The physiological studies showed that for organism in growth the best fats are ones which contain 50–55% of oleic acid, 25–35% saturated acids and 10–25% of linoleic acid (*cis* form). The melting point of the product destined for direct consumption must be between 25–27C and the content of solid triglycerides at 20C 30–35%. In the paper, the formulation of fatty phase for such a margarine is given. Concerning older persons, fats with higher linoleic acid content are required and must be free from *trans* fatty acids. For this use, the authors prepared a mixture of tallow and sunflowerseed oil submitted to transesterification. The transesterification is done at 80C with 0.15% of sodium-methylate as catalyst. The physical-chemical values of the product before and after transesterification are given. (Rev. Fr. Corps Gras)

VARIATIONS IN THE IRON CONTENT DURING THE ADSORBENT REFINING OF SOYBEAN OIL. A.N. Umanskaja et al. *Maslo-zhir Prom-St.* **1974**(11), 12–14. During the adsorbent refining of soybean oil, the elimination of iron ions, depends upon their concentration in non-bleached oil and upon quantity of adsorbent used. The iron content in the adsorbent has an influence on the oxidation of oil and for this reason, the adsorbent destined for oil decolorization must be free of iron. (Rev. Fr. Corps Gras)

BLEACHING OF A CONCENTRATE OF PHOSPHATIDES. G.S. Garmas et al. *Maslo-zhir Prom-St.* **1974**(11), 15. The UkrNIIMP has elaborated a method for bleaching of phosphatides concentrate. The method consists of treating the concentrate with 33% hydrogen peroxide for 1 hour, after which the unreacted hydrogen peroxide is decomposed by the catalase. The residual catalase is inactivated at 70–75C. The phosphatides concentrates are purified by redissolving in refined or hydrogenated oil in a ratio 1:1 or 1:2. The resulting decolorized phosphatides concentrate has a light brown color and it is suitable for use in food industry. (Rev. Fr. Corps Gras)

COMPOSITION AND PROPERTIES OF FATS FOR CAKES. T.P. Dorozkina et al. *Maslo-zhir Prom-St.* **1974**(11), 16–17. The authors studied the influence of the ratio between solid and liquid phases of the fat and their physical-chemical values on the rheological properties on the dough and on the quality of the cakes. In the preliminary studies, the sunflowerseed and cottonseed oils with different degees of saturation have been used. The best solid fat phase was hydrogenated cottonseed oil. After that, it was used as liquid phase, 80% refined and deodorized sunflowerseed oil, and as solid phase, 20% hydrogenated cottonseed oil with the hardness of 511 g/cm. (Rev. Fr. Corps Gras)

INFLUENCE OF STRONG ELECTRICAL FIELDS ON THE QUALITY OF HYDROGENATED FATS. V.T. Zolocevskij et al. *Maslo-zhir Prom-St.* **1974**(12), 17–18. In the process for catalyst precipitation from hydrogenated fats in electrical field, it is possible to eliminate the catalyst below 10 mg/kg. The obtained results show that it is possible to use the electrotechnology for catalyst elimination from hydrogenated fats. The precipitation of catalyst is done during 2 min. in electrostatic field with tension of 20 kV/cm. (Rev. Fr. Corps Gras)

OBTAINMENT OF TECHNICAL OLEIC ACID OF HIGHER QUALITY. M.V. Irodov et al. *Maslo-zhir Prom-St.* **1975**(3), 23–5. On the quality of technical oleic acid, some complaints have been made by consumers. The product contained 65–70% of oleic acid and about 10% linoleic acid and the titre was at most 10C. The authors resolved this problem by the production of a better product from pork skin which contains 24.4% palmitic acid, 8.9% stearic acid, 55.5% oleic acid, and 3.2% linoleic acid. The titre is 36.7C and iodine value 68.0. After hydrolysis, distillation, and fractionation in the presence of surface active-substance and one electrolyte, the liquid fatty acids were obtained with the titre 10C, iodine value 86.0, the oleic acid content 74.6%, and linoleic acid content 6.0%. (Rev. Fr. Corps Gras)

DETERMINATION OF ASSIMILABLE LYSINE CONTENT IN THE PROTEIN ISOLATE OF COTTONSEED. M.M. Rahimov et al. *Maslo-zhir Prom-St.* **1975**(4), 22–4. In this paper, the results obtained for lysine determination with o-diacetylbenzine are given. The protein isolate obtained from cottonseed has been examined. The reaction o-diacetylbenzen with protein is done at 20C in NaOH solution at pH of 10.2. With lysine a fluorescent product is formed. Between other aminoacids, the reaction with o-diacetylbenzine gives beside lysine, glycine (70% comparing with lysine) and ornithine (86%). Glycine reacts only if it has N-terminal. Regarding ornithine, it is not present in the protein of cottonseed. (Rev. Fr. Corps Gras)

CONTINUAL OIL REFINING IN THE APPARATUS OF COLUMN TYPE. N.P. Ihno et al. *Maslo-zhir Prom-St.* **1975**(4), 43–5. This apparatus was constructed by the workers of the oil factory in Gomel. The apparatus consists of a column for hydration, a column for decantation, a column for neutralization, and a column for washing in which oil is dispersed. Afterwards, the oil is dried in vacuum. The capacity of the installation is about 15401/h. The quality of sunflowerseed oil refined in this apparatus was a) after hydration: acidity value 2.26, phosphatides 0.16%; b) after neutralization: acidity 0.1, soap content 0.009%; c) after washing: acidity value 0.1, soap 0.0035%. The soapstock contains 11.73% of total fatty materials of which 10.82% is combined oil and 0.91% neutral oil. (Rev. Fr. Corps Gras)

INFLUENCE OF IRON AND COPPER ON THE MODIFICATION OF MILK FAT DURING STORAGE. M.M. Merzametov et al. *Pisch. Technol.* **1974**(4), 74–7. The iron and copper content in milk fat has influence on the modification of the fat: the content of conjugated acids decreases and the accumulation peroxides and secondary oxidation products occur. Under influence of iron and copper the changes of fundamental physico-chemical characteristics of milk fat are irregular during the storage. If the concentration of iron and copper is high, the higher modifications of all values occur in the first period of storage (first 15 days). (Rev. Fr. Corps Gras)

KINETICS OF EXTRACTION OF CRUDE SUNFLOWERSEED MEAL WITH HEXANE. V.V. Beloborodov et al. (Polytechn. Inst. Krasnodar) *Pishch. Technol.* **1974**(6), 76–80. Direct extraction of crude

meal of oilseeds is possible if the internal resistance to diffusion is minimal which can be obtained if maximal destruction of cell structure is done. The reduction in size of particles is also necessary. With polystage counter-current extraction with hexane, it is possible to obtain, from crude sunflowerseed, the meal with low oil content. In this work the kinetics of this process was studied. The curve of the extraction and the curve of the velocity of extraction are given. (Rev. Fr. Corps Gras)

INFLUENCE OF DIFFERENT FACTORS ON THE REFINING OF COTTONSEED OIL IN THE MISCELLA. N. Abdurah Manova et al. *Pishch. Technol.* 1974(6), 132–4. The optimal conditions for refining the cottonseed oil in the miscella are: temperature 50C, alkali concentration 75–100 g/l, excess of alkali 25% for the miscella from cottonseed of superior quality and excess of alkali 75% if the miscella is obtained by the extraction of cottonseed of inferior quality. For the refining of miscella obtained by the seed of inferior quality, it is necessary to use three times more alkali than for the miscella obtained by extraction of superior quality cottonseed. (Rev. Fr. Corps Gras)

THE GLUCOLIPIDS OF RAPESEED OIL. M. Zajac et al. *Tluszcze Jadalane* 18, 157–64 (1974). A study has been done on the residue obtained by the hydration of crude rapeseed oil. The glucolipids have been isolated by the column chromatography and the eluate was analyzed by two dimensional thin-layer chromatography. On the chromatogram, different compounds have been found; the esters of glucoside and sterol, glucoside of sterol, and cerebrosides were identified. The glycolipids were subjected to methanolysis and the products were analyzed by thin-layer and gas-liquid chromatography. In the hexane extract of thin-layer chromatography, methyl esters of fatty acids, sterols, and triterpenic alcohol were identified. In the methanol-water layer, glucose, mannose, and sphingosine were identified. (Rev. Fr. Corps Gras)

ABOUT THE POSSIBILITIES OF HYDROGENATION OF A MIXTURE OF PALM OILS WITHOUT PRELIMINARY REFINING. L. Strecker et al. *Tluszcze jadalane* 18, 220–4 (1974). The principal factor for decreasing catalyst activity during the hydrogenation of crude palm oil is the higher concentration of free fatty acids. The decreasing catalyst activity during hydrogenation of a mixture of crude palms oils can be compensated by the addition of a catalyst of higher activity. (Rev. Fr. Corps Gras)

DETERMINATION OF OIL IN RAPESEED BY NUCLEAR MAGNETIC RESONANCE WITH A LARGE BAND. K. Modzelewska et al. *Tluszcze Jadalane* 18, 271–81 (1974). The NMR method is applicable for the determination of oil in rapeseed if the impurities content is not above the level allowed by the standards. If this condition is not fulfilled, it is necessary to eliminate the impurities before the NMR method is applied. To obtain the determination with the precision in the lipid content within 0.4%, the following are necessary: a drying of the sample of seeds at 105C for 3 hours, the elimination of iron magnetic impurities, a regulation of apparatus on the temperature variations in the interval of 30 to 45 min., the use as standard, the oil or the seeds which have fatty acid composition similar to that of the seeds which will be analysed. (Rev. Fr. Corps Gras)

INFLUENCE OF STORAGE OF RAPESEED OIL ON THE COURSE OF REFINING PROCESS. H. Zsemraj. *Tluszcze jadalane* 19, 62–72 (1975). If, before storage, degumming of extracted rapeseed oil with the phosphoric acid is done, the quality of the oil will be better. The refining of rapeseed oil degummed and then stored is easier. The oil doesn't tend to be emulsified during the neutralization and washing. The bleaching process of this oil is also improved. (Rev. Fr. Corps Gras)

INFLUENCE OF INDUSTRIAL REFINING OF RAPESEED OIL ON THE RATE OF HYDROGENATION. S. Drozdowski et al. (Polytechnique School of Gdansk) *Tluszcze jadalane* 19, 73–87 (1975). Hydrogenation of rapeseed oil is one of the difficult processes which can be explained, beside other factors, by the deactivation of nickel catalyst due to the sulphur and phosphorus compounds and some other inhibitors present in the oil. In this paper, the elimination of these compounds is studied, especially the kinetics, of different stages of refining process of rapeseed oil. Afterwards, hydrogenation of this oil is done at 160 and 180C with 0.1% Ni catalyst. The influence of different stages of refining process on the hydrogenation is discussed. The results show the importance of the way in which the refining process is done on the rate of hydrogenation. The higher speed of hydrogenation of deodorized oil shows that some of the inhibitors are eliminated during deodorization. (Rev. Fr. Corps Gras)

PRESENCE OF RESIDUE OF ORGANOCHLORINATED INSECTICIDES IN THE MARGARINES AND EDIBLE OILS OF THE NATIVE PRODUCTION IN THE YEARS 1971 AND 1972. S.J. Kubacki et al. *Tluszcze jadalane* 19, 88–98 (1975). The residue of organochlorinated pesticides determined in margarine and oils are less than the tolerances proposed by IAO/WHO for animal fats (HCH-2 mg/kg, DDT plus metabolites -7 mg/kg). These residues are also lower than the level accepted for these compounds for the products for export (HCH-2 mg/kg, DDT & metabolites-3 mg/kg, DMDT-3 mg/kg). In the years 1971 and 1972, the contamination greater than 1 mg/kg was found only in 1% of the samples with the 30% in years 1968–70. (Rev. Fr. Corps Gras)

ABSORPTION OF SOME FATTY ACIDS OF RAPESEED OIL. S. Ziemlanski et al. *Przegl. Lek.* 31, 322–7 (1974). The intestinal absorption of oleic and erucic acids on 180 rats has been studied. The contents of these acids in the stomach, intestinal excretion, and blood plasma showed that oleic acid was absorbed and metabolized in 8 hours. Erucic acid was excreted in 5 days. The presence of erucic acid in rapeseed oil can be considered as the principal cause of mediocre digestibility. (Rev. Fr. Corps Gras)

OPTIMAL CONDITIONS FOR THE EXTRACTION OF VEGETABLE OILS BY SOLVENTS. G. Boeru. *Ind. Alimemt.* (Bucharest) 25, 278–82 (1974). The transfer of oil during extraction with solvent is rapid if the cells of the seeds are open. If hexane is used, the optimal water content must be 14% for sunflowerseed and a minimal 6% for soybean. The temperature for extraction must be near the solvent boiling point and output of miscella rich in oil 1 cm/sec. (Rev. Fr. Corps Gras)

METHOD WITH ONLY ONE STAGE FOR THE SEPARATION OF DDT AND ITS DERIVATIVES FROM NATURAL FATS. S. Smoczynski et al. *Technol. Zywn.* 1974(3), 201–9. The detailed description of the method for separation of DDT, DDD, and DDE, from animal fats, in only one stage is given in the paper. In the method, the column packed with celite with the addition of H_2SO_4 is used. The error of the method is not higher than 5%. For the separation of chlorinated hydrocarbons by the proposed method, about 1.5 hours is necessary while the Mills method needs 3 hours. (Rev. Fr. Corps Gras)

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ROLE OF THE SURFACE EXCESS OF PALMITOYL COENZYME A IN THE 1-ACYLGLYCEROL-3-PHOSPHATE ACYLTRANSFERASE REACTION CATALYZED BY MICROSOMES. H.L. Brockman (Hormel Instit., Univ. of Minn., Austin, Minnesota 55912) *J. Biol. Chem.* 250, 4423–6 (1975). Surface excess values for palmitoyl-coenzyme A have been determined at the air-water interface. In the bulk concentration range of 0.23 to 3.7 μM, the surface concentration of palmitoyl-CoA ranges from 0.7 to 1.4 $\times$ 10^{-10} mol/cm^2. The molecules of palmitoyl-CoA in the surface layer behave as if they were in a monolayer with each molecule occupying a limiting molecular area of 79 A°. The distribution of palmitoyl-CoA between bulk and surface phases can be described by a Langmuir adsorption isotherm with an equilibrium constant of 0.33 μM. This constant is identical to the apparent K_m for palmitoyl-CoA in the 1-acylglycerol-3-phosphate acyltransferase reaction catalyzed by microsomes. The results of this study, together with those from earlier work, suggest that the observed saturation behavior of the enzymatic reaction reflects the formation of a positive surface excess of palmitoyl-CoA in the vicinity of the catalytic site.

HYDROCARBON CHAIN PACKING AND MOLECULAR MOTION IN PHOSPHOLIPID BILAYERS FORMED FROM UNSATURATED LECITHINS. SYNTHESIS AND PROPERTIES OF SIXTEEN POSITIONAL ISOMERS OF 1,2-DIOCTADECENOYL-SN-GLYCERO-3-PHOSPHORYLCHOLINE. P.G. Barton and F.D. Gunstone (Dept. of Biochem., Univ. of Alberta, Edmonton, Alberta T6G 2E1, Canada) *J. Biol. Chem.* 250, 4470–6 (1975). Isomers of *cis*-octadecenoic acid, with the double bond in each position in the hydrocarbon chain, were used to synthesize the corresponding 1,2-diacyl-*sn*-glycero-3-phosphorylcholines (lecithins). Differential thermal analysis of the lecithins, as a function of water content, permitted evaluation of the limiting transition temperature (T_c) of each isomer. Values of T_c plotted against double bond position fell on a smooth curve with a minimum at −22° for the dioctadec-9′-enoyl compound. Enthalpy and entropy data were then obtained from differential scanning calorimetry measure-

ments. In the gel state, the minimum interaction potential energy of hydrocarbon chains in bilayers formed from dioctadecenoyl lipids appears to be minimized by localization of the double bond near the middle of the chains. These differences in chain packing in the gel state are promulgated beyond the phase transition to the liquid crystalline state as an enhancement of chain motion as the temperature rises above T_c.

EFFECTS OF AN ACETYL-COENZYME A CARBOXYLASE INHIBITOR AND A SODIUM-SPARING DIURETIC ON ALDOSTERONE-STIMULATED SODIUM TRANSPORT, LIPID SYNTHESIS, AND PHOSPHOLIPID FATTY ACID COMPOSITION IN THE TOAD URINARY BLADDER. E.L. Lien, D.B.P. Goodman and H. Rasmussen (Depts. of Biochem. and Pediatrics, Univ. of Penn. Sch. of Med./G3, Philadelphia, Penn. 19174). *Biochemistry* 14, 2749–54 (1975). A correlative study of the effects of two agents, 2-methyl-2-[*p*-(1,2,3,4-tetrahydro-1-naphthyl)phenoxy] propionic acid (TPIA) and amiloride, on aldosterone-induced alterations in Na^+ transport, lipid synthesis, and phospholipid fatty acid composition has been carried out in the toad urinary bladder. TPIA, an inhibitor of acetyl-CoA carboxylase, inhibits aldosterone-stimulated Na^+ transport as well as hormone-induced lipid synthesis and the increase in weight percentage of phospholipid long-chain polyunsaturated fatty acids. Amiloride, a diuretic which blocks sodium entry into the transporting epithelium, does not alter aldosterone's effects on lipid and fatty acid metabolism but prevents the hormone-induced increase in Na^+ transport. These results support the conclusion that aldosterone increases Na^+ transport in the toad urinary bladder by altering membrane fatty acid metabolism and that the lipid biosynthetic events following aldosterone treatment are a primary response to the hormone and not secondary increased Na^+ transport.

OXIDATIVE DESATURATION OF α-LINOLENIC, LINOLEIC, AND STEARIC ACIDS BY HUMAN LIVER MICROSOMES. I.N.T. De Goméz Dumm and R.R. Brenner (Instit. de Fisiologia, Facultad de Ciencias de la Salud, Universidad Nacional de La Plata, La Plata, Argentina) *Lipids* 10, 315–7 (1975). The desaturation of stearic, linoleic, and α-linolenic acids by human liver microsomes was studied. The microsomes were isolated from liver biopsies obtained during operations. It was shown that human liver microsomes are able to desaturate 1-^{14}C-α-linolenic acid to octadeca-6,9,12,15-tetraenoic acid; 1-^{14}C-linoleic acid to γ-linolenic acid and 1-^{14}C-stearic acid to oleic acid in the same system described in the rat. However, the desaturation activity obtained was low compared to other mammals. This effect was attributed to fasting, premedication, or the anaesthesia.

CHOLESTEROL ESTERASE IN RAT ADIPOSE TISSUE AND ITS ACTIVATION CYCLIC ADENOSINE 3′:5′-MONOPHOSPHATE-DEPENDENT PROTEIN KINASE. R.C. Pittman, J.C. Khoo and D. Steinberg. (Division of Metabolic Disease, Dept. of Med., Univ. of Calf., San Diego Sch. of Med., La Jolla, Calf. 92037) *J. Biol. Chem.* 250, 4505–11 (1975). A high level of cholesterol esterase activity, comparable to that of hormone-sensitive triglyceridase, has been demonstrated in rat adipose tissue. Essentially all of the activity was in the isolated adipocytes, primarily in the 100,000 × g supernatant fraction of the adipocytes. Cholesterol esterase activity in the 100,000 × g supernatant fraction was increased 40 ± 16% by incubation with ATP (0.5 mM), Mg^{2+} (1.25 mM) and cyclic adenosine 3′:5′-monophosphate (cyclic AMP) (10 μM), conditions which also activated hormone-sensitive triglyceridase. Protein kinase inhibitor (rabbit skeletal muscle) blocked activation, and activation was restored by the addition of excess protein kinase (bovine skeletal muscle). In extracts prepared from adipocytes first incubated for 5 min with 10 μM epinephrine and 1 mM theophylline there was no cyclic AMP-dependent cholesterol esterase activation, implying that the enzyme had been activated by a similar mechanism in the intact cell. The physiological role of this high level of cholesterol esterase activity in adipose tissue is unclear. Its relationship to hormone-sensitive triglyceride lipase, with which it extensively co-fractionates, and its possible involvement in fat mobilization remain to be determined.

ANTISTERILITY AND ANTIVITAMIN K ACTIVITY OF D-α-TOCOPHERYL HYDROQUINONE IN THE VITAMIN E-DEFICIENT FEMALE RAT. G.H. Rao and K.E. Mason (Dept. of Anatomy, Univ. of Rochester Schl. of Med. and Dentistry, Rochester, N.Y. 14620) *J. Nutr.* 105, 495–8 (1975). Daily administration of 5 mg of d-α-tocopheryl hydroquinone (ATHQ), intravenously or intraperitoneally throughout gestation, has been said to prevent fetal resorption in four out of five vitamin E-deficient rats (J. Nutr. 72, 322–24). These observations are supported by our bioassay tests involving 58 and 22 vitamin E deficient rats given oral supplements of ATHQ and of d-α-tocopheryl acetate, respectively, over days 5 to 8 of gestation. Evidence is presented that vitamin E fed after day 10 has little or no effect upon the course of gestation. In male rats given 330/mg/kg/day of ATHQ the testis, epididymis and related fat body were particularly prone to hemorrhage. Because internal hemorrhages in both sexes were prevented by menaquinone, the phenomena observed were attributed to an induced deficiency of vitamin K through unknown actions of ATHQ.

ON NEUTRAL FUCOGLYCOLIPIDS HAVING LONG, BRANCHED CARBOHYDRATE CHAINS: H-ACTIVE AND I-ACTIVE GLYCOSPHINGOLIPIDS OF HUMAN ERYTHROCYTE MEMBRANES. K. Watanabe, R.A. Laine and S. Hakomori (Depts. of Pathobiol. and Microbiol., Schl. of Public Health and Schl. of Med., Univ. of Wa., Seattle, Wa. 98195) *Biochemistry* 14, 2725–33 (1975). H-active ceramide heptasaccharide (H_2-glycolipid) and ceramide decasaccharide (H_3-glycolipid) were isolated from blood group O human erythrocyte membranes. Their structures have been determined by conventional methylation analysis, enzymatic degradation, and direct total mass spectrometry of the enzymatic degradation products after permethylation and reduction with sodium bis(2-methoxyethoxy)aluminum hydride. The branched sugar residue in the structure of H_3-glycolipid was unambiguously determined by a new method with the combination of enzymatic degradation and comparison of the total mass spectrogram of the reduced product of the enzyme-degraded compounds. The proposed structures are as follows: H_2 component: α_L-Fuc(1–2) β Gal(1→4) β GlcNAc(1→3) β Gal(1→4) β GlcNAc(1→3) β Gal(1→4)Glc→ceramide H_3 component: α_L-Fuc(1→2) β Gal(1→4) β GlcNAc(1→3)

β

α_L-Fuc(1→2) β Gal(1→4) β GlcNAc(1→6)

Gal(1→4) β GlcNAc(1→3) β Gal(1→4)Glc→ceramide.

