ABSTRACTS

R.A. REINERS, Editor. Abstractors: N.E. Bednarcyk, J.E. Covey, J.C. Harris, S.F. Herb, F.A. Kummerow, Biserka Matijasevic, E.G. Perkins, and R.W. Walker

• Fats and Oils

STUDY OF AUTOXIDATION OF METHYL LINOLEATE BY THE MANOMETRIC METHOD. W. Zwierzykowski et al. *Roczniki Technol: Chem. Zywn.* 22, 295–301 (1972). Autoxidation of methyl linoleate at different temperatures (60, 80, and 100C) and with the addition of different antioxidants (propyl, lauryl, and cetyl gallate) used in the concentrations of 0.0025%, 0.005% and 0.01% was studied. For these experiments, the Warburg apparatus was used. The results of this work show that antioxidant activity of gallate group of antioxidants is a function of the length of the chain of alcohol in the compound. The shorter the chain, the more active is the antioxidant. It was also found that an optimal antioxidant concentration in oil exists. (Rev. Franc. Corps Gras)

LECITHIN AND METHODS FOR ITS PURIFICATION. C. Wojnarowicz et al. *Tluszcze jad.* 17, 176–81 (1973). In this paper, a review (26 references) is given of the methods used for purifying of lecithin. The methods described are: refining by replacing the crude oil with the refined oil, refining with acetone, pure or hydrated, or with the mixture acetone-hydrocarbons (hexane, pentane, etc.), refining with fractionation in a mixture of acetone-alcohol-hexane, bleaching with chemical agents, hydrogenation, hydroxylation, etc. (Rev. Franc. Corps Gras)

REVIEW OF TECHNOLOGICAL METHODS FOR DEGUMMING VEGETABLE OILS. H. Szemraj. *Tluszcze jad.* 17, 169–75 (1973). Methods using mineral acids, adsorbents and other reagents are described. One method, not used very much, is precipitation of gums by the action of electric power at high tension. Also mentioned is the method used in USA for degumming vegetable oils with 0.1% of acetic anhydride. (Rev. Franc. Corps Gras)

CHARACTERISTICS AND PROPERTIES OF A GOOD FAT FOR THE PRODUCTION OF FRIED POTATOES. II. STUDY ON THE USE OF HYDROGENATED SOYBEAN AND PALM OIL. U. Fal. *Tluszcze jad.* 17, 127–37 (1973). Soybean and palm oils were selectively hydrogenated to a softening point of 40–42C. Linolenic acid was completely eliminated and the linoleic acid content was reduced to less than 5%. These oils are quite satisfactory for production of fried potatoes. Heated at 180C, soybean oil has better thermal resistance than palm oil. (Rev. Franc. Corps Gras)

CHEMICAL AND BIOLOGICAL VALUE CHANGES IN FAT USED FOR FRYING. S. Zalewski et al. *Roczniki Technol. Chem. Zywn.* 22, 329–341 (1972). Fatty acids composition of lard used for frying for 10 hours at 160–180C is not changed. The heated lard given to the animals shows no modification in depot fat; the gain of weight of an animal is not diminished and neither is the weight of the liver increased. (Rev. Franc. Corps Gras)

CHOICE OF AN OPTIMAL METHOD FOR THE STUDY OF AUTOXIDATION IN LARD WITH AND WITHOUT INHIBITORS. D. Chomiak. *Tluszcze jad.* 17, 92–9 (1973). Research with lard, treated by molecular distillation for elimination of natural autoxidants, has been done. The lard was stored at −10C. The rate of autoxidation was followed by the changes of peroxide values. The comparisons were made of the following tests: method with capsule, method on filter paper, Active Oxygen Method (AOM) and a method involving UV illumination. The author concluded that the AOM method, the official AOCS method, is superior. (Rev. Franc. Corps Gras)

BOILING POINT OF MISCELLA FORMED OF DIFFERENT SOLVENTS AS A FUNCTION OF RESIDUAL PRESSURE. V.V. Beloborodov et al. *Pishchevaya Tehnol.* 1973(1), 66–8. Use of one solvent for oil

Call for Nominations Award in Lipid Chemistry

Sponsored by Applied Science Laboratories

In April 1964 the Governing Board of the American Oil Chemists' Society established an Award in Lipid Chemistry under the sponsorship of the Applied Science Laboratories Inc., State College, Pa. Previous awards were presented as follows: Erich Baer, August 1964; Ernest Klenk, October 1965; H.E. Carter, October 1966; Sune Bergstrom, October 1967; Daniel Swern, October 1968; H.J. Dutton, October 1969; E.P. Kennedy, September 1970; E.S. Lutton, October 1971; A.T. James, September 1972; and F.D. Gunstone, September 1973.

The award consists of $2500 accompanied by an appropriate certificate. It is now planned that the 11th award will be presented at the AOCS Fall Meeting in Philadelphia, September 29-October 3, 1974.

Canvassing Committee Appointees

Policies and procedures governing the selection of award winners have been set by the AOCS Governing Board. An Award Nomination Canvassing Committee has been appointed. Members are: C.D. Evans, Chairman; C.W. Williams; D.L. Berner; G. Fuller; and R.J. Buswell. The function of this committee is to solicit nominations for the 11th award. Selection of the award winner will be made by the Award Committee whose membership will remain anonymous.

Rules

The rules prescribe that nominees shall have been responsible for the accomplishment of original research in lipid chemistry and must have presented the results thereof through publication of technical papers of high quality. Preference will be given to individuals who are actively associated with research in lipid chemistry and who have made fundamental discoveries that affect a large segment of the lipid field. For award purposes, the term "lipid chemistry" is considered to embrace all aspects of the chemistry and biochemistry of fatty acids, of naturally occurring and synthetic compounds and derivatives of fatty acids, and of compounds that are related to fatty acids metabolically, or occur naturally in close association with fatty acids or derivatives thereof. The award will be made without regard for national origin, race, color, creed or sex.

Letters of nomination together with supporting documents must be submitted in octuplicate to C.D. Evans, Northern Regional Research Center, 1815 N. University, Peoria, Ill. 61604 before the deadline of April 1, 1974. The supporting documents shall consist of professional biographical data, including a summary of the nominee's research accomplishments, a list of his publications, the degrees he holds, together with the names of the granting institutions, and the positions held during his professional career. There is no requirement that either the nominator or the nominee be a member of the American Oil Chemists' Society. In addition, letters from at least three other scientists supporting the nomination must be submitted in octuplicate.

Remember the DEADLINE, April 1, 1974

extraction, instead of a mixture of different hydrocarbones, is better. In this case, it is possible to use lower temperatures for miscella distillation which is important for obtaining better oil quality. (Rev. Franc. Corps Gras)

STRUCTURAL-MECHANICAL PROPERTIES OF THE FATTY PHASE OF MARGARINE. K.G. Savilova et al. *Maslozir. Prom.* 1973(6), 18 20. Elastoplasticity properties of fatty phase of margarine, made with different percentage of sunflower and copra oil, cotton palmitine and mixed hydrogenated oils have been studied. Plasticity is calculated as the ratio between residual irreversible deformation and total deformation. Elasticity is the ratio of elastic deformation and elasto-plasticity deformation. Of all compositions studied, fatty phases which contained 40% of sunflower oil or 20% of copra oil have higher elasto-plasticity properties. (Rev. Franc. Corps Gras)

THE COLOR OF VEGETABLE OILS. A.M. Goldovskij et al. *Maslozir. Prom.* 1973(6), 9–14. The color of crude vegetable oils is due to the presence of the following group of pigments: pigments of seeds from which the oil is obtained, pigments formed from these pigments during the storage of seeds, pigments derived from impurities and pigments formed during the treatment. By oil degumming, alkali neutralization, washing and drying the pigments formed during the treatment of seeds are mostly eliminated, while pigments formed during the storage of seeds are very difficult to eliminate. Most of carotenoids also stay because they are resistant to the action of alkali, but they are eliminated during bleaching with adsorbents. (Rev. Franc. Corps Gras)

INFLUENCE OF OIL AND CATALYST COMPOSITION ON THE PROCESS OF ELECTROCHEMICAL SEPARATION OF CATALYST FROM HYDROGENATED OILS. V.T. Zolocevskij et al. *Maslozir. Prom.* 1973(5), 23–5. The separation of catalyst from hydrogenated oils is a real problem for the oil industry. Separation by filter-press is not satisfactory and the yield is low. If batch filter-presses are used, the problem of fat oxidation also exists. Regarding different methods for catalyst separation, methods using electro-ionic technology seem to be satisfactory. Two methods for catalyst separation are elaborated: one is based on the use of filling between the electrodes and the second one on the direct settling of catalysts on the electrodes. The last one is simpler and achieves maximal concentration of catalyst and better yield. It is possible to make this method completely automatic. It was found that the catalyst separation from hydrogenated oil, by this method, depends not on activity or concentration of catalyst, but only on the phosphatide content in the oil. If the content of phosphatides is higher than 0.1%, it adversely affects the degree of catalyst separation. (Rev. Franc. Corps Gras)

THE INFLUENCE OF THE METHOD USED FOR REFINING ON THE QUALITY OF COTTONSEED OIL. A.I. Askinazi et al. *Maslozir. Prom.* 1973(5), 20–3. Comparing objective values for the quality, cottonseed oil refined in miscella and treated with a natural adsorbent is no worse than the oil refined with alkali and bleached afterward. Bleaching is better in the presence of a hydrocarbon solvent. A bleaching earth based on a thermally activated halloysite has less bleaching effect but the isomerization and the quantity of the oil adsorbed on the earth is less than with the Czech activated bleaching earth. (Rev. Franc. Corps Gras)

INFLUENCE OF HULL CONTENT ON THE QUALITY OF SUNFLOWER OIL. N.S. Arutjunjan et al. *Maslozir. Prom.* 1973(5), 15–20. The higher the hull content in the raw material going to the extraction is, the higher the unsaponifiable matter and phosphorus content of the sunflower oil are. If only extraction with the hexane is applied, the quantity of these materials is higher than if pressing and extraction are used. Regarding the oxidative changes of the oil, no influence of the hull content on the oil quality was found. The quality of the oil is correlated only with the quality of the treated seed. (Rev. Franc. Corps Gras)

EXPERIENCE OBTAINED WITH "GIANAZZA" EXTRACTION EQUIPMENT. N.M. Stepanov et al. *Maslozir. Prom.* 1973(4), 40–4. The results obtained with "Gianazza" extraction equipment used for linseed oil are described. The "Gianazza" extraction has been used from 1971 in the oil factory in Rzev (USSR). In the paper, "Gianazza" specification data are compared with the average values obtained in the factory. Better results were obtained in practice than specified: the capacity was higher (100–105t daily vs. 80t given in the specification), and the oil content of the meal was less (0.75–0.85% vs a specification of 1.85%). (Rev. Franc. Corps Gras)

RESULTS OF OIL INDUSTRIES IN 1972. S.F. Kiporenko et al. *Maslozir. Prom.* 1973(4), 27–35. In 1972, USSR oil industries treated 4.15 million tons of sunflowerseed and 3.62 million tons of cottonseed which represent 1.73 million tons of sunflowerseed oil and 0.64 tons of cottonseed oil. Regarding other oil seeds, the following quantities of oil were obtained: linseed oil 52,000t, soybean oil 39,000t, castor oil 21,000t, corn oil 10,000t, mustard oil 8,500t and peanut oil 2,000t. Production of margarine was 845,000t. For new kinds of margarine, fat was prepared by interesterification (margarine "Era" and cooking fat "Prima"). Production of soap was 1.19 million tons, calculated on the basis of 40% of fatty acids. From this quantity, 182,000t represents toilet soap and 199,000t synthetic detergents. (Rev. Franc. Corps Gras)