The fourth component of H-active glycolipid (H_4-glycolipid) was also isolated in chromatographically heterogenous form, but chemical analysis and methylation study indicate heterogeneity of the fraction. Both H_3- and H_4-glycolipids inhibit I-hemagglutination, whereas H_1- and H_2-glycolipids do not inhibit I-hemagglutination.

LACTOSYL CERAMIDOSIS: NORMAL ACTIVITY FOR TWO LACTOSYL CERAMIDE β-GALACTOSIDASES. D.A. Wenger, M. Sattler, C. Clark, H. Tanaka, K. Suzuki and G. Dawson (Dept. of Pediatrics, Univ. of Colorado Med. Center, Denver 80220) *Science* 188, 1310–2 (1975). Lactosyl ceramide β-galactosidase activities in the fibroblasts from the previously described patient with so-called "lactosyl ceramidosis" were reexamined with the two recently developed assay methods which appear to measure two genetically distinct enzymes that can degrade this substrate. No deficiency of either of the lactosyl ceramide-cleaving enzymes was observed. In addition, sphingomyelinase activity was only one-sixth of normal, while all other enzymes examined were within the normal ranges.

VITAMIN D: 3-DEOXY-1α-HYDROXYVITAMIN D_3, BIOLOGICALLY ACTIVE ANALOG OF 1α,25-DIHYDROXYVITAMIN D_3. A.W. Norman, M.N. Mitra, W.H. Okamura, and R.M. Wing (Dept. of Biochm., Univ. of Clf., Riverside 92502) *Science* 188, 1013–5 (1975). The ability of chemically synthesized 3-deoxy-1α-hydroxyvitamin D_3, an analog of the biologically active form of vitamin D_3 (1α,25-dihydroxyvitamin D_3), to stimulate intestinal calcium transport was assessed. The 3-deoxy analog acted significantly more rapidly than vitamin D_3 and only slightly slower than 1α,25-dihydroxyvitamin D_3. Comparison of the dose-response curves of these three vitamin D derivatives emphasizes the importance of the 3β-hydroxyl group to biological activity.

DIETARY LEVELS OF VITAMIN E AND POLYUNSATURATED FATTY ACIDS AND PLASMA VITAMIN E. L.A. Witting and L. Lee, (College of Nutr., Textiles, and Human Develop., Tex. Woman's Univ., Box 23975, TWU Station, Denton, Tex. 76204) *Am. J. Clin. Nutr.* 28, 571–6 (1975). Seventeen daily diets (breakfast, lunch, and dinner) were analyzed from a 35-day menu cycle fed to students, under contract in the University dining halls. This 35-day menu cycle was repeated 6.6 times over the course of two 15-week semesters and registration and final examination periods. The average 2,500 kcal diet collected during the sixth and seventh menu cycles contained 96 ± 26 g fat of which 19.5 ± 1.8% was linoleate and 28.7 ± 14.2 mg total tocopherol of which 7.5 ± 3.5 mg was

RRR-α-tocopherol. Blood samples obtained from 26 female undergraduate student volunteers contained adequate levels of plasma total vitamin E, 1.09 ± 0.25 mg/100 ml, despite the observation that 71% and 65% of the diets analyzed did not meet the value tabulated in the eighth edition of "Recommended Dietary Allowances" for adult females in terms of RRR-α-tocopherol or total vitamin E activity, respectively. These data emphasize the importance of the average long-term consumption of this fat-soluble vitamin rather than daily intake.

RECOMMENDED DIETARY ALLOWANCE FOR VITAMIN E: RELATION TO DIETARY, ERYTHROCYTE AND ADIPOSE TISSUE LINOLEATE. L.A. Witting and L. Lee, (College of Nutr., Textiles, and Human Develop., Tex. Woman's Univ., Box 23975, TWU Station, Denton, Tex. 76204) *Am. J. Clin. Nutr.* 28, 577–83 (1975). The general trend toward increased consumption of polyunsaturated fatty acids is apparent in the linoleate level of adipose tissue (13.0 ± 1.3%) and erythrocyte lipids (14.0 ± 1.9%) in the present group of female undergraduate student volunteers compared to values reported in the early 1960's. On the basis of the level of linoleate in their diets (19.5 ± 0.8%), it is also apparent that further increases in tissue lipid linoleate levels are to be anticipated, which in turn will result in an increased requirement for vitamin E. It is suggested that adipose tissue linoleate levels in the general population be used as a baseline for the periodic evaluation and revision of the recommended dietary allowance for vitamin E. The recommended dietary allowance could then be phrased in terms of the quantity of vitamin E activity to be consumed per gram linoleate in 100 g adipose tissue fatty acids. A recommendation of 0.6 IU vitamin E activity/g linoleate in 100 g adipose tissue fatty acids is tentatively suggested.

EFFECT OF TEMPERATURE UPON LINOLENIC ACID LEVEL IN WHEAT AND RYE SEEDLINGS. T. Farkas, E. Deri-Hadlaczky and A. Belea (Instit. of Biochem., Instit. of Genetics, Biolog. Res. Ctr., Hungarian Academy of Sci., 6701 Szeged, Hungary) *Lipids* 10, 331–4 (1975). The fatty acid composition of leaves of nine wheat and one rye species was studied in relation to temperature both under laboratory and field conditions. Seedlings exposed to cold (2 C) either in laboratory or on field had higher levels of linolenic acid in their lipids than their greenhouse (22 C) germinated controls. The increase of the level of linolenic acid was accompanied by a decrease in the level of linoleic acid in field grown species. A relationship seems to exist between sensitivity to cold and accumulation of linolenic acid; those species resistant to cold displayed greater increase in their linolenic acids than those more sensitive to chilling temperatures. This response in cold resistant species was quite rapid, two days of cold exposure resulted in a significant increase of linolenic acid. The possible mechanisms responsible for the observed changes are discussed.

^{13}C NUCLEAR MAGNETIC RESONANCE STUDY OF THE DYNAMIC STRUCTURE OF LECITHIN-CHOLESTEROL MEMBRANES AND THE POSITION OF STEARIC ACID SPIN-LABELS. P.E. Godici and F.R. Landsberger (Exxon Res. and Engineering Co., Lindne, N.J. 07036) *Biochem.* 14, 3927–33 (1975). The dynamic structure of phosphatidylcholine-cholesterol bilayers has been investigated by measuring the ^{13}C nuclear spin-lattice relaxation times and line widths of sonicated egg yolk lecithin-cholesterol (2:1) dispersions. The present studies suggest that cholesterol diminishes the long-range swinging motion of the fatty acyl chains but does not appreciably affect the rate of rapid rotational isomerizations. Data are presented which suggest that the motion of the polar head groups of the lecithin bilayer is independent of cholesterol content. Furthermore, the positioning of the C_5 stearic acid derivative spin-label is not detectably altered by the incorporation of cholesterol into phosphatidylcholine bilayers. Spin-label electron spin resonance studies of the partitioning of a small nitroxide, Tempo (2,2,6,6-tetramethylpiperidinyl-1-oxy), between the aqueous and lipid phases suggest that the lecithin-cholesterol (2:1) vesicles are largely in a fluid state at physiological temperatures.

ELECTRICAL CAPACITY OF BLACK LIPID FILMS AND OF LIPID BILAYERS MADE FROM MONOLAYERS. R. Benz, O. Fröhlich, P. Läuger and M. Montal (Fachbereich Biologie, Universität Konstanz, D-775 Konstanz (G.F.R.) *Biochim. Biophys. Acta* 394, 323–34 (1975). Planar bilayer membranes were formed from monolayers of a series of monounsaturated monoglycerides and lecithins. The hydrocarbon thickness of these membranes, as calculated from the electrical capacity, increases with the length of the fatty acid chain. The specific capacity of monoolein bilayers was found to be 0.745 $\mu F/cm^2$ which is nearly twice that of a monoolein black film made in the presence of decane, but is close to that obtained after freezing out the solvent from the black film. The hydrocarbon thickness of the bilayer, as calculated with a dielectric constant of 2.1, is considerably less than twice the length of the extended hydrocarbon chain of the monoglyceride. The specific capacity (C_m) of bilayers made from monoolein monolayers showed a negligible voltage dependence, whereas the C_m increased significantly at a voltage of 150 mV in the case of Mueller-Rudin-type monoolein films with *n*-decane as a solvent.

ENZYMATIC CHOLESTEROL DETERMINATION USING ION-SELECTIVE MEMBRANE ELECTRODES. D.S. Papastathopoulos and G.A. Rechnitz (Dept. of Chem., State Univ. of N.Y., Buffalo, N.Y. 14214) *Anal. Chem.* 47, 1792–6 (1975). A potentiometric analysis method for cholesterol using a double enzyme procedure in an automated analysis system is described. The method is evaluated with synthetic standards, standard reference serum samples, and actual patient serum samples correlated with independent analyses. The clinical range, precision, and accuracy of the proposed method are attractive for routine determinations of total cholesterol in clinical serum samples. Operating variables are critically examined to define conditions for optimum linearity and sensitivity.

FLUID LIPID FRACTION IN ROD OUTER SEGMENT MEMBRANE. M. Pontus and M. Delmelle (Dept. de Physique Atomique et Moleculaire, Univ. de Liege, 4000 Sart Tilman par Liege I, Belgium) *Biochim. Biophys. Acta* 401, 221–30 (1975). Rod outer segment membrane is analyzed using the spin label technique by means of two probes. The solubility of the first label, 2,2,6,6-tetramethylpiperidin-1-oxyl, is correlated with the membrane fluidity which is measured using a stearic acid spin probe. The two values are compared to the solubility-fluidity relationship which characterizes a model system in which all lipids are in a fluid state. The analysis leads to the conclusion that only two thirds of the membrane lipids are fluid. This conclusion is reinforced by the observation that partial lipid removal leaves rigid lipids associated with the rhodopsin molecules.

FRACTIONATION AND ANALYSIS OF FLUORESCENT PRODUCTS OF LIPID PEROXIDATION. R. Trombly and A. Tappel (Dept. of Food Sci. and Tech., Univ. of California, Davis, Ca. 95616) *Lipids* 10, 441–7 (1975). The fluorescence excitation spectrum of model conjugated Schiff base compounds that arise from the reaction of malonaldehyde with amino acids was shown to contain a maximum at 260–280 nm in addition to the previously observed maximum at 350–390 nm. Excitation at either maximum results in emission at a single maximum at 440–480 nm. The excitation and emission maxima of the model fluorescent compounds, together with the characteristic reductions in fluorescence intensity caused by alkaline pH or heavy metal coordination, provide criteria with which to examine lipid peroxidation products for the presence of the conjugated Schiff base fluorophore. Silicic acid column chromatography and silica gel thin layer chromatography were employed to fractionate the fluorescent products of model lipid peroxidation systems and of rat testicular lipid soluble extracts. These products contained large families of compounds whose fluorescence characteristics were the same as those of the Schiff base fluorophores. The fractionation methods used enabled more thorough fluorescence characterization of many of the products of lipid peroxidation, but the fluorescence criteria available do not provide definitive proof of structure.

KINETICS OF A Ca^{2+}-TRIGGERED MEMBRANE AGGREGATION REACTION OF PHOSPHOLIPID MEMBRANES. J. Lansman and D.H. Haynes (Dept. of Pharmacol., Univ. of Miami Schl. of Med., Miami, Fla. 33152) *Biochim. Biophys. Acta* 394, 335–47 (1975). Ca^{2+} and other divalent cations can trigger aggregation of phospholipid vesicles containing phosphatidic acid or phosphatidylserine. The reaction, which can be detected by an increase in light scattering, has a critical dependence on the Ca^{2+} concentration, with a threshold near 4 mM Ca^{2+}. This is the concentration for half-saturation of the polar head groups and for full neutralization of the membrane surface charge. The aggregation proceeds as a "polymerization" reaction, eventually forming such large aggregates that the vesicles precipitate. The stopped-flow rapid mixing technique was used to study the vesicle dimerization reaction which is the first step in the overall aggregation process. Evidence is given that the stable complex is effected by Ca^{2+}-mediated salt bridges between the two membranes and that the rate constant of the transformation step derives from the statistics

of the distribution and the rate of redistribution of Ca^{2+}-occupied polar head groups on the membrane surfaces.

LATERAL DIFFUSION OF CHOLESTEROL IN MONOLAYERS. P. Stroeve and I. Miller (Lab. of Membranes and Bioregulation, Weizmann Inst. of Sci., Rehovot (Israel) *Biochim. Biophys. Acta* **401**, 157–67 (1975). The surface diffusion coefficient of cholesterol in cholesterol monolayers has been measured as a function of cholesterol surface concentration. Two different radiochemical methods, one integral and the other differential, were developed which gave comparable results. In the integral method two cholesterol monolayers, one of which is radioactive, are isolated on inert hydrophilic supports and then brought into contact. After some time the supports are separated and the radioactivity of the supports is measured. The differential method is an autoradiographic experiment. Two cholesterol monolayers, one of which is radioactive, are separated by means of a thin barrier. Upon removal of the barrier and at later times, an autoradiographic plate is brought to within a fraction of a mm from the aqueous surface and exposed. The plates are developed and analysed. The data show that the cholesterol surface diffusion coefficient in the dilute monolayers is approximately 10^{-6} cm^2/s and is nearly independent of surface concentration up to a concentration corresponding to an area of 40 $Å^2$/molecule. As the monolayer becomes compressed beyond this surface concentration, the diffusion coefficient decreases abruptly with the deeply decreasing surface tension to about 10^{-7} cm^2/s, when a fully condensed surface layer of 38 $Å^2$/molecule is reached. This diffusion coefficient is of the same order of magnitude as the diffusion coefficients measured in lipid bilayers and in membranes.

PROTON MAGNETIC RESONANCE RELAXATION STUDIES ON THE STRUCTURE OF MIXED MICELLES OF TRITON X-100 AND DIMYRISTOYLPHOSPHATIDYLCHOLINE. A.A. Ribeiro and E.A. Dennis (Dept. of Chem., Univ. of Calif. at San Diego, La Jolla, Calif. 92037) *Biochemistry* **14**, 3746–55 (1975). Proton magnetic resonance and gel chromatographic studies on mixtures of phospholipid and the nonionic surfactant Triton X-100 have shown that at temperatures above the thermotropic phase transition of the phospholipid and below the cloud point of Triton, mixed micelles are present at molar ratios above about 2:1 Triton/phospholipid. Proton T_1 and T_2 (from line widths) relaxation times are reported for protons in Triton micelles and in mixed micelles of Triton and dimyristoylphosphatidylcholine at a molar ratio of 3:1 Triton/phospholipid. The T_1 and T_2 values of Triton are unchanged in the presence of phosphatidylcholine. T_1 measurements in H_2O/D_2O mixtures are consistent with the idea that water does not penetrate the hydrophobic core of the mixed micelles, while water does solvate the polar oxyethylene and choline methyl groups. Titrations with Mn^{2+} confirms that the oxyethylene and choline methyl groups are on the exterior of the mixed micelle while the hydrophobic groups are located in the micellar interior.

SINGLET OXYGEN PRODUCTION ASSOCIATED WITH ENZYME-CATALYZED LIPID PEROXIDATION IN LIVER MICROSOMES. M.M. King, E.K. Lai, and P.B. McCay (Biomembrane Res. Lab., Oklahoma Med. Res. Foundation, Oklahoma City, Ok. 73104) *J. Biol. Chem.* **250**, 6496–502 (1975). Evidence for the formation of singlet oxygen during the oxidation of NADPH by liver microsomes is presented. The evidence is based primarily on the enzyme-dependent formation of dibenzoylethylene from diphenylfuran, a reaction which is specific for singlet oxygen. The apparent formation of singlet oxygen is coupled to the occurrence of peroxidation of microsomal lipid, a phenomenon known to be associated with NADPH oxidation by particles. Both the peroxidation of lipid and the apparent formation of singlet oxygen are related to the amount of Fe^{3+} present in the system and the results are consistent with the possibility that the singlet oxygen formed by this system is derived from the breakdown of lipid peroxides. This report also includes description of studies indicating that another enzyme, xanthine oxidase, which forms superoxide anion during its activity under aerobic conditions, does not form singlet oxygen during its function. This finding is in contrast to reports of others which indicate that xanthine oxidase activity does produce $^1O_2$.

SUBSTITUTION REACTIONS OF LINOLEIC ACID HYDROPEROXIDE ISOMERASE. D.D. Christianson and H.W. Gardner (Northern Regional Res. Lab., Peoria, Ill. 61604) *Lipids* **10**, 448–53 (1975). Linoleic acid hydroperoxide isomerase was extracted from corn germ and partially purified by differential centrifugation. This enzyme catalyzed the isomerization of linoleic acid hydroperoxide (R-CHOOH-CH===CH-CH==CH-R_1) to the expected α-ketol (R-CHOH-CO-CH_2-CH==CH-R_1) and γ-ketol (R-CH_2-CO-CH===CH-CHOH-R_1). Isomerase also catalyzed the substitution of various reagents at the carbon bearing the hydroperoxide group. These fatty acid products had the following functional groupings: R-CHX-CO-CH_2-CH==CH-R_1 where X is either oleoyloxy, ethylthio, or methoxy resulting from the presence of oleic acid, ethanethiol, or methanol, respectively. A crude wheat germ extract containing both lipoxygenase and isomerase enzymes reacted with linoleic acid to yield α-ketols, γ-ketols, and a substitution product, the linoleoyloxy ester of α-ketol. Characterization of these products from wheat germ enzymes showed that the substitution reaction was not unique to corn germ. Because anions of the reagents tested are typical nucleophiles, the substitution reactions may proceed by a nucleophilic mechanism as mediated by the isomerase enzyme.

trans cis *cis* *trans* *cis*

SUPPRESSION OF LYMPHOCYTE TRANSFORMATION BY 16, (16) DIMETHYL PROSTAGLANDIN E_2 AND UNSATURATED FATTY ACIDS. A.A. Mihas, R.G. Gibson and B.I. Hirschowitz (Div. of Gastroenterol., Univ. of Alabama in Birmingham, Birmingham, Ala. 35294) *Proc. Soc. Exp. Biol. Med.* **149**, 1026–8 (1975). A new synthetic prostaglandin (16, 16-PGE_2) and unsaturated fatty acids have been shown to inhibit the incorporation of [^{3}H]thymidine in the lymphocyte transformation reaction in response to phytohemagglutinin (PHA). This inhibition was not due to toxicity of these substances, for the lymphocytes remained intact and capable of excluding trypan blue.

SYNTHESIS OF A NEW PHOSPHATIDYLSERINE SPIN-LABEL AND CALCIUM-INDUCED LATERAL PHASE SEPARATION IN PHOSPHATIDYLSERINE-PHOSPHATIDYLCHOLINE MEMBRANES. T. Ito, S. Ohnishi, M. Ishinaga and M. Kito (Dept. of Biophys, Fac. of Sci., Kyoto Univ. Kyoto 606, Japan) *Biochemistry* **14**, 3064–9 (1975). A new phosphatidylserine spin label with nitroxide stearate attached at the 2 position has been synthesized by the reaction of spin-labeled CDP-diglyceride with L-serine under the catalytic action of phosphatidylserine synthetase. The calcium-induced lateral phase separation in the binary membrane was studied from the side of the calcium-receiving lipid. The results confirmed and extended our previous conclusion drawn with PC spin label. The phase diagram of the binary membrane in the presence of Ca^{2+} was determined. Not all PS molecules were aggregated to form the solid patches but some remained dissolved in the fluid PC matrix. The fluid PS fraction was larger for the membranes containing more PC. The membrane with 10% PS still had a significant fraction of solid phase. The rate of calcium-induced aggregation was greatly dependent of the PS content. The aggregation was almost complete within 5 min in the membrane containing 67% PS, while it was still proceeding after several hours in the membrane with 20% PS. The possible biological significance of the ionotropic phase separation was discussed whereby a transient density fluctuation was emphasized.

SYNTHESIS OF SULPHOQUINOVOSYL DIACYLGLYCEROL BY HIGHER PLANTS. J.L. Harwood (Dept. of Biochem., Univ. College, P.O. Box 78, Cardiff CF1 1XL, U.K.) *Biochim. Biophys. Acta* **398**, 224–30 (1975). The biosynthesis of sulphoquinovosyl diacylglycerol in germinating alfalfa seeds has been examined. Some incorporation of [^{35}S]sulphate into the lipid occurs before chlorophyll production and this is unaffected by chloramphenicol. Cysteic acid, molybdate, sulphite and sulpholactic acid all reduce incorporation of [^{35}S]sulphate into sulphoquinovosyl diacylglycerol. Some comparisons are made with other seed types. The results indicate that sulphoquinovosyl diacylglycerol synthesis in alfalfa probably proceeds by a pathway similar to that in *Euglena*.

THE EFFECT OF SALT ON PHOSPHOLIPID FATTY ACID COMPOSITION IN ESCHERICHIA COLI K-12. J.T. McGarrity and J.B. Armstrong (Dept. of Biol., Univ. of Ottawa, Ottawa, K1N 6N5, Canada) *Biochim. Biophys. Acta* **398**, 258–64 (1975). The fatty acid compositions of the three major phospholipids of *Escherichia coli* K-12; phosphatidylethanolamine, phosphatidylglycerol and cardiolipin; were determined during growth in media differing in NaCl concentration. Significant differences in fatty acid composition of the phospholipids were observed in the stationary phase cultures, but no appreciable differences were found in early exponential cultures.

THERMOTROPIC LIPID CLUSTERING IN TETRAHYMENA MEMBRANES. F. Wunderlich, A. Ronai, V. Speth, J. Seelig and A. Blume

(Inst. für Biol. II, Lehrstuhl für Zellbiol., Univ. Freiburg, 78 Freiburg, West Germany) *Biochemistry* 14, 3730–5 (1975). The effect of temperature on the core structure of endoplasmic reticulum membranes has been visualized directly in cells of the poikilothermic eukaryote *Tetrahymena pyriformis* by freeze-etch electron microscopy. Moreover, the effect of temperature on the smooth microsomal membrane vesicles isolated from these cells, as well as on the extracted membrane lipids, has been examined by fluorescence probing, electron spin resonance, proton nuclear magnetic resonance, and calorimetry. Freeze-etch electron microscopy of *T. pyriformis* cells, equilibrated at different temperatures between 28 and 5°, reveals the emergence of smooth areas on the fracture faces of endoplasmic reticulum membranes at temperatures below ~17°. In this temperature range, we also find discontinuities in the glucose 6-phosphatase activity, in the fluorescence intensity of 8-anilino-1-naphthalenesulfonate, in the partition of 4-doxyldecane, and in the separation of the outer hyperfine extrema of 5-doxylstearic acid in the microsomal membranes. The thermotropic alterations observed within the membranes are interpreted to be due primarily to a clustering of "rigid" liquid crystalline lipid environments which exclude membrane-intercalating proteins.