SOME PHYSICAL AND THERMOPHYSICAL CHARACTERISTICS OF FRYING FATS. M.I. Beljaev et al. *Maslozir. Prom.* 1973(4), 18–19. Thermal conductivity, density and viscosity were determined in cooking fats, commercially known as "Ukrainskij" and "Belorusskij." These fats contain 30–35% lard and tallow, respectively, and are largely used for frying. The results show that thermal conductivity is lower when the temperature is higher. The same is true for viscosity. Prolonging the heating time also increases the viscosity of fats. Density changes as viscosity. (Rev. Franc. Corps Gras)

HYDROGENATION OF COTTONSEED OIL ON NICKEL-COPPER STATIONARY CATALYST. H.I. Aresidze et al. *Maslozir. Prom.* 1973(3), 20–2. Hydrogenation was done with refined edible cottonseed oil and the catalyst was nickel-copper (5.9:1.8) on gumbrine (georgienne bentonite). Oil was hydrogenated at 180, 200 or 220C with hydrogen pressures of 0, 0.981×10^5, 1.962×10^5, 3.924×10^5, 5.886×10^5 or $8.829 \times 10^5 N/m^2$. The hydrogenated fats obtained correspond to GOST standards for edible hydrogenated fats. (Rev. Franc. Corps Gras)

REMOVING OIL BEFORE EXTRACTION. R.I. Spinov et al. *Maslozir. Prom.* 1973(2), 19–21. Direct extraction of oil is always applied to seeds with a low oil content. The methods used to obtain the oil from seeds rich in oil are also discussed. Pressing is generally used to obtain the oil before extraction. To obtain the sunflower cake containing 14% oil or a cottonseed cake with 11–12% oil, the temperature of the materials during processing was 100–105C, even 115C. If prepressing is done at 65–75C, the cakes contain 20–25% of oil. (Rev. Franc. Corps Gras)

SILYL DERIVATIVES OF STEROIDS. EVIDENCE FOR INTRAMOLECULAR SILYLATION PROCESSES AND ELECTRON IMPACT INDUCED RECIPROCAL EXCHANGE OF TRIMETHYLSILYL GROUPS. P. Vouros (Inst. for Lipid Res., Baylor College of Med., Houston, Tx. 77025). *J. Org. Chem.* 38, 3555–3560 (1973). The preparation of mixed trimethylsilyl-d_0 and trimethylsilyl-d_9 derivatives of 17α,20-dihydroxy steroids is described, in which the labeled silyl groups occupy specific positions. The reaction products are analyzed by mass spectrometry and evidence is presented for migration of the 20-trimethylsilyl group to the 17α position during silylation. Electron impact ionization is shown to cause reciprocal exchange of the 17α- and 20α-trimethylsilyl groups in the formation of certain ions in the mass spectrum of the trimethylsilyl derivative of 5-pregnene-3β,17α,20α-triol.

LIPIDS IN EGG WHITE. Yasushi Sato, Kenji Watanabe and Toshiaki Takahashi (Lab. of Food Sci. and Technol. (Animal Products), Faculty of Agr., Nagoya Univ., Nagoya, Japan). *Poultry Sci.* 52, 1564–70 (1973). Fresh egg white contained about 0.02% lipids of which 13–15% was phospholipids. The acetone-soluble lipids were made up of triglycerides, diglycerides, free fatty acids, cholesterol esters and cholesterol. Phosphatidylcholine (PC), lysophosphatidylcholine (LPC), phosphatidylethanolamine (PE), sphingomyelin (SPM) and an unknown material with choline base were present in the acetone-insoluble material. Triglyceride was present in largest amount. The amounts of PC, SPM, LPC and PE were 43, 32, 24% and trace, respectively. It was suggested that more than half

of lipids were bound to the protein. Lipid content of egg white increased slightly during storage at 30 ± 1C and 12 ± 1C, but increased little at 4 ± 2C. It was shown that phospholipids do not but triglyceride and cholesterol ester may pass from egg yolk to albumen during storage.

LIPIDS AND FATTY ACIDS OF CHICKEN BONE MARROW. K.E. Moerck and H.R. Ball, Jr. (Dept. of Food Sci., North Carolina State Univ., Raleigh, N.C. 27607). *J. Food Sci.* **38**, 978–80 (1973). In the past few years the mechanical deboning process has been used extensively to remove poultry meat from bones. This process incorporates unknown quantities of bone marrow in the deboned meat. Because oxidative rancidity is believed to be the major cause of flavor deterioration, the lipid composition of bone marrow could have a significant influence on the stability of finished products containing deboned meat. The objective of this study was to identify and quantitate the lipids and fatty acids of chicken bone marrow.

THE NATURE OF FATS AND FATTY COMPONENTS IN NONDAIRY IMITATION MILKS. M. Filsoof, M. Mehran and F.V. Kosikowski (Dept. of Food Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Food Sci.* **38**, 945–8 (1973). This study deals with a comprehensive analysis of the fats and fatty components of available nondairy imitation milk powders and concentrates obtained country-wide over 2 years.

MOLECULAR MOTION IN LIPID BILAYERS. A NUCLEAR MAGNETIC RESONANCE LINE WIDTH STUDY. C.H.A. Seiter and S.I. Chan (A.A. Noyes Lab. of Chem. Physics, Cal. Inst. of Technol., Pasadena, Cal. 91109). *J. Amer. Chem. Soc.* **95**, 7541–53 (1973). A model of the molecular motional state of unsonicated lipid bilayers is derived from proton magnetic resonance (pmr) line width considerations. The pmr line widths of both chain protons and the protons of methyl groups are calculated using a computer program based on Anderson's stochastic theory of resonance line widths. Spin-lattice relaxation phenomena observed for protons in lipid bilayers are also explained in terms of the same motional model. Finally, the effects of sample sonication on the pmr line widths are discussed in the light of stochastic relaxation results.

EFFECT OF CARBONYL STRUCTURE AND REACTION TEMPERATURE ON DETERMINATION OF TRACE CARBONYLS IN ALIPHATIC HYDROCARBONS. M.W. Scoggins (Res. and Dev. Div., Phillips Petroleum Co., Bartlesville, OK 74004). *Anal. Chem.* **45**, 2204–7 (1973). Methyl ketones and aldehydes without branching at the α-carbon through C_9 and most branched-chain isomers through C_7 in aliphatic hydrocarbons can be determined using the heterogeneous 2,4-dinitrophenylhydrazone-extraction method. Quantitative results are achieved at 25C by proper choice of reaction time and ultraviolet absorbance measurement at 345 nm. Extraction of carbonyl hydrazones by cyclohexane from aqueous 1 M HCl solution saturated with 2,4-dinitrophenylhydrazine is rapid and quantitative in a single step except for formaldehyde, acetaldehyde and acetone.

CHOLESTERIC LIQUID CRYSTAL INDUCED CIRCULAR DICHROISM (LCICD). V. SOME MECHANISTIC ASPECTS OF LCICD. F.D. Saeva, P.E. Sharpe and G.R. Olin (Xerox Corp., Rochester Res. Center, Webster, N.Y. 14580). *J. Amer. Chem. Soc.* **95**, 7656–9 (1973). The influence of cholesteric liquid crystalline mesophase pitch (degree of helicity), temperature, texture, solute concentration and cholesteric matrix on the intensity and sign of the cholesteric liquid crystal induced circular dichroism (LCICD) in pyrene was investigated. The spectroscopic information (polarizations of electronic transitions, detection of hidden transitions) provided by the LCICD spectra is also discussed. The LCICD intensity is dependent on pitch of the cholesteric mesophase, temperature and texture. The sign of the LCICD is dependent on the position of λ_0 of the cholesteric pitch band relative to the wavelength of absorption, cholesteric matrix properties, as well as the chirality of the mesophase. The molecular ellipticity, $[\Theta]$ (deg cm^2/dmol), for pyrene in a single cholesteric matrix is independent of solute concentration over a range in which the concentration was altered by two orders of magnitude.

VI. LCICD BEHAVIOR OF BENZENE AND SOME OF ITS MONO- AND DISUBSTITUTED DERIVATIVES. *Ibid.*, 7660–3. Liquid crystal induced circular dichroism (LCICD) studies on a series of mono- and disubstituted benzene derivatives show both spectroscopic and conformational effects as a function of aromatic ring substitution. The sign of the extrinsic circular dichroism (CD) within the ^1L_b electronic transition in monosubstituted benzenes depends on the ortho, para directing ability of the substituent, similar to that found in magnetic circular dichroism studies. LCICD spectra of some ortho-, meta-, and para-disubstituted benzenes show the para isomer to exhibit oppositely signed CD within the ^1L_b transition from the less symmetrical ortho and meta derivatives. This para effect is attributed to conformational variations between the isomers in a cholesteric mesophase of a single chirality.

AROMA COMPONENTS OF OLIVE OIL. R.A. Flath, R.R. Forrey and D.G. Guadagni (Western Regional Res. Lab., ARS, USDA, Berkeley, Cal. 94710). *J. Agr. Food Chem.* **21**, 948–52 (1973). The polar volatile components of virgin olive oil were concentrated by codistillation with water, followed by solvent extraction and dry-column chromatography. Gas chromatographic-mass spectrometric examination of the polar concentrate yielded the identities of 77 components. Organoleptic assessment of some of these compounds indicated that several are significant contributors to olive oil aroma.

ENHANCEMENT OF THE SENSITIVITY AND SELECTIVITY OF THE COULSON ELECTROLYTIC CONDUCTIVITY DETECTOR TO CHLORINATED HYDROCARBON PESTICIDES. J.W. Dolan and R.C. Hall (Dept. of Entomol., Purdue Univ., West Lafayette, Ind. 47907). *Anal. Chem.* **45**, 2198–2204 (1973). Factors which influence the sensitivity and selectivity of the Coulson electrolytic conductivity detector to chlorinated hydrocarbon pesticides were determined and optimized. The most influential factors which affect sensitivity are absorptive surfaces, electrode polarization, system stability and furnace temperature. Replacement of the standard 4-mm i.d. quartz reaction tube with one of 0.5-mm i.d., replacement of the silicone rubber septum at the furnace exit with a Teflon fitting and increasing the maximum cell voltage to 44 V dc resulted in a minimum detectability of 0.1 ng for heptachlor and a useable sensitivity of 0.4 ng as compared to 2 ng and 5 ng, respectively, for the unmodified detector. The most influential factors which affect selectivity are furnace temperature, reaction gas composition, and reaction gas flow rate. Optimization of these parameters enables most chlorinated hydrocarbon pesticides to be selectively determined in the presence of other halogenated materials such as PCB with selectivities $> 10^3$:1.

HIGH PRECISION SAMPLING FOR CHROMATOGRAPHIC SEPARATIONS. B.E. Bowen, S.P. Cram, J.E. Leitner and R.L. Wade (Analytical Chem. Div., Natl. Bureau of Standards, Washington, D.C. 20234). *Anal. Chem.* 45, 2185-91 (1973). The precision of several chromatographic sampling valves of original design is shown to approach 0.05% for unretained solutes. Hybrid-fluidic, high pressure and commercial valves have been characterized by measuring the precision of their column input profiles and statistical moments. A computer-based data acquisition and control system was developed for use with high precision algorithms.