VITAMIN K AND THE BIOSYTHESIS OF PROTHROMBIN. V. γ-CARBOXYGLUTAMIC ACIDS, THE VITAMIN K-DEPENDENT STRUCTURES IN PROTHROMBIN. P. Fernlund, J. Stenflo, P. Roepstorff and J. Thomsen (Dept. of Clinical Chem., Univ. of Lund, Malmö General Hospital, S-214 01 Malmö, Sweden) *J. Biol. Chem.* 250, 6125–33 (1975). Tryptic peptides obtained from normal prothrombin have been compared with those obtained from prothrombin synthesized by cattle given the vitamin K antagonist dicumarol. Two peptides were found which contain vitamin K-dependent structures. These peptides contain residues 4 through 10 and residues 12 through 44, respectively. One of these (residues 4 through 10) has previously been shown to contain γ-carboxyglutamic acid residues. Digestion of this peptide with aminopeptidase M and carboxypeptidase B yielded a tetrapeptide (residues 6 through 9). Mass spectra of this peptide showed that it has the structure Leu-Glu-(CO_2)-Glu(CO_2)-Val. The structure of the peptide containing residues 12 through 44 was determined by automated degradation in a peptide sequenator. The modified glutamic acid residues were identified by mass spectrometric comparison with the thiohydantoin derivatives of synthetic γ-carboxyglutamic acid. This approach unequivocally demonstrated that all of the first 10 glutamic acid residues in prothrombin are carboxylated to form γ-carboxyglutamic acid residues. Evidence is also presented that indicates that these γ-carboxyglutamic acid residues constitute the entire vitamin K-dependent modification of prothrombin.

α-HYDROXYLATION OF LIGNOCERIC ACID TO CEREBRONIC ACID DURING BRAIN DEVELOPMENT. DIMINISHED HYDROXYLASE ACTIVITY IN MYELIN-DEFICIENT MOUSE MUTANTS. S. Murad and Y. Kishimoto (Eunice Kennedy Shriver Ctr. for Mental Retardation at Walter E. Fernald State Schl., Waltham, Mass. 02154) *J. Biol. Chem.* 250, 5841–6 (1975). α-Hydroxylation of lignoceric acid (n-tetracosanoic acid) to cerebronic acid (2-hydroxylignoceric acid) by postnuclear preparations of brains from developing rat, mouse, and several neurological mouse mutants was studied. The preparations of brains from jimpy and myelin synthesis deficiency (msd) mice were found to synthesize cerebronic acid at less than 10% of their control rates, and those from quaking and dilute-lethal approximately 30 and 50%, respectively. The developmental pattern of the hydroxylase activity was examined in quaking, jimpy, and their control mice. In normal brains the hydroxylase activity was low in the immediate postnatal period, increased sharply between 10 and 20 days after birth, and fell to a low level following maturation of the brain. The hydroxylase activity in quaking mice changed similarly during brain development but at a much reduced level. The brains of jimpy mice had barely detectable hydroxylase activity which changed little with age and reached a peak at about 15 days postpartum.

ACTIONS OF INSULIN, EPINEPHRINE, AND DIBUTYRYL CYCLIC ADENOSINE 5′-MONOPHOSPHATE ON FAT CELL PROTEIN PHOSPHORYLATIONS. CYCLIC ADENOSINE 5′-MONOPHOSPHATE DEPENDENT AND INDEPENDENT MECHANISMS. W.B. Benjamin and I. Singer (Depts. of Med., Univ. of Pa. Schl. of Med., and Philadelphia Veterans Administration Hosp., Philadelphia, Pa. 19174). *Biochemistry* 14, 3301–9 (1975). Endogenous and hormone-induced protein (polypeptide) phosphorylations were studied in isolated rat fat cells, in fat pads, and in subcellular fractions obtained from fat tissue under different physiological conditions. Insulin (25–100 μU/ml) increased the incorporation of ^{32}P into two proteins: insulin-phosphorylated proteins (IPP 140 and IPP 50; ~140,000 and 50,000 daltons, respectively). Epinephrine (10^{-7}–10^{-6}M) increased the incorporation of ^{32}P into another protein: epinephrine-phosphorylated protein (EPP 60–65; ~60,000–65,000 daltons). Endogenous IPP 140 phosphorylation in fat cells obtained from fasted and refed rats was similar to that of insulin in normal cells. No differences in the total receptor protein or total protein kinase activity using [γ-^{32}P]ATP were noted between insulin-treated and control preparations.

A LIPID-LINKED OLIGOSACCHARIDE INTERMEDIATE IN GLYCOPROTEIN SYNTHESIS. CHARACTERIZATION OF [MAN-^{14}C]GLYCOPROTEINS LABELED FROM [MAN-^{14}C]OLIGOSACCHARIDE-LIPID AND GDP-[^{14}C]MAN. D.D. Pless and W.J. Lennarz (Dept. of Physiol. Chem., The Johns Hopkins Univ. Schl. of Med., Baltimore, Md. 21205) *J. Biol. Chem.* 250, 7014–9 (1975). Endogenous proteins of cell-free preparations of hen oviduct labeled from GDP-[^{14}C]Man or from [*Man*-^{14}C]oligosaccharide-lipid have been compared by sodium dodecyl sulfate polyacrylamide gel electrophoresis. Under the conditions tested, a polypeptide chain of molecular weight about 25,000 was the principle acceptor for the oligosaccaride moiety of exogenous [*Man*-^{14}C] oligosaccharide-lipid. The product labeled by [*Man*-^{14}C]oligosaccharide-lipid appeared identical with one of three glycoproteins formed when GDP-[^{14}C]Man was incubated with a crude membrane fraction. These three proteins (apparent molecular weights of 75,000, 55,000, and 25,000) accounted for nearly two-thirds of the [^{14}C]mannose-labeled glycoprotein products using GDP-[^{14}C]Man and either the crude membrane fraction or a total oviduct homogenate. Thus, all of the mannose acceptor proteins present in the oviduct homogenate appear to be membrane-bound. Analyses of the [*Man*-^{14}C] glycoproteins labeled from GDP-[^{14}C]Man in membrane fractions from hen kidney, liver, brain and oviduct indicated that a labeled polypeptide of apparent molecular weight 25,000 was the only major protein product common to the four preparations.

A LIPID-LINKED OLIGOSACCHARIDE INTERMEDIATE IN GLYCOPROTEIN SYNTHESIS IN OVIDUCT. STRUCTURAL STUDIES ON THE OLIGOSACCHARIDE CHAIN. W.W. Chen, W.J. Lennarz, A.L. Tarentino and F. Maley (Dept. of Physiol. Chem., The Johns Hopkins Univ. Schl. of Med., Baltimore, Md. 21205) *J. Biol. Chem.* 250, 7006–13 (1975). The structure of the oligosaccharide chain of the lipid-linked oligosaccharide that serves as a donor of oligosaccharide chain to proteins of hen oviduct membranes has been investigated. A [*Man*-^{14}C]glycopeptide fraction was prepared from membrane glycoproteins labeled with GDP-[^{14}C]mannose. Reductive alkaline cleavage of this glycopeptide yielded a reduced oligosaccharide that, by four criteria, was identical with reduced [*Man*-^{14}C]oligosaccharide prepared from [*Man*-^{14}C]oligosaccharide-lipid. The structure of the oligosaccharide chain of the [*Man*-^{14}C]glycopeptide was investigated by cleavage with a specific endo-β-N-acetylglucosaminidase, followed by treatment of the released oligosaccharide with purified α- and β-mannosidases. By this procedure it was possible to establish the structure of the cleavage product as (α-Man)$_n$-β-Man-(1→4)-GlcNAc. Similar studies were performed on the [*GlcNAc*-^{14}C]oligosaccharide prepared by hydrolysis of [*GlcNAc*-^{14}C]oligosaccharide-lipid. The results indicate that the structure of the intact oligosaccharide is (α-Man)$_n$-β-Man-(1→4)-β-GlcNAc-(1→4)-GlcNAc. These experiments, coupled with earlier enzymatic studies on synthesis of the glycoproteins from the lipid-linked oligosaccharide, provide strong evidence that the structure of the oligosaccharide intermediate and the oligosaccharide chain of the glycoprotein product contain the same core structure found in many secretory glycoproteins.

ANALYSIS OF TUMOR-ASSOCIATED ALKYLDIACYLGLYCEROLS AND OTHER LIPIDS DURING RADIATION-INDUCED THYMIC LEUKEMOGENESIS (38904). R.C. Brown, M.L. Blank, J.A. Kostyu, P. Osburn, A. Kilgore and F. Snyder (Dept. of Pathol., Univ. of N.C. Schl. of Med., Chapel Hill, N.C. 27514) *Proc. Soc. Exper. Biol. Med.* 149, 808–13 (1975). Lipid compositions of thymuses investigated during the development of thymic leukemogenesis induced by exposing C57BL/6J mice to gamma radiation led to the following conclusions. Alkyldiacylglycerols, a class of lipids that are generally elevated in most neoplastic tissues, occurred only in small quantities (less than 1% of the total lipids) in the thymuses of both control and irradiated mice. Thymuses 3 days after irradiation and leukemic thymuses contain 2- to 3-fold greater quantities of cholesterol esters than control thymuses. No major differences

were found in the distribution of acyl moieties in the cholesterol esters of the various thymus samples from the same aged mice except that in thymic tumors the quantity of 18:1 esters was increased by about 25% over that of the controls. Acyl composition of the triacylglycerols of thymuses revealed an increase in the 18:1 and a decrease in the 18:2 acids at 3 days after irradiation when compared to the same aged controls. The fatty acid distribution in the phospholipid fraction of thymuses was not altered by the appearance of leukemia.

BIOSYNTHESIS OF ACYL GROUPS IN MOLECULAR SPECIES OF BILIARY PHOSPHATIDYLCHOLINES DURING METABOLISM OF [2,2,2-$^2H_3$]ETHANOL. T. Curstedt (Kemiska Instit., Karolinska Instit., S-104 01 Stockholm 60, Sweden) *Biochim. Biophys. Acta* 398, 265–74 (1975). Incorporation of deuterium into different positions of individual molecular species of biliary phosphatidylcholines was determined in bile fistula rats given [2,2,2-$^2H_3$]ethanol under conditions ensuring maximal rate of oxidation for 24 hr. The deuterium-labelling of the glycerol moiety of the major molecular species was about 6–8 atom % at the end of ethanol administration. The deuterium excess at each of the different positions of the glycerol moiety of 1-palmitoyl-2-linoleoyl phosphatidylcholine was less than 3 atom %. From the isotopic composition of the palmitoyl residues of the phosphatidylcholines, it was calculated that [2,2,2-$^2H_3$] ethanol supplied about 35–40% of the acetyl-CoA forming the terminal methyl group and about 25–30% of the other C_2 units of the palmitic acid chain. This difference in deuterium incorporation was interpreted as being due to an isotope effect, probably in the rate-limiting carboxylation step of acetyl-CoA. Most or perhaps all of the acetyl groups derived from ethanol were introduced into the terminal methyl group without loss of deuterium. This indicates that citrate is not an important carrier of acetyl-CoA in the biosynthesis of fatty acids from ethanol.

BIOSYNTHESIS AND STRUCTURE OF GLYCOSYL DIGLYCERIDES, STERYL GLUCOSIDES, AND ACYLATED STERYL GLUCOSIDES. A.D. Elbein, W.T. Forsee, J.C. Schultz and R.A. Laine (Dept. of Biochem., Univ. of Texas Hlth. Sci. Ctr., San Antonio, Texas 78284) *Lipids* 10, 427–36 (1975). A particulate enzyme fraction from *Mycobacterium smegmatis* catalyzed the transfer of ^{14}C-glucose from UDP-^{14}C-glucose into neutral glycolipids. The two major radioactive components were purified by column chromatography on O-diethylamino ethyl cellulose (acetate) and thin layer chromatography on silica gel in several solvents. The first product yielded a water-soluble component upon saponification, which had a hexose-glycerol ratio of 1:1 with all of the hexose being identified as glucose. The second product yielded a water-soluble component upon saponification which contained hexose and glycerol in a 2:1 ratio and, in addition to glucose, contained lesser amounts of mannose and galactose. Particulate fractions from developing cotton fibers also catalyzed the formation of steryl glucosides and, in addition, they catalyzed the esterification of steryl glucosides at the 6 position of glucose with fatty acids (primarily palmitate and oleate) from an endogenous acyl donor. Both the glycosyl transferase and the acyltransferase have been solubilized with Triton X-100 and partially purified by chromatography on Sephadex G-200. The acyltransferase activity was reconstituted by the addition of the steryl glucoside and a phospholipid acyl donor.

CHARACTERIZATION OF A HUMAN INTESTINAL FUCOLIPID WITH BLOOD GROUP Le^a ACTIVITY. E.L. Smith, J.M. McKibbin, K. Karlsson, I. Pascher, B.E. Samuelsson, Yu-Teh Li and Su-Chen Li (Dept. of Biochem., Univ. of Alabama, Birmingham, Ala. 35294) *J. Bio. Chem.* 250, 6059–64 (1975). A fucolipid that carried human blood group Le^a activity was isolated from human small intestine. It contained fucose, galactose, *N*-acetyl glucosamine, glucose, and ceramide in a molar ratio of 1:2:1:1:1. After periodate oxidation only 1 molecule of galactose and the *N*-acetylglucosamine remained. Permethylation of the lipid gave derivatives of a terminal fucose and glactose residue together with 2,4,6-tri-*O*-methylgalactose and 2,3,6-tri-*O*-methylglucose. After removal of fucose the lipid could be converted to a ceramide trihexoside with β-galactosidase, and this, in turn, to ceramide lactoside by the action of β-*N*-acetylhexosaminidase. Both enzymes converted the defucosylated derivative to a ceramide monohexoside. The methylated and the methylated and reduced derivatives of the intact lipid gave ions in mass spectrometry for a terminal hexose and deoxyhexose, a terminal trisaccharide of hexose, deoxyhexose and *N*-acetylhexosamine, and terminal tetra- and pentasaccharides. Ceramide fragments characteristic of hydroxy fatty acids with 16, 22, 23, and 24 carbons were found together with those of phytosphingosine as the major long chain base. On the basis of these results and the immunologic activity of the fucolipid, the following structure is proposed:

$$\beta\,\text{Gal}\,(1\rightarrow3)\,\beta\,\text{GlcNAc}\,(1\rightarrow3)\,\beta\,\text{Gal}\,(1\rightarrow4)\,\text{Glc-ceramide}$$
$$\uparrow$$
$$\alpha\text{Fuc}\,(1\rightarrow)$$

ω-CYCLOHEXYL FATTY ACIDS IN ACIDOPHILIC THERMOPHILIC BACTERIA. STUDIES ON THEIR PRESENCE, STRUCTURE, AND BIOSYNTHESIS USING PRECURSORS LABELED WITH STABLE ISOTOPES AND RADIOISOTOPES. M. Oshima and T. Ariga (Dept. of Biochem., Kitasato Univ. Schl. of Med., Sagamihara-shi, Kanagawa, Japan) *J. Biol. Chem.* 250, 6963–8 (1975). ω-Cyclohexyl undecanoic acid and ω-cyclohexyl tridecanoic acid were found in 10 strains of acido-thermophilic bacteria isolated from different Japanese hot springs. These unusual fatty acids were found in the esterified form in glyceride type complex lipids and constituted 74 to 93% of the total fatty acids in the bacteria. The fatty acids other than ω-cyclohexyl fatty acids found were 14-methyl hexadecanoic acid (3 to 15%) and 15-methyl hexadecanoic acid (1 to 6%), and trace amounts of straight chain and methyl-branched tetra- and pentadecanoic acids. Biosynthesis of ω-cyclohexyl fatty acids increased with increase in the concentration of glucose in the culture medium. The metabolism of ω-cyclohexyl fatty acids was studied using deuterium-labeled precursors by mass fragmentation analysis. The deuterium of 2-D glucose was specifically incorporated into position 2 of the cyclohexyl ring of the fatty acids, indicating that the ring was synthesized from the glucose molecule. Radioactivity was efficiently incorporated into the ω-cyclohexyl fatty acids from labeled glucose, shikimate, and cyclohexyl carboxylate. These findings indicate that ω-cyclohexyl fatty acids are synthesized with glucose through shikimic acid and probably cyclohexyl carboxylyl-CoA derivative as the intermediates.

DIETARY FATS AND PROPERTIES OF ENDOPLASMIC RETICULUM: I. DIETARY LIPID INDUCED CHANGES IN COMPOSITION OF MICROSOMAL MEMBRANES IN LIVER AND GASTRODUODENAL MUCOSA OF RAT. M. Laitinen, E. Hietanen, H. Vainio and O. Hanninen (Dept. of Physiol., Univ. of Kuopio, SF-70100 Kuopio, Finland) *Lipids* 10, 461–6 (1975). Rats were fed for four weeks with different lipid diets to determine the effects on the endoplasmic reticulum membranes of the liver and on the postmitochondrial supernatant fraction of the gastroduodenal mucosa. The diets contained cholesterol, cacao butter, olive oil, and these in combination. The results showed that dietary lipids were able to modify the composition of the hepatic endoplasmic reticulum and, to a lesser extent, that of postmitochondrial fraction of gastroduodenal mucosa. Cacao butter in the diet decreased the relative proportion of protein in hepatic microsomes. Cholesterol and olive oil were able to increase the cholesterol content of microsomes. The trypsin digestion of membranes revealed that cholesterol increased the solubility of microsomal protein and decreased the trypsin sensitive protein-lipid binding. The neutral fat diets increased the binding of proteins to the membrane, and cholesterol had no effect when it was given in combination. The low power photomicrographs revealed vacuolization of the cytoplasm of the hepatocytes when rats were fed on lipid rich diets. Also fatty degeneration was present. Cholesterol in combination with olive oil, however, did normalize the structure of the hepatocytes to a marked extent.

DIETARY FATS AND PROPERTIES OF ENDOPLASMIC RETICULUM: II. DIETARY LIPID INDUCED CHANGES IN ACTIVITIES OF DRUG METABOLIZING ENZYMES IN LIVER AND DUODENUM OF RAT. E. Hietanen, M. Laitinen, H. Vainio and O. Hänninen (Dept. of Physiol., Univ. of Kuopio, SF-70100 Kuopio, Finland) *Lipids* 10, 467–72 (1975). Rats were fed cholesterol, cacao butter, or olive oil diets to determine the effect of dietary lipids on the rate of drug biotransformation in the liver and duodenum. The cholesterol rich diet maintained the hepatic aryl hydrocarbon hydroxylase activity at the same level as did the standard diet. Rats fed olive oil and cacao butter diets showed lower hepatic aryl hydrocarbon hydrorylase activity. The p-nitroanisole O-demethylase activity was double in hepatic-microsomes of rats fed the high cholesterol diet when compared to rats fed the standard diet. The hepatic uridine diphosphate glucuronosyltransferase activity showed different patterns depending on the in vitro treatment of the microsomal membranes. If the enzyme activity was assayed from the native, untreated microsomes, an increase in the measurable uridine diphosphate glucuronosyl transferase activity was found in rats having cholesterol rich diet.

EFFECTS OF BACTERIOPHAGE M13 INFECTION UPON PHOSPHOLIPID AND FATTY ACID COMPOSITIONS OF ESCHERICHIA COLI. P.K. Chattopadhyay and J. Dutta (Dept. of Chem., Bose Instit., Calcutta 9, India) *Lipids* 10, 497–500 (1975). *Escherichia coli* K38 were grown and infected with wild type and amber mutants of bacteriophage M13 in the early log phase. Lipid compositions of the infected and healthy cultures, grown under identical conditions, were determined 2 hr after infection. From the results, it was observed that total lipid and total phospholipid content remained nearly constant, suggesting that the cell membrane which contained the maximum phospholipids was not damaged by the infection. Moreover, the percentage of diphosphatidylglycerol and lyso- compounds corresponding to phosphatidylethanolamine and phosphatidylglycerol increased, while phosphatidylethanolamine and phosphatidylglycerol decreased. The increase in lyso-compounds may be due to the release of phospholipase A_2 (a periplasmic enzyme) from the cell wall after damage by the infection. Bacteriophage M13 infection had no effect on the fatty acid composition of the phospholipids.

EFFECTS OF DIET, AGE, STRAIN AND ANATOMICAL SITE ON FAT DEPOT TRIGLYCERIDE AND FATTY ACID CONTENT IN RATS. P.D. Shier and R. Schemmel (Dept. of Food Sci. and Human Nutr., Mich. State Univ., East Lansing, Mich. 48824) *Proc. Soc. Exp. Biol. Med.* 149, 864–70 (1975). OM rats fed a high fat ration were heavier, fatter and had fat depots which weighed at least three times as much as those fed a low fat (grain) ration. S rats fed a high fat ration showed a slight increase in fat depot weights and no increase in body weight or fat when compared to rats of the same strain fed grain. For both strains of rats fed either diet for 4, 10 or 20 wk following weaning, there was a lower percentage of TG in the inguinal depot than in the epididymal or perirenal-retroperitoneal fat depots. There was a tendency for rats fed a high fat ration to have a higher percentage of TG in adipose tissues than rats fed grain, but the differences were not significant as long as age, anatomical site and strain were constant. Strain and age had no significant effect on the percentage of TG in fat depots. The fatty acid composition of the fat depots was effected by ration, but not by age, strain or anatomical site of the fat depot.

EFFECTS OF GANGLIONIC AND β-ADRENERGIC BLOCKAGE ON CARDIOVASCULAR RESPONSES TO THE BISENOIC PROSTAGLANDINS AND THEIR PRECURSOR ARACHIDONIC ACID. P.A. Kot, M. Johnson, P.W. Ramwell, and J.C. Rose (Dept. of Physiol. and Biophys., Georgetown Univ. Med. Ctr., Washington, D.C. 20007) *Proc. Soc. Exp. Biol. Med.* 149, 953–7 (1975). Arachidonic acid (AA) 300 μg/kg, and PGE_2, 5 μg/kg consistently produced a decrease in systemic arterial pressure in anesthetized dogs. PGF_{2a}, 5 μg/kg, produced a pressor response. All three compounds increased myocardial contractile force, but the magnitude of the change following AA was less prominent. After ganglionic blockade, the depressor response to AA and PGE_2 persisted and the pressor response to PGF_{2a} was augmented. Myocardial contractile force did not increase following AA in ganglion-blocked animals indicating that the cardiac responses observed before hexamethonium were mediated by the baroreceptor reflexes. A much larger dose of AA (900 μg/kg) resulted in a small positive inotropic effect on the heart. This possibly represents a direct cardiac effect of AA, or may be indicative of increased biosynthesis of an intermediate endoperoxide, or PGE_2 and PGF_{2a}. Both PGE_2 and PGF_{2a} have a direct positive inotropic effect on the heart. The persistent cardiac effects of PGE_2 and PGF_2 after β-adrenergic blockade suggests that these compounds may not interact with the β-receptors of the myocardium.

EFFECT OF GLUCOSE ADMINISTRATION ON CHOLESTEROL AND BILE ACID METABOLISM IN RATS. K. Uchida, N. Takeuchi and Y. Yamamura (Shionogi Res. Lab., Shionogi & Co. Ltd., Fukushima-ku, Osaka, 553 Japan) *Lipids* 10, 473–7 (1975). Glucose administered to fasted rats caused a marked stimulation in hepatic cholesterogenesis and cholesterol 7α-hydroxylation, and an increase in biliary excretion of cholesterol and total bile acids. The excretion of cholic acid was not influenced during the first few hr after glucose administration, but was significantly increased after 5 hr. Chenodeoxycholic acid showed a similar change, but the increase was only ca. one tenth of that of cholic acid. The excretion of deoxycholic acid was markedly increased by 1 hr, but gradually decreased thereafter. Pretreatment with neomycin abolished the increase in deoxycholic acid by fasting and glucose administration. Other bile acid components showed no significant change. It thus was presumed that cholesterol endogenously synthesized in the liver was metabolized mainly to chenodeoxycholic acid. During the period of the acute enhancement of cholic acid formation from the endogenous cholesterol, biliary excretion of deoxycholic acid was increased. This probably occurred through the depression of 7α-rehydroxylation of deoxycholic acid, or through the enhancement of microbial formation of deoxycholic acid in the lumen, and through the increase of intestinal absorption.

EFFECT OF THE HUMAN PLASMA APOLIPOPROTEINS AND PHOSPHATIDYLCHOLINE ACYL DONOR ON THE ACTIVITY OF LECITHIN: CHOLESTEROL ACYLTRANSFERASE. A.K. Soutar, C.W. Garner, H.N. Baker, J.T. Sparrow, R.L. Jackson, A.M. Gotto and L.C. Smith (Dept. of Biochem., Tx. Technol. Med. Ctr., Lubbock, Tx. 79406). *Biochemistry* 14, 3057–64 (1975). The human plasma apoproteins apoA-I and apoC-I enhanced the activity of partially purified lecithin:cholesterol acyltransferase five to tenfold with chemically defined phosphatidylcholine:cholesterol single bilayer vesicles as substrates. By contrast, apoproteins apoA-II, apoC-II, and apoC-III did not give any enhancement of enzyme activity. The activation by apoA-I and apoC-I differed, depending upon the nature of the hydrocarbon chains of phosphatidylcholine acyl donor. ApoA-I was most effective with a phosphatidylcholine containing an unsaturated fatty acyl chain. ApoC-I activated LCAT to the same extent with both saturated and unsaturated phosphatidylcholine substrates. Two of the four peptides obtained by cyanogen bromide cleavage of apoA-I retained some ability to activate LCAT. The efficacy of each of these peptides was approximately 25% that of the whole protein. Cyanogen bromide fragments of apoC-I were inactive. The apoproteins from HDL, HDL_2, and HDL_3, at low protein concentrations, were equally effective as activators of LCAT and less effective than apoA-I. Higher concentrations of apoHDL, apoHDL_2, and apoHDL_3 inhibited LCAT activity. ApoC and apoA-II were both found to inhibit the activation of LCAT by apoA-I. The inhibition of LCAT by higher concentrations of apoHDL was not correlated with the apoA-II and apoC content.

EFFECT OF LYSINE ACETYLSALICYLATE ON BILIARY LIPID SECRETION IN DOGS. S. Erlinger, D. Bienfait, R. Poupon, M. Dumont and M. Duval (Unite de Recherches de Physiopathologie Hepatique (INSERM), Hôpital Beaujon, Clichy, France) *Clin. Sci. Mol. Med.* 49, 253–6 (1975). The influence of lysine acetylsalicylate on bile flow, erythritol clearance and bile salt, phospholipid and cholesterol secretion in bile was studied in unanaesthetized dogs fitted with a Thomas duodenal cannula. Lysine acetylsalicylate induced a marked increase in bile flow and a parallel increase in erythritol clearance although the bile salt secretion remained unchanged; this suggests that the compound stimulated the formation of the canalicular (hepatocytic) bile salt-independent fraction of bile flow. Lysine acetylsalicylate induced a significant decrease in biliary phospholipid and cholesterol secretion and the cholesterol saturation of bile was significantly reduced. It is postulated that the decrease in phospholipid and cholesterol secretion resulted from the dilution of intracanalicular bile salts. This effect of lysine acetylsalicylate, and possibly of other bile salt-independent choleretics, may be of value in the treatment of cholesterol gallstones in man.

EFFECT OF MODIFICATION OF THYROID FUNCTION ON CHOLESTEROL 7α-HYDROXYLATION IN RAT LIVER. N. Takeuchi, M. Ito, K. Uchida and Y. Yamamura (Third Dept. of Internal Med., Osaka Univ. Hosp. Fukushima-ku, Osaka, 533 Japan) *Biochem. J.* 148, 499–503 (1975). Hepatic activities of cholesterol synthesis and cholesterol 7α-hydroxylation were determined in hyper- and hypo-thyroid rats after oral administration of glucose or cholesterol. Increases in activities of both cholesterol synthesis and cholesterol 7α-hydroxylation induced by glucose administration were enhanced by pretreatment with thyroid powder but suppressed by pretreatment with thiouracil. The enhancement of 7α-hydroxylation was produced by a relatively small amount of thyroid powder, but high doses were required to increase cholesterol synthesis. On the other hand, the suppression of 7α-hydroxylation was brought about by a low dose of thiouracil, but high doses were required to decrease cholesterol synthesis. Thus it is concluded that cholesterol 7α-hydroxylase activity is more sensitive to thyroid function than are activities of cholesterol-synthetic enzymes.

EFFECT OF SUPPLEMENTAL VITAMIN E IN CONTROL OF RANCIDITY IN POULTRY MEAT. W.L. Marusich, E. De Ritter, E.F. Orinz, J. Keating, M. Mitrovic and R.H. Bunnell (Animal Hlth. Res. Depart. and Product Dev. Depart., Hoffmann-La Roche Inc., Nutley, N.J. 07110) *Poult. Sci.* 54, 831–44 (1975). The

effect of feeding graded concentrations of vitamin E on retarding rancidity in breast muscle was studied after slaughter and storage of market weight broilers and turkeys. Malonaldehyde content, determined by the thiobarbituric acid (TBA) method, was used as the index of rancidity development during refrigerated storage at 1°C. The α-tocopherol content of both breast muscle and liver and the lipid content of breast muscle were measured to established a correlation with the dietary vitamin E intake and the TBA value. Turkeys required markedly higher levels of supplemental vitamin E than broiler chickens to delay the onset of rancidity. Good correlation was found between TBA values and the α-tocopherol content of breast muscle for both broilers and turkeys.

EFFECT OF VITAMIN B-12 DEFICIENCY ON THE HEPATIC TISSUE CONCENTRATION OF ACYL CARNITINES. W.C. Burton and E.P. Frenkel (Evelyn L. Overton Hematology-Oncology Res. Lab., Dept. of Internal Med., Univ. of Texas Southwestern Med. Schl. and Veterans Admin. Hos., Dallas, Texas) *Biochim. Biophys. Acta* 398, 217–23 (1975). Concentrations of carnitine, acetyl carnitine, propionyl carnitine, and long chain acyl carnitines have been measured in hepatic tissue of normal and vitamin B-12 deficient rats using radiolabelled butyrobetaine to label carnitine pools. Increased levels of propionyl carnitine were seen in the livers of vitamin B-12 deprived animals when compared to those from normal animals. Methylmalonyl carnitine was not detected in the B-12 deprived animals. Free carnitine levels were no different in the livers from the B-12 deprived animals than from the normal control animals.

EFFECTS OF VITAMIN K DEFICIENCY, WARFARIN, AND INHIBITORS OF PROTEIN SYNTHESIS UPON THE PLASMA LEVELS OF VITAMIN K-DEPENDENT CLOTTING FACTORS IN THE CHICK. D.A. Walz, R.K. Kipfer and R.E. Olson (Dept. of Biochem., St. Louis Univ. Schl. of Med., St. Louis, Mo. 63104) *J. Nutr.* 105, 972–81 (1975). Two-week-old chicks adequate in vitamin K showed a relative lack of vitamin K-dependent clotting factors when compared with the rat, cow, and man. Chick prothrombin was 50%, IX 8%, and X 6% of respective levels in the rat. Factor VII was not detectable in chick plasma. When 1-day-old chicks were fed a vitamin K-deficient diet, prothrombin levels fell to 5% in 5 days, whereas factors IX and X fell to only 60% of normal. After warfarin administration to normal chicks, prothrombin levels fell to 20% in 6 hours, whereas factors IX and X fell to 60%. When cycloheximide was given to normal chicks, all vitamin K-dependent factors fell at the same relative rate with a half time of 2 hours. Puromycin was effective in blocking the action of vitamin K at both physiological and pharmacological doses.

EFFECT UPON BRAIN WEIGHT AND CHOLESTEROL CONTENT OF MAINTAINING RATS OF VARIOUS AGES AT CONSTANT WEIGHT. F. Chevallier, C. Serougne and G. Champarnaud (Lab. de Physiol. de la Nutr., Univ. de Paris-Sud, Batiment 447, F 91405 Orsay, France) *J. Nutr.* 105, 1003–11 (1975). Rats weighing 400 g were maintained at constant weight for 500 days. Their diet consisted of 14 g/day for the first 150 days and 13 g/day thereafter. A second group of rats weighing 350 g was fed 11.5 g/day for 400 days; at the end of the experiment, these rats weighed 382 g. Under these conditions, the increase in brain weight and in quantity and concentration of cholesterol in the brain as a function of time was identical to that observed in the control rats fed ad libitum. The increase in brain weight and in brain cholesterol content as a function of time was less than that observed in the control rats. A curve deduced from these results has the practical interest of indicating the daily energy requirement for maintaining rats at a chosen constant weight. It was also observed that, when conditions of minimal economy are imposed upon the adult rat, brain nutrition is not modified. But for young rats (100 g), brain development under these nutritional conditions is affected.

EVIDENCE FOR A FACTOR IN PIG ADIPOSE TISSUE CONTROLLING THE SPECIFICITY OF THE ACYLTRANSFERASE(S) OF TRIACYLGLYCEROL SYNTHESIS. G.B. Stokes and S.B. Tove (Dept. of Biochem., North Carolina State Univ., Raleigh, N.C. 27607) *J. Biol. Chem.* 250, 6315–9 (1975). The proportion of palmitate at position 2 of triacylglycerols synthesized by microsome-cytosol preparations of rat, mouse, or chicken adipose tissue was found to be markedly increased by the addition of an inactivated preparation of pig adipose tissue microsomes. A phosphate extract of pig adipose tissue microsomes was also active in directing palmitate to position 2 of rat triacylglycerols. The proportion of palmitate at position 2 of triacylglycerols synthesized was reduced by prior repeated extraction of the pig adipose tissue microsomes with phosphate. The pretreatment specificity was restored when the extract was added back to the microsomes. These observations support the proposal that the unusually high proportion of palmitate at position 2 of lard results from the action of a factor controlling the specificity of the acyltransferase(s) from pig adipose tissue.

FATTY ACID BIOSYNTHESIS IN EHRLICH CELLS. THE MECHANISM OF SHORT TERM CONTROL BY EXOGENOUS FREE FATTY ACIDS. R. McGee and A.A. Spector (Depts. of Biochem. and Internal Med., The Univ. of Iowa, Iowa City, Ia. 52242) *J. Biol. Chem.* 250, 5419–25 (1975). We have examined the mechanism by which extracellular free fatty acids regulate fatty acid biosynthesis in Ehrlich ascites tumor cells. *De novo* biosynthesis in intact cells was inhibited by stearate > oleate > palmitate > linoleate. The amount of citrate and long chain acyl-CoA in the cells was not changed appreciably by the addition of free fatty acids to the incubation medium, indicating that free fatty acids do not regulate fatty acid biosynthesis by changing the total intracellular content of these metabolites. By measuring the incorporation of labeled free fatty acids into acyl-CoA, however, it was determined that the fatty acid composition of the acyl-CoA pool was changed dramatically to reflect the composition of the exogenous free fatty acids. Microsomal chain elongation, the major system for elongation in Ehrlich cells, also was regulated by the composition of the cellular acyl-CoA pool. Lauroyl-CoA, myristoyl-CoA, and palmitoyl-CoA were good substrates for elongation by isolated microsomes; oleoyl-CoA and linoleoyl-CoA were intermediate; and stearoyl-CoA was a very poor substrate. We conclude that free fatty acids regulate fatty acid biosynthesis by changing the composition of the cellular acyl-CoA pool. These changes control the rate of malonyl-CoA production and, because of the acyl-CoA substrate specificity of the microsomal elongation system, modulate the amount of malonyl-CoA used for chain elongation.

FREE FATTY ACIDS AS FEEDBACK REGULATORS OF ADENYLATE CYCLASE AND CYCLIC 3′:5′-AMP ACCUMULATION IN RAT FAT CELLS. J.N. Fain and R.E. Shepherd (Div. of Biol. and Med. Sci., Brown Univ., Providence, R.I. 02912) *J. Biol. Chem.* 250, 6586–92 (1975). Rat fat cells incubated with lipolytic agents released substances to the medium which acted as feedback regulators of cyclic adenosine 3′:5′-monophosphate (cyclic AMP) accumulation. The feedback regulators were not removed by adenosine deaminase. Dialyzed medium that had previously been incubated with fat cells in the presence of norepinephrine markedly inhibited cyclic AMP accumulation by fresh cells, whereas dialyzed medium from control cells did not inhibit cyclic AMP accumulation. The effects of lipolytic agents could be mimicked by adding dialyzed medium previously incubated with fat cells in the presence of oleic acid.

IMMUNOCHEMISTRY OF HUMAN PLASMA HIGH DENSITY LIPOPROTEINS. RADIOIMMUNOASSAY OF APOLIPOPROTEIN A-II. S.J.T. Mao, A.M. Gotto, Jr., and R.L. Jackson (Depts. of Med. and Cell Biol., Baylor Col. of Med. and The Methodist Hosp., Houston, Tx. 77025) *Biochemistry* 14, 4127–31 (1975). Apolipoprotein A-II (ApoA-II) is a major apoprotein of human plasma high density lipoproteins (HDL). The apoprotein has two identical chains of known amino acid sequence; the chains are linked by a single disulfide bond. In the present study, we have developed a specific radioimmunoassay for ApoA-II that provides a convenient and reproducible method for measuring 10–100 ng of apoprotein. The assay was based on the competition of apoprotein with isotopically labeled [^{125}I]apoA-II. Dioxane (52%) was used to separate antibody bound [^{125}I]apoA-II from the free apoprotein. The assay has enabled us to begin studies directed toward mapping-out of the antigenic reactive regions of apoA-II. It has also allowed us to determine the interrelationship between the lipid-binding sites and the antigenic sites of the molecule. The antigenic reactivity of apoA-II was approximately the same in HDL and phospholipid-apoA-II complexes as that of the free apoprotein. However, succinylation of apoA-II was associated with a marked decrease in antigenic reactivity.

INFLUENCE OF ALTERATIONS IN MEAL FREQUENCY ON LIPOGENESIS AND BODY FAT CONTENT IN THE RAT. A.J. DeBont, D.R. Romsos, A.C. Tsai, R.A. Waterman, and G.A. Leveille (Dept. Food Sci. and Human Nutr., Mich. State Univ., East Lansing, Mich. 48824) *Proc. Soc. Exp. Biol. Med.* 149, 849–54 (1975). Rats were allowed to eat only 2 hr per day (meal-fed) or were fed *ad libitum* (nibbler) for 12 wk; another group of animals was meal-fed for 3 wk and then fed *ad libitum* (con-

verted I) while the fourth group of rats (converted II) was meal-fed for 3 wk, allowed to nibble for the next 3 wk, meal-fed from the 6th to 9th wk and then returned to *ad libitum* feeding for the last 3 wk. Body fat gain and food efficiency was increased in converted I rats. The lipogenic capacity of adipose tissue from meal-fed rats was greater than observed in nibbling rats. Changes in adipose tissue lipogenic activity decreased slowly when meal-fed rats were reverted to *ad libitum* feeding whereas lipogenic activity increased rapidly when *ad libitum* fed rats were switched to meal-feeding.

INFLUENCE OF SIALIC ACID GROUPS ON THE RETENTION OF GLYCOSPHINGOLIPIDS IN BLOOD PLASMA. A. Barkai and J.L. Di Cesare (Div. of Neurosci., New York State Psych. Instit., New York, N.Y. 10032) *Biochim. Biophys. Acta* 398, 287–93 (1975). The removal of several glycosphingolipids from the circulation and their disposal in different tissue and fluid compartments was studied in adult rats. ^{3}H-labeled dihydro analogs of several glycosphingolipids were injected intravenously and radioactivity was measured in arterial blood samples at subsequent time intervals, to obtain half life values for the labeled compound in the plasma. Half life values of less than 1 min were obtained for neutral glycosphingolipids whereas the half lives of labeled gangliosides were much longer and ranged from 3.8 to 21 hr. The prompt removal of labeled neutral glycosphingolipids but not of the gangliosides indicates that sialic acid groups play a significant role in the retention of glycosphingolipids in the circulation. The results suggest that neutral glycosphingolipids are rapidly exchanged with their counterparts in a large extraplasma pool and that a major portion of this exchange could occur between plasma and liver. The detection of only a minute fraction of the injected glycosphingolipids in the cerebrospinal fluid indicates that a blood-cerebrospinal fluid barrier exists for these compounds in the rat.

INTERACTION OF D-β-HYDROXYBUTYRATE APODEHYDROGENASE WITH PHOSPHOLIPIDS. P. Gazzotti, H.G. Bock, and S. Fleischer (Dept. of Molec. Biol., Vanderbilt Univ., Nashville, Tenn. 37235) *J. Biol. Chem.* 250, 5782–90 (1975). The interaction of a soluble homogeneous preparation of D-β-hydroxybutyrate apodehydrogenase with phospholipid was studied in terms of restoration of enzymic activity and complex formation. The purified apoenzyme, which is devoid of lipid, is inactive. It is reactivated specifically by the addition of lecithin or mixtures of phospholipids containing lecithin. Mitochondrial phospholipid, *i.e.* the mixture of phospholipids in mitochondria, reactivates with the highest specific activity (approximately 100 μmol of DPN reduced/min/mg at 37° and with the greatest efficiency (2.5 to 4 mol of lecithin/mol of enzyme subunit). Each of the lecithins of varying chain length and unsaturation reactivated the enzyme, albeit to differing extents and efficiencies. In general, lecithins containing unsaturated fatty acid moieties reactivated better than those containing the comparable saturated lipid. Optimal reactivation can be obtained for the various lecithins when they are microdispersed together with phosphatidylethanolamine. When the lecithins are added microdispersed together with both phosphatidylethanolamine and cardiolipin, maximal efficiency is obtained. Complex formation was studied using gel exclusion chromatography. The same energies of activation are obtained from Arrhenius plots for the membrane-bound enzyme and for the purified soluble enzyme reactivated with mitochondrial phospholipid of different lecithins. Hence, there is no indication that a lipid phase transition occurs to influence the activity of this enzyme.

INTERACTION OF L-α-PALMITOYL LYSOPHOSPHATIDYLCHOLINE WITH THE AI POLYPEPTIDE OF HIGH DENSITY LIPOPROTEIN. M.E. Haberland and J.A. Reynolds (Dept. of Biochem., Duke Univ. Med. Ctr., Durham, N.C. 27710) *J. Biol. Chem.* 250, 6636–9 (1975). The AI polypeptide chain from human high density serum lipoprotein has two accessible conformational states in aqueous solution. L-α-Palmitoyl lysophosphatidylcholine induces the transition between these two states at an equlibrium concentration of ligand of 2×10^{-5}M, and the protein has a maximum binding capacity of 95 to 100 mol of lipid/mol of protein. The present study, together with previous investigations in this laboratory, suggests that the conformational state of AI in the presence of high levels of bound amphiphiles is similar to the *in vivo* state, and further, that this complex does not result from the insertion of AI into amphiphilic micelles. The mode of interaction of AI with amphiphilic ligands is shown to be significantly different from that of membrane proteins thus far investigated.

INVOLVEMENT OF CYTOSOL PROTEINS IN OLEATE ACTIVATION OF RABBIT LIVER FRUCTOSE-1,6-DIPHOSPHATASE. C.W. Carlson, G.A. Tejwani, R.C. Baxter, E.H. Ulm and B.M. Pogell (Dept. of Microbio., St. Louis Univ. Sch. of Med., St. Louis, Mo. 63104) *J. Bio. Chem.* 250, 4996–5002 (1975). Dialyzed rabbit liver cytosol was specifically freed of endogenous fructose-1,6-diphosphatase by immunoadsorption on a column of Sepharose-immobilized anti-fructose-1,6-diphosphatase. This material increased the specific activity of homogeneous enzyme to the maximal rate observed with EDTA and shifted the pH optimum from 8.4 to 7.4. With oleate or other fatty acids as activators, the hydrolysis of fructose-1,6-diphosphatase by enzyme, at neutral pH, showed nonlinear initial rates dropping to lower linear rates. Phosphatidic acid and phosphatidylserine activated fructose-1,6-diphosphatase, and their action was synergistic with oleate. Glutathione (1 mM) activated the enzyme 5-fold at pH 7.3 and its effects were additive with oleate and cytosol or α-globulins.

ISOLATION AND CHARACTERIZATION OF C_{50}-CAROTENOID PIGMENTS AND OTHER POLAR ISOPRENOIDS FROM HALOBACTERIUM CUTIRUBRUM. S.C. Kushwaha, J.K.G. Kramer and M. Kates (Dept. of Biochem., Univ. of Ottawa, Ottawa, K1N 6N5, Canada) *Biochim. Biophys. Acta* 398, 303–14 (1975). The polar acetone-soluble lipids of *Halobacterium cutirubrum* were found to contain (in addition to the previously reported vitamin MK-8 and retinal) *neo*-bacterioruberin U, bacterioruberin, monoanhydrobacterioruberin, bisanhydrobacterioruberin, an isomer of geranylgeraniol (with one internal *cis*-isoprene residue), 2,3-di-*O*-phytanyl-*sn*-glycerol and two unidentified polar isoprenoids. All compounds were isolated in pure form by column and thin-layer chromatography, quantitated and characterized by their visible, ultraviolet, infrared, proton magnetic resonance and mass spectra and the spectra of their acetyl or silyl derivatives and/or dehydrated products.