COMPOSITION OF FATTY ACIDS IN BULGARIAN PINEWOOD ROSIN AND PINE OLEORESIN. I.I. BARDYSHEV, et al. *Nauch. Tr. Vissh. Ped. Inst, Plovdiv, Mat, Fiz, Khim, Biol.* 9 No 1, 95-9 (1971). The fatty acid fractions analysed were obtained from oleoresin of *Pinus sylvestris* and *P. nigra*, and from wood rosin samples of these species. The extraction and separation procedure is described. The fatty acids were analysed by GLC as their methyl esters. The retention times of the components and their contents in the two oleoresin samples and in a mixture of rosin from both species are tabulated. The samples contained 16 identified and 5 unidentified unsaturated fatty acids, and 11 identified saturated acids. (World Surface Coatings Abs. No. 374)

QUANTITATIVE ANALYSIS OF MIXTURE OF ROSIN ACIDS BY GAS-LIQUID CHROMATOGRAPHY. I.I. Bardyshev, A.L. Pertsovskii, G.I. Livko and V.M. Akulovich. *Zh. Anal. Khim.* 26 No 9, 1859-60 (1971). The methyl esters of pimaric, laevopimaric, abietic and dehydroabietic acids were determined by GLC at 210 C with the use of a stainless steel column (3 m. × 4 mm.) packed with 20% of diethylene glycol succinate on deactivated INZ-600 brick, or at 230 C with the use of a similar column (2 m. long) packed with 10% of Apiezon L plus 0.2% of polyoxyethylene glycol 600 on the same support; the flow rate of carrier gas (H_2) was 70 or 90 ml. per min, respectively, and thermal conductivity detection was used. The method gives reasonably accurate results without the use of correction factors. As the methyl esters polymerise appreciably on storage, only the freshly prepared esters should be analysed. (World Surface Coatings Abs. No. 375)

ACID NUMBER OF TALL OIL. Scandinavian Pulp, Paper and Board Testing Comm. *Svensk Papp Tidn.* 75 No 6, 217-8 *(in English)*, 219-20 *(in Swedish)* (1972). The oil sample (≃4 g.) is dissolved in 100 ml. of ethanol and is titrated potentiometrically with 0.5 *M* aq. ethanolic KOH (33 g. of KOH dissolved in ≃30 ml. of water and diluted to 1 l. with ethanol); a pH-meter with an alkali-resistant glass electrode and a calomel reference electrode is used. Tall oil rosin and tall oil pitch are first dissolved in a little toluene/ethanol (1:1) before titration. The method is applicable to tall oil fatty acids and tall light oil, as well as to the crude and distilled oils. (World Surface Coatings Abs. No. 375)

DETERMINATION OF ACID VALUE (POTENTIOMETRIC METHOD). NF T 60-221, 1972. *Assoc. Franc. de Normalization Bull. Bibliographique* 1973, No 1, 2. This method is particularly suitable for use with dark colored animal and vegetable oils, for which the titrimetric method is inapplicable. (World Surface Coatings Abs. No. 375)

POLYUNSATURATES AND FAT IN FISH FLESH. M.E. Stansby (Northwest Fisheries Center, NOAA, Seattle, Wash.). *J. Am. Dietetic Assoc.* 63, 625-30 (1973). Tables are presented which (a) categorize 55 species of fish as to fat and protein content and (b) list total polyunsaturates and docosahexaenoic acid content by species. Fish can have an important role in reducing diets, because of the high protein and low fat contents of certain species, and in diets designed for control of serum cholesterol, because of the content of docosahexaenoic acid.

CATALYSTS. B.A. Heide, J.J. Muller and T.J. Kock (Lever Bros.). *U.S. 3,776,858.* The specification describes interesterification catalysts comprising particles of a catalytically active alkali metal derivative, e.g., sodium ethoxide, immobilized by a completely saturated solid fatty material, e.g., hydrogenated fat, soap or fatty acid wax. The catalyst can be used for the interesterification of glycerides.

SEPARATION PROCESS. E.J. Dufault and D.A. Heeks (Syron Corp.). *U.S. 3,780,075.* The stickwater produced in processes for centrifugally separating fat bearing animal material, such as low temperature mechanical rendering processes, is split into a high fat fraction and a low fat fraction by heating to above 220F and holding quiescent in a pressurized separator. The stickwater separates into an upper layer containing most of the fat and insoluble defatted solids and a lower layer comprising water and dissolved defatted solids.

OIL TREATMENT PROCESS. B.T. Papahronis and W.P. Gibble (Hunt-Wesson Foods, Inc.). *U.S. 3,780,076.* A continuous method of treating refined unbleached soybean oil to produce a stable frying oil is disclosed. The method comprises, in the following sequence, preheating the oil, degassing the oil, heating to a higher temperature, adding a copper chromite catalyst, heating the oil to the catalytic reaction temperature, and contacting it with CO_2, degassing and cooling the oil, filtering, bleaching and deodorizing the oil.