β-KETOACYL-ACYL CARRIER PROTEIN SYNTHETASE. CHARACTERIZATION OF THE ACYL-ENZYME INTERMEDIATE. G. D'Agnolo, I.S. Rosenfeld and P.R. Vagelos (Dept. of Bio. Chem., Div. of Bio. and Biomed. Sci., Washington Univ., St. Louis, Mo. 63110) *J. Bio. Chem.* 250, 5283–8 (1975). β-Ketoacyl-acyl carrier protein (ACP) synthetase catalyzes the condensation reaction of fatty acid synthesis in *Escherichia coli*. The homogeneous enzyme reacts with hexanoyl-CoA to form hexanoyl-enzyme which was isolated and characterized. Hexanoyl-enzyme contains 2 mol of hexanoate/mol of enzyme (molecular weight 66,000); it is labile at alkaline pH, and it reacts with neutral hydroxylamine to form hexanoyl hydroxamic acid. Hexanoate was cleaved from the enzyme when hexanoyl-enzyme was subjected to performic acid oxidation. These properties indicate that hexanoyl-enzyme is a thioester. Studies of the circular dichroism spectra of fully acylated and nonacylated forms of the enzyme indicated that the secondary structure of the enzyme is relatively unperturbed by the presence of the hexanoyl groups. An α helical content of 65% was estimated for the enzyme from the circular dichroism spectrum. Hexanoyl-enzyme is active in both partial reactions that comprise the β-ketoacyl-ACP synthetase reaction; it reacts with ACP to form hexanoyl-ACP and with malonyl-ACP to form β-ketooctanoyl-ACP. Although the hexanoate of hexanoyl-enzyme is transferred very rapidly to ACP, the physiological acceptor in this reaction, it is also transferred very slowly to CoA, dithiothreitol, and 2-mercaptoethanol, indicating that the enzyme can react nonspecifically with a number of unrelated mercaptans.

KINETIC CHANGES OF THE ERYTHROCYTE (Mg^{2+} + Ca^{2+})-ADENOSINE TRIPHOSPHATASE OF RATS FED DIFFERENT FAT-SUPPLEMENTED DIETS. M.G. Galo, B. Bloj and R.N. Farias (Inst. de Química Bio., Fac. de Biochem., Química y Farmacia, Univ. Nacional de Tucumán, San Miguel de Tucumán, Rep. of Argentina) *J. Biol. Chem.* 250, 6204–7 (1975). The activation by Mg^{2+}, in the presence of 0.2 mM Ca^{2+}, of the erythrocyte ATPase from rats fed with six different fat-supplemented diets has been studied. A sigmoid kinetic curve was found. The values of the Hill coefficient showed a positive correlation with the membrane fatty acid fluidity, which is expressed as the ratio between double bond index and saturated fatty acid content. The values of the Hill coefficient ranged from 1.0, in animals fed with lard-supplemented diet, to 2.0, in animals fed with corn oil-supplemented diet. When the effect of increasing Ca^{2+} concentration in these two groups was studied at pH 8.1, an activation with the latter group and an inhibition with the former one were found. The activation by Ca^{2+} found in corn oil-fed animals was lost after treatment with phospholipase C and restored after the addition of homologous phospholipids. The activation could not be restored by addi-

tion of phospholipids from lard-fed animals. In this group, treatment with phospholipase C left the kinetic behavior unmodified, but an activation by Ca^{2+} could be detected after adding phospholipids from corn oil-fed animals. It is suggested that membrane fatty acid fluidity is involved in the cooperative transitions and cryptic activity of the (Mg^{2+} + Ca^{2+})-ATPase.

LACK OF FEEDBACK REGULATION OF CYCLIC 3′:5′-AMP ACCUMULATION BY FREE FATTY ACIDS IN CHICKEN FAT CELLS. J.A. Malgieri, R.E. Shepherd, and J.N. Fain (Div. of Biol. and Med. Sci., Brown University, Providence, R.I. 02912) *J. Biol. Chem.* 250, 6593–8 (1975). Fat cells isolated from the mesenteric adipose tissue of chickens (pullets) responded to glucagon with an increase in lipolysis and a sustained rise in cyclic adenosine 3′:5′-monophosphate (cyclic AMP) over a 30-min incubation. The prolonged accumulation of cyclic AMP due to glucagon in chicken fat cells was primarily intracellular. In addition, there was little increase in cyclic AMP accumulation due to theophylline alone or potentiation of the increase due to glucagon. Neither lipolysis nor cyclic AMP accumulation by chicken fat cells was inhibited by free fatty acid to albumin ratios (3 to 7) which markedly reduced both events in rat fat cells. However, in the absence of albumin from the medium, lipolysis in chicken fat cells was reduced, but not to the same extent as in rat fat cells. Chicken fat cells did accumulate more intracellular free fatty acids in response to lipolytic agents than did rat fat cells. The uptake of oleate by rat and chicken fat cells was identical.

LINOLEATE ENRICHMENT OF DIET AND PROSTAGLANDIN METABOLISM IN RATS. D.H. Hwang, M.M. Mathias, J. Dupont and D.L. Meyer (Dept. of Food Sci. and Nutr., Colo. State Univ., Fort Collins, Colo. 80523) *J. Nutr.* 105, 995–1002 (1975). Evidence that biosynthesis of prostaglandins (PG) in tissues of animals deficient in essential fatty acids is dependent on the availability of their precursors has been demonstrated. The purpose of this study was to determine the following: effects of dietary linoleate enrichment on PG biosynthesis in rats; effects of exogenous PGE_2 and dietary linoleate on plasma free fatty acids and serum cholesterol in fed and fasted rats. Rats were fed three different concentrations of dietary linoleate as beef tallow, hydrogenated vegetable fat, or corn oil. The concentrations of PGE_1 and PGF_2 measured by radioimmunoassay were higher in rats fed the corn oil diet than those fed the beef tallow diet independent of energy status. The increase in plasma free fatty acids associated with fasting was prevented by PGE_2 for all diets, but had the most marked effect on rats fed hydrogenated vegetable fat.

LIPID BIOSYNTHESIS IN THE CHICK. A CONSIDERATION OF SITE OF SYNTHESIS, INFLUENCE OF DIET AND POSSIBLE REGULATORY MECHANISMS. G.A. Leveille, D.R. Romsos, Y. Yeh, and E.K. O'Hea (Dept. of Food Sci. and Human Nutr., Mich. St. Univ., East Lansing, Mich. 48824) *Poult. Sci.* 54, 1075–93 (1975). Studies *in vitro* and with intact chicks support the view that liver is the major site of lipid biosynthesis in the chicken. Adipose tissue is relatively unimportant as a site of fatty acid biosynthesis in this species although it does have the ability to esterify fatty acids to triglycerides. Fasting, even for short periods of time, markedly depresses the capacity for hepatic lipogenesis in the chick. Food restriction for 2 hr. depresses hepatic lipogenesis by about 90% and refeeding for 1 hr./or/the intravenous administration of glucose or fructose restores the lipogenic capacity. Feeding diets high in fat or protein to chicks also reduces the capacity for hepatic lipogenesis. The effects of dietary fat and protein cannot be adequately explained on the basis of the reduction of dietary carbohydrate which accompanies increased dietary protein or fat levels. Dietary alterations influence the hepatic lactate-pyruvate ratio of chicks, however the changes observed are not always consistent with the changes observed in rat liver. Chicks fed high-protein diets have a decreased hepatic lactate/pyruvate ratio indicative of a more oxidized cytoplasmic environment. Thyroxine and glucagon affect hepatic fatty acid synthesis in the chick, however insulin appears to play a lesser role.

LIPID COMPOSITION OF BROWN ADIPOSE TISSUE AS RELATED TO NUTRITION DURING THE NEONATAL PERIOD IN HYPOTROPHIC RATS. A. Cogneville, N. Cividino and C.T. Caridroit (INSERM-Unite 29, 123, Bd de Port-ROYAL-75014-Paris, France) *J. Nutr.* 105, 982–8 (1975). Animals with intrauterine growth retardation (IUGR) were obtained by artery clamping of one uterine horn of the rat on day 17 of gestation. Body weight reduction was at least 30% as compared with the control animals that originated from the other horn. Brown adipose tissue (ISBAT), which plays a role in nonshivering thermogenesis, was greatly reduced during the period studied (fetuses from the day before up to 10 days after birth). Total lipids were very low after birth and increased rapidly up to age 3 days. Nevertheless, lipids of IUGR rats were lower during 48 hours and became identical to the controls only at 3 days. On the other hand, a change from mainly saturated to a greater proportion of unsaturated fatty acids occurred just after the first suckling. This switch was closely correlated to the fatty acid composition of the rat milk. Incorporation of ^{14}C from [^{14}C]glucose into lipids of ISBAT was lower in IUGR rats up to 48 hours as compared with control values and overlapped the control value after.

MULTIPLE FORMS OF β-KETOACYL-ACYL CARRIER PROTEIN SYNTHETASE IN ESCHERICHIA COLI. G. D'Agnolo, I.S. Rosenfeld and P.R. Vagelos (Dept. of Bio. Chem., Div. of Bio. and Biomed. Sci., Washington Univ., St. Louis, Mo. 63110) *J. Bio. Chem.* 250, 5289–94 (1975). Two forms of β-ketoacyl-acyl carrier protein (ACP) synthetase (designated I and II) have been identified in extracts of *Escherichia coli*. Synthetase I corresponds to the condensing enzyme that was studied earlier; synthetase II represents a new form of the enzyme. Synthetase II was isolated as a homogeneous protein. It differs from synthetase I in having a higher molecular weight (76,000 *versus* 66,000), a lower pH optimim (5.5 to 6.1 *versus* 7.2), and a greater resistance to denaturation by heat. Synthetase II is similar to synthetase I in that both are inactivated by iodoacetamide, and prior incubation of the enzymes with fatty acyl thioesters prevents the inhibitory effect of iodoacetamide. Both also react with a fatty acyl thioester to form an acyl-enzyme intermediate, and the latter reacts with malonyl-ACP to form a β-ketoacyl thioester. An investigation of synthetases I and II in two classes of unsaturated fatty acid auxotrophs revealed that synthetase I is absent in one class, *fab*B. Addition of wild type synthetase I to *fab*B fatty acid synthetase, which synthesizes only saturated fatty acids, permitted this fatty acid synthetase to synthesize unsaturated fatty acids.

ON THE ROLE OF LYSOPHOSPHATIDES IN VIRUS-INDUCED CELL FUSION AND LYSIS. J.G. Parkes and C.F. Fox (Dept. of Bacteriology and the Molecular Biol. Instit., Univ. of Calif., Los Angeles, Calif. 90024) *Biochemistry* 14, 3725–9 (1975). Three strains of Newcastle disease virus (NDV-HP-16, NDV-L-Kansas, and NDV-N) were propagated in chick embryo fibroblasts, equilibrium labeled with $^{32}P_i$, and the composition of phospholipid in the membranous envelope of the virions determined. A phospholipid identified as monoacylphosphatidylserine was consistently observed in the viral strains which are listed as follows in their order of decreasing abundance of lysophosphatidylserine: NDV-HP-16 > NDV-L-Kansas >> NDV-N. The phosphatidylserine concentration in the virion envelopes of these strains decreased in proportion to the increase in the monoacylphosphatidylserine concentration. No other lysophosphatide was observed in significant quantity in virions of these strains. On the basis of these findings we conclude that there is no direct correlation between the level of lysophosphatide in the virion and its ability to induce cell membrane fusion. A direct correlation was observed, however, between the presence of high monoacylphosphatidylserine content and the ability of a strain to produce lytic infection.

PLASMA TRIGLYCERIDE CLEARING IN OBESE CHILDREN. P.P. Forget, J. Fernandes and P.H. Begemann (Dept. of Ped., Sophia Children's Hosp. and Neonatal Unit, Gorgelweg 160, Erasmus Univ., Rotterdam, The Netherlands) *Am. J. Clin. Nutr.* 28, 858–65 (1975). In 13 obese children plasma triglyceride concentrations were found to be significantly elevated, while plasma cholesterol concentrations were normal. In the hypertriglyceridemic obese children, the plasma fractional triglyceride removal, measured by the intravenous fat tolerance test, was significantly reduced. A few patients showed an increased triglyceride production. These abnormalities reverted to normal in 8 patients retested after weight loss. Plasma postheparin lipoprotein lipase activity was found to be increased and significantly related to the degree of obesity. As to carbohydrate metabolism, a decreased glucose tolerance and hyperinsulinemia were found. Hyperinsulinemia reverted to normal during dietary restriction, glucose intolerance did not.

PLASMA VITAMIN A, RETINOL-BINDING PROTEIN AND PREALBUMIN CONCENTRATIONS IN PROTEIN-CALORIE MALNUTRITION. III. RESPONSE TO VARYING DIETARY TREATMENTS. F.R. Smith, R. Suskind, O. Thanangkul, C. Leitzmann, D.S. Goodman and R.E. Olson (Dept. of Med., College of Physicians and Sur-

geons, Columbia University, New York, N.Y.) *Am. J. Clin. Nutr.* 28, 732–8 (1975). Plasma vitamin A, retinol-binding protein, and prealbumin concentrations have been studied in 38 northern Thai children with protein-calorie malnutrition (PCM). The 4-week study period consisted of 1 week of stabilization followed by 3 weeks of treatment with formula diets varying in their protein and calorie content. The stabilization period comprised 7 days of initial treatment with fluids, antibiotics, and a gradually increasing intake of protein and calories to a final level of 1 g protein and 100 kcal/kg of body weight. The higher protein regimens (4 g/kg per day) resulted in much greater increases in plasma albumin and total protein levels than did the lower protein regimens. No significant differences in the changes in retinol-binding protein or vitamin A levels were apparent between the test groups. Sixteen additional children with both clinical vitamin A deficiency and protein-calorie malnutrition showed significant increases in total plasma vitamin A concentrations 24 hours after the intramuscular injection of 100,000 IU water-miscible vitamin A palmitate, without a change in plasma retinol-binding protein concentrations.

PURIFICATION FROM HUMAN PLASMA OF A HEPARIN-RELEASED LIPASE WITH ACTIVITY AGAINST TRIGLYCERIDE AND PHOSPHOLIPIDS. C. Ehnholm, W. Shaw, H. Greten, and W.V. Brown (Dept. of Med., Schl. of Med., Univ. of Calif., San Diego, La Jolla, Calif. 92037) *J. Biol. Chem.* 250, 6756–61 (1975). A triglyceride lipase different from lipoprotein lipase, but measurable only after intravenous heparin injection, has been isolated from human plasma by sequential use of heparin-Sepharose and concanavalin A-Sepharose affinity chromatography. Using these procedures, phospholipase A_1 activity was found to chromatograph identically with the triglyceride lipase. The constancy of the ratio of activities after isoelectric focusing (pI 4.1) and during thermal deactivation indicates that this enzyme has hydrolase activity against both triglycerides and phospholipids. This conclusion was supported further by the homogeneity of the protein as indicated by sodium dodecyl sulfate polyacrylamide gel electrophoresis.

REGULATION OF MEMBRANE LIPID SYNTHESIS IN ESCHERICHIA COLI. ACCUMULATION OF FREE FATTY ACIDS OF ABNORMAL LENGTH DURING INHIBITION OF PHOSPHOLIPID SYNTHESIS. J.E. Cronan, Jr., L.J. Weisberg, and R.G. Allen (Dept. of Molec. Biophys. and Biochem., Yale Univ. Schl. of Med., New Haven, Conn. 06510) *J. Biol. Chem.* 250, 5835–40 (1975). Glycerol starvation of an *Escherichia coli* glycerol auxotroph results in a specific inhibition of membrane phospholipid synthesis. Mindich observed only a trace accumulation of free fatty acid following glycerol deprivation. We have repeated these experiments using glycerol auxotrophs which also possess a lesion in β oxidation. This defect was introduced in order to control fatty acid degradation. In contrast to the previous results, we find free fatty acid does accumulate during glycerol starvation. Other experiments have shown that the free fatty acid fraction in glycerol-starved cells is metabolically active. This fraction turns over despite the defective β oxidation system. Restoration of glycerol to starved cells allows the incorporation of the unesterified fatty acids into phospholipid.

REGULATORY EFFECTS OF FATTY ACYL-COENZYME A DERIVATIVES ON PHOSPHATE-ACTIVATED PIG BRAIN AND KIDNEY GLUTAMINASE IN VITRO. E. Kvamme and I.A. Torgner (Neurochemical Lab., The Oslo Univ. Psychiatric Clinic, Vinderen, Oslo 3, Norway) *Biochem. J.* 149, 83–91 (1975). Fatty *n*-acyl-CoA derivatives in the concentration range 5 μM–0.1 mM and with 5–18 fatty acyl carbons have dual effects on phosphate-activated glutaminase from pig brain and kidney. Generally, fatty acyl-CoA derivatives in low concentrations activate the enzyme, but inhibit at higher concentrations; phosphate and citrate potentiate the activation, displaying positive co-operativity, and protect against inactivation. Saturated fatty acyl-CoA derivatives, with 5–10 fatty acyl carbons, only activate the enzyme in the concentration range 0–0.1 mM. When the fatty acyl chain is elongated, the fatty acyl-CoA derivatives gradually become more powerful inhibitors of glutaminase at the expense of their activating capacity. The unsaturated fatty acyl-CoA derivatives, oleoyl-CoA and linoleoyl-CoA, behave as potent activators in the lower part of the concentration range tested (0–0.5 mM), and as inhibitors in the upper part of this range (0.02–0.10 mM). Phosphate both prevented and reversed the inhibition, but no restoration of activity was possible once the enzyme became inactivated. By changing the pH from 7.0 to 8.0 the activating capacity of the fatty acyl-CoA derivatives is increased, as is their concentration range for activation. The fatty acyl-CoA derivatives are somewhat more potent activators for brain glutaminase, but otherwise they affect the two enzymes similarly.

RESPONSE OF LIPOGENESIS AND FATTY ACID SYNTHETASE TO PHYSICAL TRAINING AND EXHAUSTIVE EXERCISE IN RATS. E.W. Askew, H. Barakat, G.L. Kuhl and G.L. Dohm (Dept. of Nutr., Letterman Army Inst. of Res., Presidio of San Francisco, Ca. 94129) *Lipids* 10, 491–6 (1975). The effect of physical training and exhaustive exercise on fatty acid synthesis in rat liver and adipose tissue has been investigated. Exercise training (treadmill running) significantly ($P < 0.05$) decreased body wt, epididymal fat pad wt, adipocyte size, and hepatic fatty acid synthetase activity. Training did not significantly affect adipose tissue cell number, lipogenesis from glucose-U-^{14}C, or fatty acid synthetase. Exercise to exhaustion immediately prior to sacrifice significantly ($P < 0.05$) decreased lipogenesis from glucose-U-^{14}C and fatty acid synthetase in adipose tissue from trained but not untrained rats. Liver fatty acid synthetase was not significantly influenced by exhaustive exercise. The results of this study indicate that rats may adapt to physical training by decreasing adipose tissue lipogenesis during exhaustive exercise. This adaptation in energy metabolism may facilitate physically trained animals in conserving blood glucose during exhaustive exercise, thereby prolonging endurance.

ROLE OF CYTIDINE TRIPHOSPHATE AND CYTIDINE DIPHOSPHATE IN PROMOTING INOSITOL ENTRY INTO MICROSOMAL PHOSPHATIDYLINOSITOL. B.J. Holub (Dept. of Nutr., College of Biol. Sci., Univ. of Guelph, Guelph, Ontario, Canada) *Lipids* 10, 483–90 (1975). The Mn^{2+} activated incorporation of myo-inositol-^{3}H into subfractions of phosphatidylinositol in rat liver microsomes was studied in the presence and absence of cytidine triphosphate or cytidine diphosphate choline using phosphate buffer. The distribution of labeled inositol among molecular species of microsomal phosphatidylinositol was also investigated in vivo. In other experiments, the release of radioactivity from microsomes labeled with inositol-^{3}H in the phospholipid was measured after the addition of Mn^{2+}, unlabeled inositol, and cytidine nucleotide. Similar chase experiments were conducted with microsomes containing phosphatidylcholine-^{14}C or phosphatidylethanolamine-^{14}C. In chase experiments, the release of radioactivity from phospholipid in the presence of cytidine triphosphate or cytidine diphosphate choline was greatly enhanced by the addition of free inositol when microsomes containing phosphatidylinositol-^{3}H, but not phosphatidylcholine-^{14}C or phosphatidylethanolamine-^{14}C, were employed.

STUDIES ON LYSOPHOSPHOLIPASES. IV. THE SUBCELLULAR DISTRIBUTION OF TWO LYSOLECITHIN-HYDROLYZING ENZYMES IN BEEF LIVER. H.V. Den Bosch and J.G.N. De Jong (Lab of Biochem., State Univ. of Utrecht, Transitorium 3, De Uithof, Padualaan 8, Netherlands) *Biochim. Biophys. Acta* 398, 244–57 (1975). In a previous paper the purification of two proteins with lysophospholipase activity (EC 3.1.1.3), provisionally denoted lysophospholipase I and lysophospholipase II, has been described. The subcellular localization of both enzymes was investigated by cell fractionation studies. For each subcellular fraction the total lysophospholipase activity, after solubilization by *n*-butanol treatment, was separated into a lysophospholipase I and II contribution by DEAE-Sephadex ion exchange chromatography. Lysophospholipase I was found to be a soluble enzyme with a bimodal distribution. Highest relative specific activities were measured in the mitochondrial and the cytoplasmic fraction. Evidence is presented indicating that this enzyme is present in the mitochondrial matrix fraction. Lysophospholipase II appeared to be a membrane-bound enzyme with highest relative specific activity in the microsomal fraction.

STUDY ON AMPHIBIAN LIPIDS. I. CHARACTERIZATION OF MONOGLYCOSYLCERAMIDES FROM THE SKIN OF RANA NIGROMACULATA (JAPANESE POND FROG). Y. Tamai, M. Ryuzaki and H. Kojima (Dept. of Biochem., Kitasato Univ. Schl. of Med., Sagamihara, Kanagawa 228, Japan) *Biochim. Biophys. Acta* 398, 294–302 (1975). Monoglycosylceramide was isolated from the skin of *Rana nigromaculata* (Japanese pond frog), and further fractionated into three subgroups (Fraction I, Fraction II and Fraction III) by borate-impregnated Florisil column chromatography. Fraction I and Fraction II contained mainly glucose as their hexose components, while Fraction III contained galactose. Major long chain bases of Fraction I and Fraction III were D-erythro-1,3-dihydroxy-2-amino-4-*trans*-octadecene (4-sphingenine) and D-erythro-1,3-dihydroxy-2-aminooctadecane (sphinganine), whereas those of Fraction II

were D-ribo-1,3,4-trihydroxy-2-aminooctadecane (4D-hydroxysphinganine) and 1,3,4-trihydroxy-2-aminoeicosane (C_{20} homologues of 4D-hydroxysphinganine). This is the first evidence of the presence of trihydroxy base-containing glycolipids in the skin of vertebrates. All three subgroups of monoglycosylceramide contained both hydroxy and nonhydroxy fatty acids ranging from C_{14} and C_{26}. Saturated fatty acids represented more than 90% of the total. Some differences of the fatty acid composition in the three subgroups were also observed.

TEMPERATURE DEPENDENCE OF THE OPTICAL ACTIVITY OF HUMAN SERUM LOW DENSITY LIPOPROTEIN. The role of lipids. G.C. Chen and J.P. Kane (Specialized Ctr. of Res. in Arteriosclerosis of the Cardiovascular Res. Inst. and the Dept. of Med., Univ. of Calif., San Francisco, Calif. 94143) *Biochemistry* **14**, 3357–62 (1975). Low density lipoprotein (LDL) (1.024–1.045 g/cm^3) was prepared by ultracentrifugal flotation from serum of normal fasting subjects. Circular dichroism (CD) and optical rotatory dispersion (ORD) spectra in the ultraviolet region were measured at 2, 25 and 37° on LDL, lipid extracted from LDL, and on pure component lipids. All exhibit reversible, temperature-dependent optical activities. Sphingomyelin has a strong negative CD band around 195 nm. Cholesterol and cholesteryl esters have a CD minimum at 208 nm. They have positive CD bands around 201 and 198 nm which decrease sharply and become negative at 198 and 193 nm, respectively. The CD of the total lipid extract of LDL is negative and drops monotonically below 200 nm. After subtraction of the ellipticity corresponding to amounts of lipids in organic solvents equivalent to those found in LDL, the 208–210 nm trough of LDL diminishes markedly.

THE INFLUENCE OF EXOGENOUS PMS AND HCG ON THE ARACHIDONIC ACID CONTENT OF THE IMMATURE RAT OVARY. (38944). H.T. Jonsson, Jr., T.W. Culp, R.H. Kaufman, A. Smythe, and G.L. Feldman (Dept. of Biochem. and Obstetrics and Gynecology, Med. Univ. of S. Ca., Charleston 29401) *Proc. Soc. Exper. Biol. and Med.* **149**, 1005–9 (1975). The influence of exogenous PMS and/or HCG, on the arachidonic acid (C 20:4ω6) content of the immature rat ovary was examined. Changes in ovarian arachidonate content associated with hormone administration were assessed in total lipid extracts, and in several neutral and phospholipid fractions. Both relative percentage and absolute amounts of arachidonic acid in several lipids were measured as well as uptake of radioactivity into total lipid resulting from the administration of ^{3}H-labeled arachidonic acid *in vivo*.

THE INTERACTION OF HUMAN PLASMA GLYCOSAMINOGLYCANS WITH PLASMA LIPOPROTEINS. Y. Nakashima, Nicola Di Ferrante, R.L. Jackson and H.J. Pownall (Lab. of Connective Tissue Res. of Dept. of Biochem., Baylor Col. of Med., Houston, Tex. 77025) *J. Biol. Chem.* **250**, 5386–92 (1975). Modifications of existing methods have allowed for the isolation and purification of various species of plasma glycosaminoglycans on the basis of their sulfate content and molecular size. All of the preparations precipitated human plasma low density lipoproteins (LDL); maximal precipitation occurred with amounts of glycans corresponding to 50 μg of hexuronate and 12 mg of LDL. The interaction of glycans with pyrene-labeled lipoproteins was also studied, measuring variations of the fluorescence emitted by the monomer *(M)* and excimer *(E)* species of the bound pyrene. The modification of LDL conformation could be prevented by proteolytic treatment of the sulfate-rich species or by addition to the system of suitable amounts of sulfate-poor species or of chondroitin-4-sulfate, but could not be prevented by increased ionic concentration.

THE MECHANISM OF C-4 DEMETHYLATION DURING CHOLESTEROL BIOSYNTHESIS. EVIDENCE FOR A DECARBOXYLATION MECHANISM NOT INVOLVING A SCHIFF-BASE INTERMEDIATE. D.C. Wilton and M. Akhtar (Dept. of Physiol. and Biochem., Univ. of Southampton, Southhampton S09 3TU, U.K.) *Biochem. J.* **149**, 233–5 (1975). The conversion of 4,4-dimethylcholest-7-enol into 4α-methylcholest-7-enol by rat liver microsomal preparations involves the decarboxylation of a sterol 3-oxo-4α-carboxylic acid. By using an ^{18}O-labelled substrate it was shown that this decarboxylation does not involve a Schiff-base intermediate.

THE ROLE OF INTERMEDIATES IN MITOCHONDRIAL FATTY ACID OXIDATION. K.K. Stanley and P.K. Tubbs (Dept. of Biochem., Univ. of Cambridge, Tennis Crt Rd, Cambridge CB2 1 QW, U.K.) *Biochem. J.* **150**, 77–88 (1975). Rat liver mitochondria oxidizing [16-^{14}C]palmitoylcarnitine accumulate saturated long-chain thioester intermediates which may be detected by radio-g.l.c. Time-courses of intermediate accumulation display no product-precursor relationships and the end product, measured as [^{14}C]citrate, is produced without a detectable initial lag. A short pulse of [16-^{14}C]palmitoylcarnitine followed by unlabelled palmitoylcarnitine showed that the observed intermediates (at least in the greater part) were not the direct precursors of [^{14}C]citrate. The quantity of saturated intermediates depended on the total accumulated flux of acyl units through the pathway provided that some mitochondrial CoA and unused substrate remained. In the presence of rotenone and carnitine, 2-unsaturated, 3-unsaturated and 3-hydroxy intermediates were formed as well as saturated intermediates. No attempt was made to detect 3-oxoacyl-CoA. These observations are explained on a 'leaky-hosepipe' model of β-oxidation in which the observed intermediates arise by a constant 'leakage' from the 'true' intermediates on the pathway to citrate.

VARIABLE EFFECTS OF A LIPOTROPE-DEFICIENT, HIGH-FAT DIET ON CHEMICAL CARCINOGENESIS IN RATS. A.E. Rogers (Dept. of Nutr. and Fd. Sci., Mass. Inst. of Tech., Cambridge, Mass. 02139) *Cancer Res.* **35**, 2469–74 (1975). Earlier studies demonstrated enhanced chemical carcinogenesis in the liver, colon, and probably esophagus of male rats that were fed a lipotrope-deficient, high-fat diet. In further experiments, designed to examine the range of the dietary effect on chemical carcinogenesis, rats were fed either the marginally lipotrope-deficient, high-fat diet or an adequate control diet, and treated with *N*-2-fluorenylacetamide, 3,3-dephenyl-3-dimethylcarbamoyl-1-propyne, *N*-methyl-N-nitroso-*N'*-nitroguanidine, *N*-[4-(5-nitro-2-furyl)-2-thiazolyl]formamide, aflatoxin G_1, or ethionine. *N*-2-Fluorenylacetamide induced hepatocarcinomas more rapidly and in higher incidence in deficient rats than in control rats. 3,3-Diphenyl-3-dimethylcarbamoyl-1-propyne induced a higher incidence of hepatocarcinomas but not gastric tumors in deficient rats. Aflatoxin B_1, included as a positive control, was significantly more hepatocarcinogenic in deficient rats. Gastric tumor induction by *N*-methyl-*N*-nitroso-*N'*-nitroguanidine and induction of tumors of the urinary bladder by *N*-[4-(5-nitro-2-furyl)-2-thiazylyl]formamide were not influenced by diet. Aflatoxin G_1 and ethionine were toxic to deficient rats, and carcinogenic doses could not be administered.

VITAMIN E STATUS OF ALASKAN ESKIMOS. C.K. Wei Wo, and H.H. Draper, (Dept. of Food Sci., Univ. of Ill. at Urbana-Champaign, Urbana, Ill. 61801) *Am. J. Clin. Nutr.* **28**, 808–13 (1975). A survey was conducted during 1971–1973 on the vitamin E status of Alaskan Eskimos. The subjects were 315 residents of the northern coastal villages of Wainwright and Point Hope and the southwestern inland villages of Kasigluk and Nunapitchuk. Plasma vitamin E levels for the 6- to 17-year-old subjects at Wainwright, Point Hope, and Nunapitchuk were 0.81 $\pm$ 0.26, 0.90 $\pm$ 0.20, and 0.84 $\pm$ 0.25 mg/100 ml (mean and standard deviation), respectively. The values for adults at Wainwright, Point Hope, and Kasigluk were 1.23 $\pm$ 0.27, 1.23 $\pm$ 0.27, and 1.27 $\pm$ 0.33 mg/100 ml, respectively. No value less than 0.30 mg/100 ml was observed. Alpha-tocopherol was the only isomer present in significant amounts. Plasma vitamin E levels did not change significantly between 6 and 17 years of age; however, a steady increase with age was observed in the 18- to 69-year-old groups. Plasma α-tocopherol concentrations were significantly lower in children than in adults but there were no differences attributable to sex or geographic location. Vitamin E concentration in the blood plasma was linearly correlated with cholesterol concentration. Values are reported for the vitamin E content of some native foods. This study indicates that plasma vitamin E levels in Alaskan Eskimos consuming a high meat or fish diet are comparable to those in adults of the United States consuming a mixed diet.

PURIFICATION OF GLYCERO-LIPID-SPLITTING ENZYMES. Y. Horiuchi and S. Imamura (Toyo Jozo Kabushiki Kaisha). *U.S. 3,901,763.* A method for the purification of an enzyme having substrate specificity to glycero-lipids selected from the group consisting of glycerides and glycero-phosphatides comprises the steps of (a) contacting an aqueous solution of the enzyme with a carrier selected from the group consisting of fatty acid esters of water-insoluble polysaccharides, and (b) eluting the adsorbed enzyme with an aqueous solution of a surface active agent. The polysaccharide contains hydroxyl groups, and the fatty acid has at least 6 carbon atoms.

MODIFICATION OF THYROID UNDER THE ACTION OF THERMALLY OXIDIZED AND POLYMERIZED VEGETABLE OILS IN THE CASE OF IODINE INSUFFICIENCY. Y.N. Eremin. *Vopr. Pitan.* **1974**(2), 41–3. Rats, on a diet with cottonseed oil which contains 1.3%

of oxidation products, stopped gaining weight. Avitaminose A and the alteration of the thyroid appeared. The modifications were characterized by the sclerose, epithelial desquamation and the delay of iodine transit. (Rev. Fr. Corps Gras)

CHANGES IN FATTY ACID SYNTHESIS AND LIPOGENIC ENZYMES IN ADIPOSE TISSUE FROM FASTED AND FASTED-REFED STEERS. M.A. Pothoven and D.C. Beitz (Dept. of Animal Sci., Iowa State Univ., Ames, Iowa 58010) *J. Nutr.* **105,** 1055–61 (1975). Controls of fatty acid synthesis in bovine adipose tissue were investigated. Six Brown Swiss steers were fasted for 8 days and then refed for 56 days. Biopsy samples of backfat adipose tissue were taken during the fasting and refeeding periods. Rates of acetate incorporation into fatty acids (FAS), activities of acetyl CoA carboxylase (CBX), glucose-6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase, and NADP: isocitrate dehydrogenase, and plasma free fatty acids (FFA) and plasma acetate were determined. FAS decreased 60% after 1 day of fasting and 99% after 8 days. FAS did not increase until day 3 of refeeding when energy intake was above maintenance, then returned to normal by 14 days. CBX followed a pattern similar to FAS, except its activity did rise above the control rate during refeeding. Plasma FFA increased 350% and acetate decreased 67% during fasting. After 4 days of refeeding, FFA returned to normal, and acetate increased to 156% of initial concentration, then returned to normal by 21 days. These data suggest that CBX limits FAS in adipose tissue of cattle.

PRELIMINARY OBSERVATIONS ON THE MITOGENIC EFFECT OF CYCLOPROPENOID FATTY ACIDS ON RAT PANCREAS. D.G. Scarpelli (Dept. of Pathol. and Oncology, Univ. of Kansas Med. Ctr., Kansas City, Kansas 66103) *Cancer Res.* 35, 2278–83 (1975). Male Sprague-Dawley rats were fed a diet containing 500 ppm of cyclopropenoid fatty acids (CPFA). After 2 weeks, mitotic activity and [^{3}H]thymidine incorporation into DNA were significantly increased in pancreatic acinar cells. Continued feeding of the diet for 4 and 8 weeks led to decreasing mitotic activity which was still significantly increased over that of control animals. Focal necrosis of acinar cells was histologically apparent after 8 weeks of CPFA ingestion. Ultrastructural evidence of focal cytoplasmic injury was detected in acinar epithelial cells as early as 2 weeks after feeding of the CPFA diet was begun. A difference in dose response to CPFA appears to exist between Sprague-Dawley and Fischer F344 rats in that the latter, a dose of CPFA (5 mg/100 g body weight), did not evoke a mitogenic response.

ENVIRONMENTAL DEGRADATION OF THE INSECT GROWTH REGULATOR METHOPRENE. VII. BOVINE METABOLISM TO CHOLESTEROL AND RELATED NATURAL PRODUCTS. G.B. Quistad, L.E. Staiger, B.J. Bergot, and D.A. Schooley (Zoecon Corp. Res. Lab., Palo Alto, Calif. 94304). *J. Agric. Food Chem.* 23, 743–9 (1975). Samples of fat, muscle, liver, lung, blood, and bile from a steer which received a single dose of [5-^{14}C]methoprene were analyzed for radioactive residues. No primary methoprene metabolites could be characterized, but the majority (16–88%, depending on tissue) of the total tissue radioactivity was positively identified as [^{14}C]cholesterol. A total of 72% of the bile radioactivity was contributed by cholesterol, cholic acid, and deoxycholic acid. Radioactivity from catabolized methoprene was also associated with protein and cholesteryl esters of fatty acids.

STEREOSPECIFIC ANALYSIS OF HEPATOMA, HOST LIVER, AND NORMAL RAT LIVER TRIGLYCERIDES FROM ANIMALS ON CHOW AND FAT FREE DIETS. R. Wood (Division of Gastroenterology, Depts. of Med. and Biochem., Univ. of Missouri Sch. of Med., Columbia, Missouri 65201) *Lipids* 10, 404–8 (1975). Triglycerides from normal liver, host liver, and hepatoma of rats maintained on chow and fat-free diets were subjected to stereospecific analysis. Normal and host liver triglycerides from animals on the same diet did not exhibit significant differences. Fat-free diet reduced polyunsaturated fatty acids in normal and host liver triglycerides, but had no effect upon hepatoma triglycerides. Each position of hepatoma and liver triglyceride glycerol exhibited a characteristic fatty acid composition. Palmitate concentrations were reduced dramatically and stearate levels were increased significantly at the 1 position of hepatoma triglycerides, relative to the corresponding position of liver triglycerides which were affected little by diet or tumor. Except for higher percentages of C-20 and higher fatty acids, common to all three positions, the composition of hepatoma triglycerides at the 2 position appeared normal. The 3 position of hepatoma triglycerides contained significantly higher percentages of stearate than liver. Data obtained previously for Ehrlich ascites cell triglycerides were in good agreement with this hepatoma. Data from these two neoplasms suggest that the metabolic system that regulates or controls the fatty acid composition at the 1 and 3 positions of normal tissue triglycerides does not function normally in neoplasms.

ASYMMETRIC EXCHANGE OF VESICLE PHOSPHOLIPIDS CATALYZED BY THE PHOSPHATIDYLCHOLINE EXCHANGE PROTEIN. MEASUREMENT OF INSIDE-OUTSIDE TRANSITIONS. J.E. Rothman and E.A. Dawidowicz (Dept. of Biol. Chem. and Biophys. Lab., Harvard Med. Schl., Boston, Mass. 02115) *Biochemistry* **14,** 2809–16 (1975). Purified phosphatidylcholine exchange protein was used to exchange phosphatidylcholine between homogeneous single-walled phosphatidylcholine vesicles and human erythrocyte ghosts. When excess ghosts were present, it was found that only 70% of the vesicle phosphatidylcholine was available for exchange. This fraction corresponds closely to the amount of phosphatidylcholine in the outer monolayer of these vesicles, indicating that only the outer surface of the vesicle is accessible to the exchange protein. Also, it was found that all phosphatidylcholine introduced into vesicles by the exchange protein was available for subsequent exchange. Using the exchange protein, asymmetrical vesicles were prepared in which the outer monolayer was either enriched or depleted in radioactive phosphatidylcholine as compared to the inner monolayer. Reequilibration of the radioactivity between the two surfaces of the vesicle (flip-flop) could not be detected, even after 5 days at 37°. It is estimated that the half-time for flip-flop is in excess of 11 days at 37°. These results indicate that the properties of the exchange protein can be exploited to measure phosphatidylcholine flip-flop and possible phosphatidylcholine asymmetry in biological and model membranes, without altering the structure of the membrane.

STUDIES ON CHEMICAL NATURE OF LIPOFUSCIN (AGE PIGMENT) ISOLATED FROM NORMAL HUMAN BRAIN. R.D. Taubold, A.N. Siakotos, and E.G. Perkins (Dept. of Food Sci., The Burnsides Res. Lab., Univ. of Ill., Urbana, Ill. 61801) *Lipids* 10, 383–90 (1975). Human brain lipofuscin isolate was studied for its purity and physical and chemical properties. Purification of the impure material was achieved by gel permeation chromatography using Sephadex LH-20 and BioBeads S-X1 gels. The purified lipofuscin polymer represented ca. 12% of the starting material with the rest of the material being various mixed lipids. The mol wt of the purified lipofusein was determined to be between 6000–7000 daltons. IR,UV-visible, NMR, and fluorometric spectra were obtained, all indicating the fundamentally lipid nature of lipofuscin. The NMR spectrum strongly resembled that of a typical long chain fatty acid. Numbers of fatty acids and several amino acids were present as a portion of the lipofusein structure. The results obtained suggested that the brain lipofuscin employed in the present study consisted mainly of polymeric lipid and phospholipid structures along with amino acids either bound to the lipids or as included proteins.

ESSENTIAL FATTY ACID DEFICIENCY: METABOLISM OF 20:3(N-9) AND 22:3(N-9) OF MAJOR PHOSPHOGLYCERIDES IN SUBCELLULAR FRACTIONS OF DEVELOPING AND MATURE MOUSE BRAIN. G.Y. Sun, H. Winniczek, J. Go and S.L. Sheng (Dept. of Chem., Univ. of Missouri, Kansas City, Missouri 64110) *Lipids* 10, 365–73 (1975). Essential fatty acid deficiency was initiated in young and mature mice. The metabolism of 20:3(n-9) and 22:3(n-9) in brain subcellular fractions was followed after the mice were switched from the deficient diet to a corn oil supplemented diet. After switching to the supplemented diet, the proportions of (n-9) polyunsaturated fatty acids in brain in both groups of mice decreased with time. The rate of disappearance of (n-9) polyunsaturated fatty acids was faster in the young groups than in the mature group. In the developing mice, the half-lives of the (n-9) polyunsaturated fatty acids in the total ethanolamine phosphoglycerides of brain microsomal, synaptosomal, and myelin fractions were 3, 10, and 15 days, respectively. In the mature group, the half-lives for 20:3(n-9) in diacyl-glycerophosphorylethanolamine of microsome, synaptosome, and myelin fractions were 8–10, 10, and 22 days, respectively; and the half-lives for 22:3(n-9) in alkenylacyl-glycerophosphorylethanolamine of the same subcellular fractions were 8–12, 28, and 35–40 days, respectively. In general, the rate of disappearance of 20:3 (n-9) in brain was faster in the diacyl-glycerophosphoryl-ethanolamine than in the alkenyl-acyl-glycerophosphoryl-ethanolamine. These results demonstrate that the metabolism of (n-9) polyunsaturated fatty acid in brain phosphoglycerides

during recovery from essential fatty acid deficiency not only varies with age, but also depends upon individual phosphoglycerides present in each subcellular fraction.

VITAMIN E OR VITAMIN A PROTECTS CHICKENS AGAINST E. COLI INFECTION. R.P. Tengerdy and C.F. Nockels (Dept. of Animal Sci., Col. State Univ., Fort Collins, Col. 80523) *Poult. Sci.* **54**, 1292–6 (1975). The supplementation of either vitamin E (300 mg./kg. diet) or vitamin A (60,000 I.U./kg. diet) to a standard chick ration increased the protection of six week old immunized chickens against *E coli* infection, decreasing mortality from about 40% to 5%. The combination of the two vitamins, however, did not give as much protection as either vitamin alone. Vitamin E or A did not protect chicks from weight loss and severe morbidity due to infection, but slightly increased the rate of recovery.

CHOLESTEROL METABOLISM IN THE CHICKEN. R.A. Teekell, C.P. Breidenstein and A.B. Watts (Dept. of Poultry Sci., La. State Univ. and A&M College, Baton Rouge, La. 70803) *Poult. Sci.* **54**, 1036–41 (1975). Four hundred and eighty, sexed (White Leghorn) chicks were divided so that each sex was fed one of eight rations to determine the effect of sex, dietary cholesterol, and stearic, oleic, and/or linoleic acid on cholesterol deposition in blood, liver and aortic tissues. After 5 months on the dietary regimen, 3 cockerels from each of the rations were orally administered 100 mC. sodium-1-C^{14}-acetate and 200 mC. cholesterol-1,2-H^3 to determine whether body tissues contained cholesterol from endogenous or exogenous origin. After 5 months on the experimental rations it was observed that male birds had higher free cholesterol levels than did females. The addition of cholesterol (2%) and fatty acids (6%) to ration increased free cholesterol levels in liver and aorta. Cholesterol stored in livers and aortas occurs principally as free cholesterol while blood cholesterol was in esterified form. Cholesterol levels in both liver and aorta are primarily of endogenous origin.