• Biochemistry and Nutrition

COMPARTMENTATION OF GLYCERIDES IN ADIPOSE TISSUE CELLS. I. THE MECHANISM OF FREE FATTY ACID RELEASE. O. Zinder, E. Eisenberg and B. Shapiro (Dept. of Biochem., Hebrew Univ.-Hadassah Med. Schl., Jerusalem, Israel). *J. Biol. Chem.* 248, 7673-6 (1973). Isolated adipose tissue cells were prelabeled by incubation with radioactive fatty acids or radioglucose and subsequently transferred to a medium containing serum albumin and epinephrine. The specific activity of the fatty acids released during the first 15 min exceeded that of the bulk glycerides by a factor of over 10, and then dropped rapidly. Cellular free fatty acids could be excluded as the source of these high activity fatty acids. The specific activity of the diglyceride fraction in the prelabeled cells was 3 times that of the fatty acid released and dropped considerably during incubation with epinephrine. The absolute amount of diglyceride did not decrease. Diglycerides accounted for part of the fatty acids released. The rest was derived from a pool of triglycerides of high specific activity, which replenished the diglyceride pool and equilibrated with the bulk triglycerides in 1 hour. Equilibration of the triglyceride pools was very slow in the absence of epinephrine.

SOLUBILIZATION BY HEPARIN OF THE PHOSPHOLIPASE A_1 FROM THE PLASMA MEMBRANES OF RAT LIVER. M. Waite and P. Sisson (Dept. of Biochem., Bowman Gray Schl. of Medicine, Wake Forest Univ., Winston-Salem, N.C. 27103). *J. Biol. Chem.* 248, 7201-6 (1973). The phospholipase A_1 of rat liver plasma membranes was stimulated 2- to 3-fold by physiologic concentrations of heparin (1 to 2.4 μg per ml for humans). The stimulation did not change appreciably with increasing enzyme or substrate concentration, nor with the time of incubation. However, activation of hydrolysis by Ca^{2+} was altered by the addition of heparin. Treatment of the plasma membranes with heparin displaced the enzyme from the membrane which accounts for the stimulation of heparin. We believe our results support the hypothesis that the liver plasma membrane is the origin of the postheparin phospholipase A_1.

HYPOLIPIDAEMIC PRINCIPLE OF THE HUSK AND BRAN OF PADDY. NATURE OF THE SUBSTANCE AND ITS EFFECT ON CHOLESTEROL ABSORPTION AND FAECAL BILE SALT EXCRETION IN RATS FED A HIGH-FAT-HIGH-CHOLESTEROL DIET. P. Vijayagopal and P.A. Kurup (Dept. of Biochem., Univ. of Kerala, Trivandrum-1, India). *Atherosclerosis* 18, 379-87 (1973). The effect of oral administration of varying doses of a polysaccharide fraction isolated from bran and husk of paddy on the cholesterol, phospholipid and triglyceride levels of the serum, liver and aorta in rats fed a high-fat, high-cholesterol diet has been studied. At a daily dose of 15 mg per rat per day, these levels were comparable to those in rats fed a normal diet. The substance, while having no appreciable effect on cholesterol absorption, considerably increased the breakdown of cholesterol to bile salts and caused increased faecal bile salt excretion. The polysaccharide fraction contains 41.53% carbohydrate, 7.48% uronic acid, 0.54% hexosamine, 22.03% protein, 1.78% sulphate and

Two AOCS members elected to soap and detergent board

Two AOCS members recently were elected to the Board of The Soap and Detergent Association. D.R. Eagleson, Emery Industries, Inc., and A.H. Howland, Original Bradford Soap Works, Inc., were two of seven new members elected to serve on the Board.

J.A. Clawson, Chemed Corp., was elected chairman and chief executive officer, and J. VanAndel, Amway Corp., was elected vice chairman. ■

4.3% acetyl groups. It is found to contain two components, one precipitable by cetylpyridinium chloride (42%) and the other not precipitable (58%).

BIOSYNTHESIS OF A MYCOBACTERIAL LIPOPOLYSACCHARIDE. PROPERTIES OF THE POLYSACCHARIDE:ACYL COENZYME A ACYLTRANSFERASE REACTION. Ker-Kong Tung and C.E. Ballou (Dept. of Biochem., Univ. of Cal., Berkeley, Cal. 94720). *J. Biol. Chem.* **248**, 7126–33 (1973). A particulate enzyme preparation was obtained from *Mycobacterium phlei* cells which had the activity of a polysaccharide:acyl coenzyme A acyltransferse. We conclude that the enzyme system is involved in the biosynthesis of the methylglucose-containing lipopolysaccharide (MGLP), since it catalyzed the transfer of acetyl, propionyl, isobutyryl, octanoyl and succinyl groups, all of which are known to be present in the lipopolysaccharide. Moreover, the enzyme preparation used α-(1→4)-D-glucooligosaccharides as acceptors, a result consistent with the fact that a major part of the polysaccharide component of the lipopolysaccharide has the same amylose-like structure.

GLUCOCORTICOID-INDUCED ALTERATIONS IN PHOSPHATIDYLCHOLINE METABOLISM IN MOUSE LYMPHOMA CELLS, L5178Y, IN VITRO. M.T. Story, M.M. Standaert and G. Melnykovych (U.S. Veterans Admin. Hosp., Kansas City, Mo. 64128). *Cancer Res.* 33, 2872–7 (1973). Prednisolone inhibited incorporation of choline-methyl-^{14}C into the phospholipid fraction of mouse lymphoma L5178Y grown in culture. The inhibition of choline-methyl-^{14}C incorporation was dependent on steroid concentration and was limited to the steroids that were active as growth inhibitors of this cell strain. The inhibition of choline incorporation was reflected also in the plasma membrane. No such effects were observed when labeled glucose was used as the source of label.

RETINYL ACETATE: EFFECT ON CELLULAR CONTENT OF RNA IN EPIDERMIS IN CELL CULTURE IN CHEMICALLY DEFINED MEDIUM. M.B. Sporn, N.M. Dunlop and S.H. Yuspa (Lung Cancer Branch, Exptl. Pathol. Branch, Carcinogenesis Program, Natl. Cancer Inst., Bethesda, Md. 20014). *Science* 182, 722–3 (1973). Cell cultures of epidermis from newborn mice were established in chemically defined medium. Additions of retinyl acetate to these cultures caused a significant increase in cellular RNA content. Addition of insulin and hydrocortisone to the cultures potentiated the effect of retinyl acetate on cellular RNA content.