EFFECT OF INOSITOL, LECITHIN, VITAMINS (B_{12} WITH CHOLINE AND E), AND IODINATED CASEIN ON INDUCED FATTY LIVER-HEMORRHAGIC SYNDROME IN LAYING CHICKENS. J.H. Wolford and D. Polin (Dept. of Poultry Sci., Michigan State Univ., East Lansing, Mich. 48824) *Poult. Sci.* **54**, 981–91 (1975). Egg production, liver lipid, and liver hemorrhagic score were not significantly altered by diets that contained inositol (at 1 or 2 g./kg. diet) and fed *ad libitum*, or force-fed to S.C. White Leghorn hens to produce fatty liver-hemorrhagic syndrome (FLHS). FLHS was not prevented by lecithin, iodinated casein alone or with inositol. The vitamins B_{12}, choline and E appeared to reduce FLHS and liver lipid in the one group tested. The dose-response relationship between feed intake, liver hemorrhagic score and liver lipid content was again demonstrated.

THE INTERACTION OF NADH-CYTOCHROME B_5 REDUCTASE AND CYTOCHROME B_5 BOUND TO EGG LECITHIN LIPOSOMES. M.J. Rogers and P. Strittmatter (Dept. of Biochem., Univ. of Conn. Health Ctr., Farmington, Conn. 06032) *J. Biol. Chem.* **250**, 5713–8 (1975). Incubation of liposomes prepared by sonication of egg lecithin with the amphipathic form of cytochrome b_5 results in the binding of a maximum of 244 molecules of cytochrome b_5 per liposomal vesicle. Interactions of the phospholipid with the hydrophobic segment of cytochrome b_5 are involved in this binding which does not disrupt the liposome. When a small amount of NADH-cytochrome b_5 reductase is bound to liposomes simultaneously with cytochrome b_5, the two proteins catalyze the reduction of cytochrome *c* by NADH. A qualitative kinetic analysis reveals that all of the cytochrome b_5 interacts with reductase, a result consistent with these proteins undergoing translational diffusion in the plane of the membrane. This system and the purified stearyl coenzyme A desaturase provide a model to study the dynamics of protein and lipid interactions in this membrane-bound oxidative sequence.

IMPORTANCE OF THE STEREOCHEMICAL POSITION OF THE 24-HYDROXYL TO BIOLOGICAL ACTIVITY OF 24-HYDROXYVITAMIN D_3. Y. Tanaka, H. Frank, H.F. DeLuca, N. Koizumi, and N. Ikekawa (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wis., Madison, Wis. 53706) *Biochemistry* **14**, 3293–5 (1975). Both stereoisomers of 24-hydroxyvitamin D_3, i.e., 24(S)-hydroxyvitamin D_3 and 24(R)-hydroxyvitamin D_3, stimulate intestinal calcium transport almost equally well in the rat. The duration of effect is somewhat shorter for the 24(S)-hydroxyvitamin D_3 than for the 24(R)-hydroxyvitamin D_3. However, the 24(S)-hydroxyvitamin D_3 has little or no activity in the mobilization of calcium from bone, in the growth of rats on a low calcium diet, in the elevation of serum phosphorus of rachitic rats, or in the calcification of bone. On the other hand, the 24(R)-hydroxyvitamin D_3 is almost as active as 25-hydroxyvitamin D_3 in all of these systems, although its activity is not always of equal duration to that of 25-hydroxyvitamin D_3. The selectivity of these systems for only one of the 24-hydroxy stereoisomers supports the idea that in vivo 24-hydroxylation of vitamin D compounds is of functional importance.

CHANGES IN RABBIT LIPOPROTEIN PROPERTIES BY DIETARY CHOLESTEROL, AND SATURATED AND POLYUNSATURATED FATS. E. Stange, B. Agostini and J. Papenberg (Medizinische Universitätsklinik (E.S.; J.P.) and Abteilung Physiologie (B.A.), Max-Planck-Institut für Medizinische Forschung, Heidelberg, W. Germany) *Atherosclerosis* **22**, 125–48 (1975). Plasma lipids and chemical, electrophoretic and electron microscopic properties of VLDL, LDL and HDL are examined in rabbits fed a control diet (group 1) or diets containing 1% cholesterol (group II), 1% cholesterol + 5% coconut oil (group III) or 1% cholesterol + 5% corn oil (group IV). The diets II, III and IV resulted in hypercholesterolemia, hypertriglyceridemia and hyperphospholipidemia. The lipid-protein composition of VLDL, LDL and HDL is changed by these diets. There is a marked increase in the total cholesterol content of all lipoprotein fractions of the high fat dietary groups II, III and IV. The electrophoretic mobilities of the VLDL and LDL II and III are reduced while the respective mobilities in the corn oil group IV are nearly "normal."

INFLUENCE OF CALORIE DENSITY ON THE PROTEIN UTILIZATION OF DIETS BASED ON CORN AND BEANS. B. Murillo, M.T. Cabezas and R. Bressani (Inst. de Nutrición de Centro América y Panamá, Guatemala, C. A.) *Nutrición* (Caracas, Venezuela) **24**(2), 223–41 (1974). Studies were conducted to determine the effect of supplemental amounts of calories, proteins and/or amino acids on protein utilization by dogs, (as indicated by nitrogen retention), based on diets of corn and beans. Two protein additives were: milk and eggs; amino acids included: lysine, methionine and tryptophane. Soya bean oil was the source of supplemental calories. While nitrogen retention (nitrogen balance) increased, when the diet of corn and beans was supplemented with additives, the increases depended on the calorie content of the diet. It was concluded that while additives improved the basic diet, it is most important to consider all the limiting nutrients in the diet.

COMPARATIVE NUTRITIONAL STUDY OF DIFFERENT PALM OILS. C. Baron et al. (Lab. Biochem., IBANA, 6, blvd Gabriel, 21-Dijon). *Oleagineux* **29**, 517–20 (1974). Samples of different kinds of palm oils as well as a refined fluid fraction are compared to a groundnut oil by administration to the Wistar rat, in a diet with 15% oil and 18% proteins. In addition, a sample of heated hybrid palm oil is compared to a heated groundnut oil under the same conditions. The measurement of nine nutritional parameters on living animals, and the histological examination of the viscera of each animal killed, give results which are as favorable to the palm oils as to the groundnut oil, at the present stage of experimentation.

• Edible Proteins

PROCESS FOR MAKING DEFATTED PEANUT FLOUR. A. Matsonaga. *U.S. 3,901,983.* The process comprises treating skinned peanuts in a saturated brine solution at a time and temperature sufficient to remove tannins and odors; heating the peanuts in water at 100–120 C for 15–45 minutes; extracting the oil from the peanuts by crushing; separating the resulting solid phase from the oil and water phases; slurrying the peanuts in a colloid mill so the peanuts will pass through a 400 mesh screen; and then spray drying the peanuts to obtain a free-flowing defatted peanut flour.

SOYBEAN BEVERAGE AND PROCESS. A.I. Nelson, M.P. Steinberg and L.-S. Wei (The University of Illinois Foundation). *U.S. 3,901,978.* The process for preparing a bland, stable aqueous dispersion of whole soybeans comprises (a) tenderizing intact soybean cotyledons, (b) heating the intact soybean cotyledons sufficiently to inactivate the lipoxidase enzyme, (c) forming an aqueous slurry of the soybeans containing less than 20% soybean, (d) homogenizing the slurry in at least one pass through the homogenizer at a pressure of 1,000–10,000 psi, and (e) recovering the stable aqueous dispersion.

RECOVERING PROTEINS FROM WASTE WATER. J.W. Finley (U.S. Secy. of Agriculture). *U.S. 3,898,160.* The method for removing proteins, starch, and other materials from proteinaceous waste water produces both an effluent capable of disposal into municipal waste treatment systems and a solid ferric-protein-phosphate complex from which the protein may be easily recovered. The process comprises (a) adding to the proteinaceous waste water an alkali metal salt of a molecularly-dehydrated phosphate, at a concentration of 0.0001 M to 0.1 M, and a source of ferric ions at a concentration of 0.001 M to 0.1 M; (b) precipitating a ferric-protein-phosphate complex and avoiding precipitation of a protein phosphate complex by raising the pH to 7.0; and (c) separating the effluent from the complex precipitate.

METHOD FOR PREPARING MEAT-LIKE PROTEIN FOOD. D. Horrocks and P. Booth (Mars Ltd.). *U.S. 3,898,345.* The method of making a protein food simulating muscle meat comprises (a) forming bundles of edible protein fibers impregnated with a binding agent coagulable by heat, (b) immersing the bundles in a liquid coagulating medium thereby forming a coagulated layer on the surface of the bundles, (c) compacting together many of the treated bundles in an oriented arrangement, and (d) heating the arrangements of bundles to complete coagulation of the binding agent. As a result of the process, the fibers of the bundles cohere and bond together into a product simulating muscle meat.

PREPARATION OF AN ACIDIC BEVERAGE. T. Yokotsuka, Y. Aoyama, S. Ishii, and M. Matsuura (Kikkoman Shoyn Co.). *U.S. 3,897,570.* A method for preparing a beverage having a pH of less than 6.0 and capable of retaining clarity, provided that the beverage is free from other colloidal material, comprises denaturing defatted soybeans by heating or steam cooking, subjecting the denatured soybeans to the action of an acid protease at a pH of 2.5–6.0 at a temperature of 40–75 C to form soluble peptides, separating a clear portion from the reaction mixture, and adding a beverage additive to the clear portion.

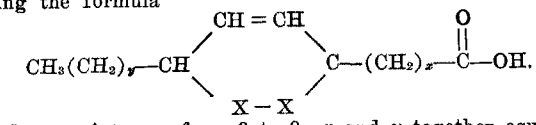
PURIFICATION OF ETHANOL EXTRACTANT IN SOY PROTEIN CONCENTRATE PROCESS. D.W. Pass (Central Soya Co.). *U.S. 3,897,574.* In the extraction process for producing protein concentrate containing 70% protein from defatted soybeans, the defatted flakes are contacted with 60–80% aqueous ethanol to extract soluble solids from the flakes. The aqueous ethanol is stripped from the extract by introducing the solution into a tray-type rectification column, withdrawing a portion of the ethanol solution from a point intermediate the column height to remove malodorous contaminants and recycling the rectified ethanol into contact with defatted soybean flakes, and removing the waste water.

• Drying Oils and Paints

COLD STORAGE OF DRYING STANDARDS. Anon. Southern Soc. for Coatings Technol. Technical Comm.). *J. Paint Technol.* 47(607), 56–63 (1975). Study traces the loss of drying of two coatings, an alkyd and linseed oil, from initial drier incorporation through paint aging for approximately one year. Samples were aged at room temperature and at low temperature in a freezer by six cooperating labs. Drying time data indicate a stabilization of drying occurred with the low temperature stored samples compared to considerable "loss-of-dry" of the room temperature stored samples. Possible uses of freezer stored standards in laboratory drying tests are suggested.

BLISTER RESISTANCE OF LINSEED OIL PAINTS FROM TREATED PIGMENTS. R.L. Eissler (Northern Reg. Res. Lab., U.S. Dept. of Agr.). *J. Paint Technol.* 47(607), 50–5 (1975). The influence of certain surface treatments for zinc oxide or titanium dioxide pigments and the effect of heat-bodying linseed oils on blister resistance of paints is examined. Paints were formed from treated or untreated pigments in bodied and in unbodied linseed oils. Blister resistance of paints after application to western red cedar panels was measured on a blister box. Experimental paints, each with the same control were tested in a two-coat test system. Data were taken from life-sized photographs according to ASTM Method D714-56 and also by counting and determining blister size. Quantitative data from the latter method are subjected to a four-way analysis of variance for significant differences. Ratios of blistering of experimental paint to that for control paint on the same panel are used in an attempt to minimize effects caused by individual wood panels. Pigment type, pigment surface treatment, and oil body all appear to influence blister resistance of test paints.

PROCESS FOR MAKING A METHACRYLIC ACID ADDUCT OF LINOLEIC ACID. B.F. Ward (Westvaco Corp.). *U.S. 3,899,476.* The process for forming a cycloaliphatic C_{22}-dicarboxylic acid from a fatty acid mixture containing conjugated and nonconjugated linoleic acid comprises reacting the linoleic acid with up to 30% by weight of methacrylic acid and 0.01–0.5% iodine at a temperature of 250–260 C. The conjugated and nonconjugated linoleic acid is converted to a dicarboxylic acid having the formula



x and y are integers from 3 to 9. x and y together equal 12. One X is CH_2 and the other is a $—C(CH_3)COOH$ group.

CRATERING AND SAGGING IN HIGH GLOSS AQUEOUS INDUSTRIAL FINISHES. F.J. Hahn and S. Steinhauer (Monsanto Polymers & Petrochems. Co.). *J. Paint Technol.* 47(606), 54–6 (1975). Aqueous soluble coatings, unlike solvent-based coatings, usually pass through one or more phase inversions while undergoing loss of volatile material during the early stages of the drying process. Such phase inversion and the high surface tension associated with an aqueous coating present a cratering problem which frequently defies correction with a surface tension reducer. Consequently, an alternate approach of providing pseudoplastic rheology to resist spreading offers a more practical corrective measure against cratering and simultaneously provides a solution to the problem of sagging which is inherent in high-gloss aqueous enamels.

DETERMINATION OF THE RELATIONSHIP BETWEEN CURE SCHEDULE AND DETERGENT RESISTANCE IN ANIONIC ELECTROCOAT FILMS. D.G. Anderson, E.J. Murphy and W.R. Schmehr (DeSoto, Inc.). *J. Paint Technol.* 47(606), 57–62 (1975). The rates at which functional groups disappear during the curing of anionic electrocoat systems have been followed using infrared spectroscopy. These changes in functionality with cure schedule have been correlated with the detergent resistance of electrodeposited films. The deleterious effects of anionic dissolution products and occluded neutralizing agent on detergent resistance have been established. Electron spectroscopy studies for chemical analysis (ESCA) have shown that, except for iron, electrocoated surfaces are essentially the same chemical composition as nonelectrocoated surfaces.

REACTION OF ETHYLENE OXIDE WITH ALIPHATIC ALCOHOLS IN THE PRESENCE OF Y- ZEOLITES AS CATALYSTS. B. Burczyk, F. Kukla (Institute of Organic and Polymer Technology, Technical University, Wroclaw, Poland). In the course of studies concerning the synthesis of non-ionic surfactants from the group of oxyethylenated alcohols there was investigated the addition of ethylene oxide to aliphatic alcohols in the presence of active forms of zeolite Y containing acid centers of both Brönsted and Lewis type. The series of alcohols used in this study included ethanol, n-butanol, n-hexanol, n-octanol and n-decanol. The active forms of zeolite were prepared from zeolite NaY produced in Poland. The preparation involved the exchange of sodium atoms with NH_4NO_3 with subsequent decomposition of the ammonium form at high temperature:

$$NaY \xrightarrow[80^\circ\,C,\,10\,h]{10\%\ NH_4NO_3} NH_4Y \xrightarrow[3\,h]{560^\circ\,C,\ air} HY$$

The obtained zeolites, designated arbitrarily H–Y, were characterized by a high degree (70–82%) of sodium atoms exchange. The addition of ethylene oxide to alcohols was carried out batchwise by passing 1–2 moles of gaseous ethylene oxide into a suspension of catalyst in alcohol. The reactions were performed over the period of 1–5 hours at temperatures in the range of 50 to 140° C. The reaction products consisted of a mixture of two groups of compounds. The first group included the products of ethylene oxide addition to alcohols. Under the employed conditions there were formed the alkyl monoethers of mono-, di- and triethylene glycols. The second group consisted of acetaldehyde, p-dioxane, 2-methyl-1, 3-dioxolane and polyoxyethylene glycols. In addition, the products of oxyethylenation of ethanol included diethyl ether, while 2-propyl-1,3-dioxolane was found among products of n-butanol reaction with ethylene oxide. The course of reaction of aliphatic alcohols with ethylene oxide in the presence of

active forms of zeolite Y was discussed on hand of obtained results. (Chemurgy of Fats, International Symposium. Gdansk, Poland. 1975)

DIESTERS OF BRASYLIC ACID AS PLASTICIZERS FOR POLY/VINYL CHLORIDE. W. Zwierzykowski, H. Szelag, B. Orzecka, J. Marcinkiewicz and H. Niewiadomski (Institute of Organic and Food Chemistry and Technology, Gdansk Technical University, Poland). Seven diesters (methyl, n-butyl, isobutyl, n-pentyl, isopentyl, 2-ethylhexyl and benzyl) of brassylic acid were prepared during azeotropic esterification. Optimal parameters for the synthesis of each ester were found taking into consideration quality and quantity of catalyst, excess of alcohol, quantity and quality of solvent. Acid value, ester value and hydroxyl value were determined as the chemical properties of obtained diesters. Following physical properties were determined: density, dinamic viscosity, flash point, colour and critical temperature of solubitization. The mechanical properties of molded PVC sheets containing brassylate diesters have been investigated. The results for brassylate diesters indicate that they are good plasticizers for poly/vinyl chloride/resins. The properties of the brassylate—diesters are compared with those of such plasticizers as diesters of adipic, azelaic and sebacic acids. (Chemurgy of Fats: International Symposium. Gdansk, Poland. 1975)

THE SYNTHESIS OF BRASSYLIC ACID POLYESTERS RECEIVED BY OZONOLYSIS OF ERUCIC ACID AND A TRAIL OF THEIR APPLY TO POLYURETHANES PRODUCTION. W. Zwierzykowski, A. Górska, J. Marcinkiewicz, J. Kalinowski and E. Noniewicz (Institute of Organic and Food Chemistry and Technology, Gdansk, Technical University, Poland). The technical erucic acid was put on oxidative ozonolysis. Isolated brassylic acid was applied on the polyesterification reaction with: ethylene-, diethylene-, 1,2-dipropylene- and butylene- glycols. The influence of molar ratio of reagents and the catalyst (p-toluenesulphonic acid) concentration on molar weight of the polyester was investigated. The reaction order and activation energy were determined in case of ethylene and the diethylene glycols. The trials to use polybrassylates to the synthesis of polyurethane elastomers were carried out. The elastomers received by using polyesters of brassylic acid esters and ethylene and diethylene glycols—were in some physiochemical properties comparable to analogous samples received by using polyesters of ethylene glycol and adipic acid but they were of considerably higher resistance to chemical agents. (Chemurgy of Fats: International Symposium. Gdansk, Poland. 1975)

• Detergents

POST-WASH FABRIC TREATING METHOD. P. Ramachandran (Colgate-Palmolive Co.). *U.S. 3,904,359.* A process for treating fabrics which are subject to yellowing in rinse water comprises laundering the fabrics and then treating them at 70–120 F with an aqueous solution containing 0.01–0.1% of a complexing acid and 0–0.1% of a cationic fabric softener. Yellowing imparted to the fabric by the cationic fabric softener is substantially reduced by the complexing acid.

FABRIC CONDITIONERS. O.W. Neiditch and J. Rudy (Lever Bros. Co.). *U.S. 3,904,533.* The conditioners consist of (a) a fabric softening compound selected from a group of amides, esters, and imidazolines; (b) 0.25–2% of a low temperature stabilizing agent; (c) 0.005–0.10% of inert ionizable salts; (d) not more than 1% of a lower unsubstituted aliphatic alcohol; (e) 0–1% of a supplementary emulsion stabilizer; and (f) water to make 100%.

CLEANSING BAR. E.M. Deweever and T.E. Carroll (Lanvin-Charles of the Ritz, Inc.). *U.S. 3,903,008.* A translucent, nonirritating, low-hygroscopic conditioning cleansing bar having a pH when dissolved in water of 8.0–9.5 consists of 15–20% sodium stearate, 7–10% polyethylene glycol of molecular weight 200–800, 3–6% polyethylene glycol of molecular weight 800–4,000, 5–8% propylene glycol, 10–20% water, 6–9% of a fatty acid dialkanolamide capable of enhancing the hardness and clarity of the bar and acting as a foam stabilizer, and 10–50% of a quaternized dihydroimidazole detergent.

COMPOSITIONS FOR ACTIVATING AN INORGANIC PEROXIDE BLEACHING AGENT. Y. Nakagawa, K. Sato, and S. Hakozaki (Kao Soap Co.). *U.S. 3,901,819.* The compositions consist of (a) acetic acid ester of a substance selected from the group consisting of a monosaccharide, a disaccharide, a sugar alcohol, an internal anhydride of a sugar alcohol, erythritol, and mixtures of these substances; and (b) acetic acid ester of polyhydric alcohol having a melting point not higher than 30 C. The ester has at least two ester groups on adjacent carbon atoms. The weight ratio of (a):(b) is from 1:9 to 9:1.

DETERGENT COMPOSITION. E. Model and J. Bindier (Ciba-Geigy Corp.). *U.S. 3,903,007.* A composition for controlling the growth of bacteria and fungi comprises (1) a bacteria and fungi growth-inhibiting amount of a compound of the formula R–O–acyl–O–R in which "acyl" is the acyl radical of an aliphatic saturated α,ω-dicarboxylic acid of 2–12 carbon atoms or of an aliphatic mono-olefinically unsaturated α,ω-dicarboxylic acid of 4–12 carbon atoms, and R represents a halogenated 2-acyloxy-diphenyl ether radical; (2) water and/or an organic solvent for the compound; and (3) a detergent.

DETERGENT CAKE CONTAINING MONOALKYLSULFOSUCCINATE. B.B. Dugan and C.J.B. Scholtz (Colgate-Palmolive Co.). *U.S. 3,901,832.* A cleansing bar comprises 40–95% of neutral water soluble alkali metal, alkaline earth metal, or ammonium di-salts of sulfosuccinate monoesters and 5–60% of a normally solid nonvolatile organic plasticizer which is molten at 95 C. The plasticizer is a fatty acid ester of a polyhydric alcohol. Usable esters are the products of the reaction between a reactive hydroxyl-containing compound having an acyclic chain of 12–18 carbon atoms and an alkali metal, alkaline earth metal, or ammonium sulfite. The process for making the cleansing cakes if also claimed.

METHOD OF MAKING DENSE DETERGENT GRANULES. C.Y. Shen and C.F. Callis (Monsanto Co.). *U.S. 3,901,831.* The composite detergent additive granules contain 3–20% alkali metal nitrilotriacetate and the balance an inorganic salt selected from the group consisting of sodium metasilicate, sodium carbonate, sodium sulfate, mixtures thereof, STP, and mixtures of STP and sodium sulfate. The method of manufacture comprises adding aqueous alkali metal nitrilotriacetate, containing 40–70% alkali metal NTA and having a temperature of 0–120 C, to an agitated bed of the inorganic salt, having an initial temperature of 300–550 C. Sufficient aqueous NTA is added to cool the bed below 300 C prior to dehydration of the bed. Addition of aqueous NTA and dehydration of the bed is complete at a bed temperature of at least 160 C when STP is present, or 120 C when STP is not present.