THE 6-O-METHYLGLUCOSE-CONTAINING LIPOPOLYSACCHARIDES OF MYCOBACTERIUM PHLEI. LOCATIONS OF THE NEUTRAL AND ACIDIC ACYL GROUPS. W.L. Smith and C.E. Ballou (Dept. of Biochem., Univ. of Cal., Berkeley, Cal. 94720). *J. Biol. Chem.* **248**, 7118–25 (1973). The methylglucose-containing lipopolysaccharide (MGLP) of *Mycobacterium phlei* is an acidic molecule with 18 hexose units. Six of these positions are now shown to be acylated specifically with monobasic acids and two others specifically with acidic succinyl groups. In addition, another site of succinylation has been found, which accounts for the nine positions in MGLP-IV. The nonrandom distribution of monobasic versus dibasic acids provides support for the concept that a defined placement of esters is in some way related to the biological function of the lipopolysaccharide.

QUANTITATIVE STUDIES ON FIBRINOGEN AND LOW-DENSITY LIPOPROTEIN IN HUMAN AORTIC INTIMA. E.B. Smith, R.S. Slater and J.A. Hunter (Dept. of Chem. Pathol., Univ. of Aberdeen, Foresterhill, Aberdeen, Great Britain). *Atherosclerosis* **18**, 479–87 (1973). The amounts of soluble, fibrinogen/fibrin related antigens (FRA) and of intact low-density (LD) lipoprotein in human aortic intima have been measured by an immunoelectrophoretic technique. Substantial amounts of FRA and LD lipoprotein were found in normal intima: in early fibrous lesions the concentrations of both antigens showed two- to four-fold increases compared with normal intima from the same aorta. In spite of the increase in concentration, the ratio LD lipoprotein cholesterol/FRA did not differ significantly between normal intima and lesions. There was a significant correlation between lipoprotein and FRA ($r = 0.722$, $P = 0.015$), which suggests that fibrinogen may be entering the intima together with lipoprotein and other plasma constituents. When tissue samples were treated with thrombin about 50% of the antigen was "clotted;" the "clottable" material was presumably fibrinogen since "clottable" fragments are not derived from lysis of a stabilized fibrin clot. The results suggest that substantial amounts of plasma fibrinogen enter the intima; if this is converted to fibrin within the intimal tissue it could be a potent factor in atherogenesis.

THE STEROLS OF THE ECHINODERM, ASTERIAS RUBENS. A.G. Smith, I. Rubinstein and L.J. Goad (Dept. of Biochem., Univ. of Liverpool, P.O. Box 147, Liverpool L69 3BX, U.K.). *Biochem. J.* **135**, 443–55 (1973). Twenty-two sterols were identified in the starfish *Asterias rubens* (Phylum, Echinodermata; Class, Asteroidea). The major 4-demethyl sterols had a Δ^7 bond and the C_{27} compound 5α-cholest-7-en-3β-ol predominated over other mono- and di-unsaturated sterols belonging to the C_{26}, C_{27}, C_{28} and C_{29} series. Small amounts of cholest-5-en-3β-ol and 5α-cholestan-3β-ol were also present. The minor sterols identified all contained either one or two methyl groups at C-4 and are considered to be potential biosynthetic precursors of 5α-cholest-7-en-3β-ol. Three sterols possessing a 9β,19-cyclopropane ring were also isolated and were probably derived by the starfish from a dietary source.

PATHWAYS OF TRIGLYCERIDE SYNTHESIS BY BOVINE JEJUNUM DURING ABSORPTION. H.B. Skrdlant, J.W. Young, R.S. Allen and A.D. McGilliard (Dept. of Animal Sci. and Dept. of Biochem. and Biophys., Iowa State Univ., Ames, Iowa 50010). *J. Dairy Sci.* **56**, 1305–11 (1973). Pathways of triglyceride synthesis were investigated in bovine intestine by incubating three different micellar substrates, each containing 1-monoolein and oleic acid with mid-jejunal sections, and by incubating jejunal microsomes with substrate mixtures containing either monoolein or α-glycerophosphate. With jejunal sections, apparent participation of monoglyceride pathway in tryglyceride synthesis was approximately 80% when the substrate contained no α-glycerophosphate precursors, 50% when the substrate contained glucose, and 30% when both glucose and glycerol were present. With microsomes, triglyceride was synthesized at approximately equal rates for both pathways. Thus, milk-fed calves possess monoglyceride pathway activity, and enzymes for this pathway are retained in older cattle fed hay and grain.

PREPARATION AND ACTIVE-SITE SPECIFIC PROPERTIES OF STURGEON MUSCLE GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE. F. Scydoux, S. Bernhard, O. Pfenninger, M. Payne and O.P. Malhotra (Inst. of Molecular Biol. and the Dept. of Chem., Univ. of Oregon, Eugene, Ore. 97403). *Biochemistry* 12, 4290–4300 (1973). Sturgeon muscle glyceraldehyde-3-phosphate dehydrogenase has been isolated and purified to maximal activity. The purified enzyme contains four unusually reactive cysteine sulfhydryls per 145,000 daltons. This highly selective reactivity is manifest in the reaction of enzyme with the sulfhydryl reagent, 2,2′-dithiobis(5-nitrobenzoate) (Nbs_2). Enzyme activity is directly proportional to the fraction of unreacted sulfhydryls. Enzyme samples of lower specific activity invariably give a proportionately lower stoichiometry of reaction. The highest purity enzyme has a specific activity in excess of any previously reported muscle and the yeast enzyme, the two highly purified enzymes have virtually the same specific activity.