THERMODYNAMICS OF THIN LIQUID FILMS. II. FILM THICKNESS AND ITS RELATION TO THE SURFACE TENSION AND THE CONTACT ANGLE. I.B. Ivanov and B.V. Toshev (Dept. Physical Chem., U. of Sofia, Sofia, Bulgaria). *Colloid Polym. Sci.* 253(7), 593–9 (1975). The problem of the definition of the film thickness and its influence on the other thermodynamic quantities is discussed. It is shown that at given physical state of the system, the film thickness can have various values depending on the way it has been defined. A detailed analysis of the contact angle between the film and the meniscus is presented and is shown that the value of this angle depends on the definition of the film thickness. If the thickness is assumed zero, the contact angle proves to be directly related to the film tension. This yields a possibility for the film tension to be measured. Formulae relating the parameters of the generatrix of the meniscus surface and the capillary pressure have been obtained for the topographic method of Scheludko et al.

PERCUTANEOUS ABSORPTION OF TRICLOSAN FROM TOILET PREPARATIONS. J.G. Black and D. Howes (Environmental Safety Div., Unilever Res. Lab., Colworth House, Sharnbrook, Bedford, MK44 1LQ). *J. Soc. Cosmet. Chem.* 26(4), 205–15 (1975). The absorption of [^{3}H] Triclosan (Irgasan DP300) through rat skin treated with shampoo containing 0.05% (w/v), and with aerosol deodorant containing 0.1% (w/v), has been measured. The products were applied in a manner designed to simulate consumer use, and the penetration was calculated from the amount of radioactivity excreted by the animals. From the shampoo, the penetration was 0.197 $\mu g\ cm^{-2}$ which increased as the concentration of [^{3}H] Triclosan was increased but which was independent of duration of contact with the skin for a given concentration of [^{3}H] Triclosan. Blood levels at 48 hr after treatment were proportional to concentration of applied Tricosan and for 0.05% (w/v) were less than the equivalent of 0.1 $\mu g\ ml^{-1}$. From the aerosol deodorant the penetration was 6.85 $\mu g\ ml^{-1}$ and the blood level reached a maximum equivalent to 0.26 $\mu g\ ml^{-1}$ at 6 h after a single application. The calculated absorption by the human is an extremely low proportion of the no-effect level in rats.

AN IN VIVO METHOD FOR THE DETECTION OF RESIDUAL ANTIMICROBIAL ACTIVITY ON HUMAN SKIN. E. Eigen, A. Legenyei and S. Weiss (Colgate-Palmolive Res. Center, Piscataway, N.J.). *J. Soc. Cosmet. Chem.* 26(8), 411–25 (1975). A new in vivo method has been devised, which realistically estimates residual antimicrobial activity on skin. Residual activity is measured by placing a small petri-type dish containing a differential medium seeded with a known amount of one specific organism on a treated site for 4 hours. The dish is then incubated for 48 hours, and the colonies, which represent survivors, are counted. These counts are compared with counts obtained in the same manner from an area treated with a placebo. The duration of antimicrobial activity on the skin is followed in this manner over a period of several days. Using this technic it has been possible to demonstrate differences in residual activity remaining on the skin after application of liquid antimicrobial skin cleansers and antimicrobial soap followed by thorough rinsing with water.

THE RELATIONSHIP BETWEEN WATER-BORNE BACTERIA AND SHAMPOO SPOILAGE. S.A. Malcolm and R.C.S. Woodroffe (Unilever Res., Isleworth Lab, Isleworth, Middlesex). *J. Soc. Cosmet. Chem.* 26(6), 277–88 (1975). Bacteria capable of surviving and multiplying in shampoos appear to represent only a very small proportion of the total population carried by mains water. Examinations of mains water (from a single source) showed these bacteria occurring with a frequency of approximately 5 in 100 l. The ability of small numbers of bacteria to initiate heavy contamination in shampoos is unrelated to the volume of product inoculated. As few as 50 bacteria are capable of initiating contamination in 1 kg of shampoo and this same small number may be capable of initiating contamination in much larger volumes, e.g. a factory batch. The implications of this observation on the methods of detection of contamination and the time after manufacture at which products should be examined for the presence of contaminants are discussed.

REACTIONS OF FATTY ACIDS AND THEIR DERIVATIVES WITH ETHYLENE OXIDE, 1: A STUDY OF THE REACTION OF RICINOLEIC ACID WITH ETHYLENE OXIDE. M. Bares, J. Coupek, S. Pokorny, J. Hanzalova and J. Zajic (Inst. Chem. Technol., Prague). *Tenside Deterg.* 12(3), 155–61 (1975). Presentation of results of investigation of the course of reaction of ricinoleic acid with ethylene oxide under conditions of alkaline catalysis. The reaction products of 1 mol ricinoleic acid with 3, 6, 10 and 20 moles of ethylene oxide showed that the mechanism is rather complicated and may be characterized by a number of side and consecutive reactions. The former views about the individual stages of the reaction of a fatty acid with ethylene oxide have been confirmed, i.e., the initial formation of a monoester followed by the formation of oligoglycol diesters of the fatty acid along with free polyethylene glycol. It was found, however, that under the given conditions the initial fatty acid also undergoes transformations. The dehydration products of ricinoleic acid and its polymeric forms may react with ethylene oxide and the reesterification products. However, ethylene oxide is added practically to the $-COO^-$ group. The formation of free polyethylene glycol is not only a result of the transesterification reaction, but also the Claisen ester condensation. The investigation of the composition and structure of the reaction products was carried out using gel permeation chromatography, nuclear magnetic resonance spectroscopy, infrared spectroscopy and other methods of chemical analysis of nonionic surfactants.

REACTIONS OF FATTY ACIDS AND THEIR DERIVATIVES WITH ETHYLENE OXIDE, II: KINETICS OF THE REACTION OF STEARIC ACID WITH ETHYLENE OXIDE. M. Bares, M. Blenha, B. Jereralova, J. Zajic and J. Coupek (Inst. Chem. Technol., Prague). *Tenside Deterg.* 12(3), 162–7 (1975). The reaction of stearic acid with ethylene oxide was studied under conditions of alkaline catalysis, at a molar ratio of the starting compounds of 1:1 and a temperature of 120 C. The time dependences of the content of individual compounds in the reaction mixture allowed three stages of the reaction course to be defined, namely, the initial stage characterized by a reaction between stearic acid and ethylene oxide with formation of ethylene glycol monostearate, the second stage determined by the moment of formation of ethylene glycol distearate and by reaching the maximum degree of conversion of the initial fatty acid, and the last stage completed by reaching the equilibrium state of the transesterification reaction of ethylene glycol monostearate to ethylene glycol distearate and free ethylene glycol. The kinetic description of the reaction under investigation was confined only to an unequivocally defined reaction in the first reaction stage. The reaction was found to be of first order; the rate constants were calculated. At the same time the activation energy of the reaction was also calculated. The equilibrium constant was determined from the reaction course in the third stage.

THE LAY OUT OF PNEUMATIC CONVEYING EQUIPMENT FOR THE DETERGENT POWDER INDUSTRY. H. Zilske (Wolfenbüttel). *Tenside Deterg.* 12(3), 149–55 (1975). Pneumatic transport has taken over all material-intensive transport routes in the detergent powder industry. It enables large quantities of powdered raw materials to be quickly transported automatically, controlled from a central control desk, without creating any dust or waste and with fewer personnel. This by no means exhausts the tasks and possibilities of pneumatic systems, for within this framework there is also accurate raw material control, elimination of formulation errors due to manual reasons, and the possibility of immediately passing the data produced in the compounding plant to the accounts department via a punched card system. The basis of every economically operating pneumatic system is accurate mathematical calculation and results obtained from experimental plants under near-practical conditions. Only in this way is it possible to coordinate all process stages and to avoid bottlenecks.

THE EVALUATION OF THE CLEANSING ACTION OF WASHING MACHINES. H. Milster, U. Sommer and D. Amthor (Berlin). *Tenside Deterg.* 12(3), 143–8 (1975). In assessing the washing effect of washing machines, five widely different types of machines were used to determine how far the results obtained in washing tests with different kinds of artificial soiling agree with those with naturally soiled household linen. In these tests 25 washing operations were carried out with WFK soiled fabric and three different EMPA soilings. For the test series with natural soiling, five types of new household linen was issued to defined households. The results from artificial and natural soiling were evaluated statistically, using various methods. For the artificial a total characteristic was formed for calculating the group relation coefficient. Depending on the type and combination of the artificial soiling, and depending on the test method employed for the group sequence for natural soiling, group relation coefficient of 0.75–0.92 were determined.

NEW WASHING PROCEDURE THROUGH THE INTRODUCTION OF A CATIONIC TENSIDE. 1. COMMUNICATION: RESEARCH ON POLYESTER/COTTON MIXED FABRIC. H. Kraus (Burnus GmbH, 61 Darmstadt, Kirschenallee 4). *Tenside Deterg.* 12(3), 137–42 (1975). Report on the use of cationic surfactants in combination with nonionic products and puts forward some theoretical considerations and practical results. No new detergents are involved, solely a new method of laundering mixed fabrics under modified physico-chemical conditions compared with those being used at present. The mixed fabrics are prepared during a preliminary wash in such a way that more complete soil removal during the main wash is achieved. A two-bath laundering process without intermediate rinsing, the cationic surfactants adhering to the textile surface not adversely influencing the anionic compounds of the main laundering operation. In this laundering process, only a quarter of the amount of detergent is added for the prelaundering operation, so that the effluent contains 75% less mineral constituents. Since the formulation is free of phosphates, the amount of phosphate in the entire laundering process decreases by at least half.

THE RELATION BETWEEN STEPWISE BULK ASSOCIATION AND INTERFACIAL PHENOMENA FOR SOME AQUEOUS SURFACTANT SOLUTIONS. Y. Zimmels, I.J. Lin and J.P. Friend (Mineral Eng. Dept., Technion-Israel Inst. Technol., Haifa, Israel). *Colloid Polym. Sci.* 253(5), 404–21 (1975). Stepwise bulk association is correlated to the stepwise pattern of some liquid-gas and solid-liquid interfacial parameters. On the basis of continuous Boltzmann distribution and a Gibbs approach, a modified Gibbs adsorption isotherm, applying to the liquid gas interface is introduced. The latter describes the stepwise pattern of the liquid-gas interfacial tension curve. The behavior of adsorption density, zeta potential, contact angle, settling rate of calcite suspensions and carbonate content in solutions were discussed in terms of a proposed stepwise adsorption model. The model includes stages of direct adsorption of monomers as well as of submicelles (for micelles). Specific combinations of chemi- and physical adsorption may possibly explain distribution between different

adsorbing species, thus showing in better detail the initial equilibrium between the different associated forms coexisting in solution. The Stern-Graham adsorption model is applied and a modified version introduced.

ON THE ASSOCIATION OF WATER ON EXPANDED FILMS. H. Steinbach and C. Sucker (Bayer AG, Leverkusen). *Colloid Polym. Sci.* **263**(5), 380–95 (1975). The hypothesis that water complexes are formed around the hydrophilic group explains the trend of the F/A isotherms of detergents spread on water. An equation of state is developed, in accordance with the general gas law, which enables calculation of the film pressure and the area requirement in relation to the temperature. The film pressure is of thermodynamic origin, while the area is determined primarily by molecular dimensions. The water complexes are characterized by co-ordination number X. Van der Waals' short range forces, hitherto considered to govern the trend of F/A isotherms, only in fact occur during a condition of extreme proximity between the detergent molecules, and then become surprisingly strong. Using polyorganosiloxane, polyethyleneoxide, albumin and glycerine esters it could be demonstrated that polymers also obey the laws described.

MEASUREMENT OF SURFACE TENSION BY PULLING A SPHERE FROM A LIQUID. A.D. Scheludko and A.D. Nikolov (Dept. Phys. Chem., Sofia U., Sofia, Bulgaria). *Colloid Polym. Sci.* **253**(5), 396–403 (1975). A new method for determination of surface tension by measuring the maximum weight at the pull of a small vitreous sphere from the liquid is proposed. The exact solution of the problem is found and is shown how the wetting of the sphere must be taken into account through the central angle formed between the sphere radius passing through the perimeter of wetting and the horizontal surface. A set for measuring the maximum weight and the central angle is described. The accuracy of determination of surface tension and of the angle of wetting is estimated to be thousandths of a dyne/cm and a few minutes, respectively. Some limitations of the method are discussed as well as the possibilities to overcome them. Various approximate solutions are treated and, in particular, it has been shown that the approximation previously used in the flotation model is satisfactorily accurate in that case.

EVALUATION OF DETERGENTS FOR INDUSTRIAL WASHING. M. Kacperska. *TSPK Pollena* **18**, 220–30 (1974). The results of laboratory and semi-pilot plant evaluation of industrial washing of white cotton with some wash paste and powder are given in the paper. The effect of concentration, hardness of water, alkalinity of wash bath, and temperature has been examined in the experiments done. (Rev. Fr. Corps Gras)

PREDICTION OF PROPERTIES AND CONDITIONS OF SYNTHESIS OF SOME NONIONIC SURFACTANT COMPOUNDS. J. Szymanowski. *TSPK Pollena* **18**, 209–19 (1974). A method for predicting the conditions of synthesis and the properties of some nonionic surfactant agents, esters of polyalcohol and glycide, is described in the paper. Application of the theory of equilibrium hydrophilic-lipophilic and the calculation of probability allows a preliminary estimating of the structure of surfactant agents and molar ratio of reactives. (Rev. Fr. Corps Gras)

COMPOSITION FOR CLEANING AND GLAZING FURS. B. Kaufman (Colgate-Palmolive Co.). *U.S. 3,900,407*. The composition consists of 0.05–0.2% of potassium oleate, 0.05–0.2% of a nonsoap detergent, 0.02–0.1% of a terpene oil, 0.05–0.2% of an alcohol, and the remainder water.

MACHINE DISHWASHING DETERGENT HAVING REDUCED CONDENSED PHOSPHATE CONTENT. J.L. Copeland and W.G. Mizuno (Economics Laboratory, Inc.). *U.S. 3,899,436*. The low- or nonfoaming detergent composition comprises an alkaline condensed phosphate salt and 2–80% of a nonsequestering alkaline, pH-adjusting or buffering builder salt. The claimed improvement comprises substituting for part of condensed phosphate with a water soluble metal salt of citric acid. The condensed phosphate is thus adjusted to a level of 0.5–35% when the citric acid salt is at a level of 5–60%.

DETERGENT COMPOSITIONS CONTAINING SILICA COLLOIDS. L. McDonald (Louis McDonald). *U.S. 3,899,447*. An aqueous detergent composition comprises (a) an alkali salt of an anionic detergent forming acid and (b) a colloidal silica sol. (a) and (b) are formed *in situ* by reaction of a corresponding water soluble alkali silicate and anionic detergent forming acid in such proportion as to yield a composition not greater than 0.2 N in alkali ion. The silica sol is alkali-stabilized within a pH range of 7.2 to 11.0.

DETERGENT CONCENTRATE. E.T. Messenger and D.E. Mather (Albright & Wilson Ltd.). *U.S. 3,899,448*. An aqueous concentrate comprises 50–70% of a sulfated alkoxylated alcohol salt. The salt is a water soluble sulfate of an alcohol which has been condensed with 1–4 ethylene oxide or propylene oxide groups and 1–10% of an aromatic sulfonate.

PROCESS FOR MANUFACTURING COLOR-STRIPED STAMPED DETERGENT BARS. G.D. Murray (Procter & Gamble). *U.S. 3,899,566*. A process for manufacturing a soap or detergent bar having stripes of at least one distinctive color, curved relative to the long axis of the bar comprises feeding into a die box a longitudinally striped billet of soap or detergent whose length is greater than the corresponding dimension of the die box. The billet is aligned when forced into the die box so that its long axis is not coincident with the long axis of the die box at the instant when it is subjected to compression therein.

BUILDERS FOR DETERGENT COMPOSITIONS BASED ON CARBOXYLATED BICYCLIC COMPOUNDS. C.D. Szymanski and R.N. DeMartino (National Starch and Chemical Corp.). *U.S. 3,898,034*. The dry detergent composition consists of an organic detergent, a filler such as sodium sulfate and sodium carbonate, and a builder based on carboxylated bicyclic compounds, their anhydrides and water soluble alkali metal salts. The detergent and the builder are present in ratios of 10:1 to 1:10. The filler comprises 10–45% of the composition. In aqueous solution, the composition gives a pH of 8–13.

ETHER-LINKED QUATERNARY AMMONIUM COMPOUNDS. R.A. Bauman (Colgate-Palmolive Co.). *U.S. 3,898,284*. The compounds have the structural formula: $RO(CH_2)_nN(CH_3)_2R_1^+X^-$. R is 1-adamantyl, R_1 is a long chain alkyl group of 10–18 carbon atoms, *n* is an integer from 1 to 3, and X is an anion selected from the group consisting of chloride, bromide, iodide, methyl sulfate, nitrate, and aryl sulfonates.

DISHWASHING COMPOSITIONS CONTAINING GEL FORMING GELATIN. R. Mermelstein and R.W. Benson (Procter & Gamble). *U.S. 3,898,186*. The compositions consist of (A) 3–45% of an organic synthetic surfactant system comprising (i) 5–75% of water soluble alkyl sulfates, (ii) 5–60% of alkyl ether sulfates, and (iii) 5–50% of amine oxide surfactants; (b) 0.1–5% of gel-forming Type B gelatin having a Bloom strength of 50–300; and (C) 5–95% water.

LIQUID DETERGENT COMPOSITIONS. J.H. Miller (Procter & Gamble). *U.S. 3,898,187*. A homogeneous liquid detergent composition comprises (a) 3–40% of water soluble organic detergent, (b) 2–30% of organic sequestering builder, (c) 2–25% of phase modifying surfactant, and (d) the balance water. The ratio of (b) to (c) is from 3:1 to 1:3.

WASHING AGENTS CONTAINING A TEXTILE SOFTENER. H.-W. Eckert and H.-J. Lehmann (Henkel & Cie). *U.S. 3,897,347*. An aqueous softening, washing liquor bath for soiled textiles contains 0.2–1.5 g/l of a tenside component consisting of 20–100% of anionic surface active sulfonates and sulfates, 0–80% of soaps, and 0–45% of nonionic surface active agents; 0.05–1.2 g/l of a softener component alkylenediamine; adducted with a vicinal lower alkyleneoxide and 0.2–6.0 g/l of a conventional builder salt having sufficient alkaline power to render the pH of the washing bath 7 or over. The amount of the tenside component is at least as large as the amount of the softener component.

SURFACE TREATING COMPOSITIONS. R.E. Atkinson (Procter & Gamble). *U.S. 3,897,348*. A surface treating composition consists of (a) a substituted ammoniamidate or a cationic adduct thereof, and (b) a pH buffering compound in an amount sufficient to maintain the pH of a solution containing 0.001–0.5% of component (a) at a pH 2 or less pH units above the pK_a value of component (a).

STABILIZED SURFACTANTS AND THEIR PREPARATION. D.R. McCoy. *U.S. 3,897,362*. A water soluble or water dispersible surfactant mixture having good stability in aqueous solution in the pH range of 5.6–13 consists of at least 0.1% of ethoxylated Schiff base and at least 0.002% of the methyl alkyl ketone self-condensates obtained from the condensation of ethanolamine with ketonic dimers. The methyl alkyl ketone condensates are present in a concentration of 2–35% of the ethoxylated Schiff base condensates. The surfactant mixture has a pH of 10–13 when present in aqueous solution at 1% concentration.

AGGLOMERATION OF DISHWASHING DETERGENTS. C.A. Sumner (Stauffer Chem. Co., Westport, Conn.). *Soap/Cosmetics/Chemical Specialties* 51(7), 29–32, 50 (1975). A special agglomeration technique which imparts to dishwasher detergents containing chlorinated trisodium phosphate superior chlorine stability and uniform-sized agglomerates which can be continuously packaged immediately after processing is described. The special agglomerator gives a very constant density curtain which allows the agglomerates to form, not plug, and produce no large lumps. Its minimum diameter is about three feet, limited by the distance liquid silicate must travel from the spray nozzle before it forms discrete droplets. Minimum residence time in the agglomerator is 15 minutes, and in the conditioner, it is 30 minutes. Dishwashing compounds produced by this method can be successfully packaged with up to 28% moisture without caking. Moreover, foil overwraps are not necessary to prevent chlorine loss and caking during storage. Formulations and stability data for several chlorinated TSP detergents amenable to this process are given.

WETTING OF COMPOSITE SURFACES. M. Manes and C.J. Zahradnik (Kent State U.). *J. Paint Technol.* 47(606), 43–8 (1975). The adhesive work of decane on graphite (on which it spreads) cannot be determined from the contact angles on composite surfaces containing graphite and Teflon (on which it does not spread). A liquid will not spread on any smooth composite surface with a significantly nonspreading solid component, regardless of how strongly the liquid is attracted by the spreading solid component. In addition to this conclusion, reasons are given for the expectation that the presence or absence of liquid vapors should make little difference in contact angle, provided that a stable positive contact angle exists.

SURFACE ACTIVITY, MICROBIAL ACTIVITY AND APPLICATION OF SELECTED TETRAALKYL-NITROGEN COMPOUNDS. M.H. Angele (Lonza AG, Basel). *Seifen-Öle-Fette-Wachse* 101(10), 273–7 (1975). The paper deals with dodecyl, decyloctyl, dioctyl dimethyl ammonium chlorides which are quaternary ammonium compounds differing considerably from the usual "quats"—generally n-alkyl dimethyl benzyl ammonium chlorides—as to their chemical structure. The former products have become known as BARDAC and are water soluble cationic surfactants. They show particular surface active properties and a remarkable microbiocidal efficacy. Due to these properties BARDACS are mostly used in formulations for example, as active ingredients in disinfectants or disinfectant cleaners for institutions, hospitals and industries or as preservatives for suitable industrial products or as biocidal ingredients of textile softeners. Examples of formulations are cited.

ABOUT THE MEASURE OF CERTAIN MECHANICAL PROPERTIES OF SOAPS. I. MEASURE OF CUTTING-RESISTANCE AND BREAKING-RESISTANCE. E. Sambuc and M. Naudet (Lab. Nat. Matiers Grasses ITERG Univ. Provence, Marseille Cedex 13) *Rev. Fr. Corps Gras* 21, 559–66 (1975). Simple and easy to be realized instruments with low cost are suitable for measuring cutting-resistance and breaking-resistance of soap. It is also necessary that the results are reproducible and that they are expressed in absolute units (g/cm). In this paper, the study of the measuring of the resistance on the cutting and of the resistance on the breaking is done. All mechanical tests which have been done on the soapcakes and toilet soaps are described and it was found that mechanical properties are strongly influenced by the orientation of the plane which directs the deformation in regard to the direction of slubbing. ■

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