THE SERUM HIGH DENSITY LIPOPROTEINS OF MACACUS RHESUS. I. ISOLATION, COMPOSITION AND PROPERTIES. A.M. Scanu, C. Edelstein, L. Vitello, R. Jones and R. Wissler (Depts. of Med., Biochem., and Pathol., Univ. of Chicago, Pritzker Schl. of Med., and the McLean Memorial Res. Inst., Chicago, Ill. 60637). *J. Biol. Chem.* **248**, 7648 52 (1973). The serum high density lipoproteins, HDL_2 (*d* 1.063 to 1.125 g per ml) and HDL_3 (*d* 1.125 to 1.21 g per ml), of normal *Macacus rhesus* kept on a low fat diet were isolated by ultracentrifugal flotation and their properties compared with those previously reported on human products. Both monkey and human lipoproteins proved very similar, in terms of hydrodynamic, spectroscopic, immunological and morphological criteria. However, the HDL_2:HDL_3 ratio in *M. rhesus* was 2:1, as compared to the

• President's Club and Honor Roll. . .

(Continued from page 303A)

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1:3 ratio in humans. Moreover, the sphingomyelin content of monkey HDL_2 and HDL_3 was significantly lower than that in man. Thus, the high density lipoproteins of *M. rhesus* are similar, but not identical, to those in man.

II. ISOLATION, PURIFICATION, AND CHARACTERIZATION OF THEIR TWO MAJOR POLYPEPTIDES. C. Edelstein, C.T. Lim and A.M. Scanu. *Ibid.*, 7653–69. The delipidated apoprotein of *Macacus rhesus* high density lipoprotein of *d* 1.063 to 1.21 g per ml (HDL) or of its two subclasses, HDL_2 (*d* 1.063 to 1.125 g per ml) or HDL_3 (*d* 1.125 to 1.21 g per ml), was fractionated by a combination of Sephadex G-200 and DEAE-cellulose column chromatography in the presence of urea. Two major polypeptides, operationally termed as Fractions III and IV, were obtained.

LIPOPHILIC INTERACTIONS OF ORGANIC CATIONS WITH MITOCHONDRIAL INNER MEMBRANES DURING RESPIRATORY CONTROL. K.S. Robers and E.S. Higgins (Dept. of Biochem., Medical Coll. of Virginia, Health Sciences Div. of Virginia Commonwealth Univ., Richmond, Va. 23298). *J. Biol. Chem.* 248, 7142–8 (1973). Twelve different lipophilic organic cations (tetraethyl-, tetrapropyl-, tetrabutyl-, tetrapentyl-, tetrahexyl-, tetraheptyl-, decyltrimethyl-, cetyltrimethyl-, and benzyltriethylammonium bromides; and dibenzyldimethylammonium chloride, N-1-dodecylnicotinamide chloride, and cetylpyridinium bromide) depressed respiratory control in rat liver mitochondria. Depression of respiratory control by the nonsymmetrical organic cations occurred by either inhibition of electron transport, action as an inhibitor of phosphorylating oxidation, or as an uncoupler. The mechanism of inhibition was dependent upon the organic structure of these amphipathic molecules.

CHOLESTEROL FEEDING ALTERS THE METABOLISM OF THORACIC-DUCT LYMPH LIPOPROTEIN CHOLESTEROL IN RABBITS BUT NOT IN RATS. T.G. Redgrave (Dept. of Physiol., Univ. of Melbourne, Parkville, Vic. 3052, Australia). *Biochem. J.* 136, 109–113 (1973). Labelled thoracic-duct lymph was collected from rats and rabbits after test meals containing [^{14}C]cholesterol and [2-^{3}H]glyceryl trioleate. The metabolism of labelled cholesterol and triglyceride was studied in normally fed and cholesterol-fed rats and rabbits injected with radioactive lymph from the same species. In normally fed animals of both species, 10 min after intravenous administration, about 80% of lymph cholesteryl ester but only about 10% of triglyceride was recovered in the liver after clearance from the plasma. This distribution is consistent with participation of 'remnant' particles in the metabolism of dietary lymph particles. The metabolism of cleared lymph lipoprotein constituents was unchanged in cholesterol-fed rats, but the recovery of cholesteryl ester in the livers of the cholesterol-fed rabbits was decreased to 30% of the cleared dose.

ELECTROPHORETIC CHARACTERIZATION OF BOVINE SERUM LIPOPROTEINS THROUGHOUT GESTATION AND LACTATION. B.C. Raphael, P.S. Dimick and D.L. Puppione (Lipids Lab., Pennsylvania State Univ., University Park, Pa. 16802). *J. Dairy Sci.* 56, 1411–4 (1973). The electrophoretic characteristics of the serum lipoproteins of Holstein cows were studied throughout gestation and lactation. The serum lipoproteins were separated into four ultracentrifugal density classes: very low density lipoproteins and chylomicrons $\rho < 1.006$, low density lipoproteins ρ 1.006 to 1.040, high density lipoproteins sub one ρ 1.040 to 1.063, and high density lipoproteins ρ 1.063 to 1.21. Agarose electrophoresis of the ultracentrifugal density classes demonstrated the association of very low density lipoproteins with pre-beta mobility, low density lipoproteins with beta mobility and the association of high density lipoproteins sub one and high density lipoproteins with alpha mobility.

EFFECT OF GLUCOSE AND INSULIN ON LIPOPROTEIN LIPASE ACTIVITY IN ADIPOSE TISSUE AND MILK. D.R. Rao, G.E. Hawkins and R.C. Smith (Dept. of Animal and Dairy Sciences, Agr. Expt. Station, Auburn Univ., Auburn, Ala. 36830). *J. Dairy Sci.* 56, 1415–9 (1973). Twelve pairs of Holstein cows were infused intravenously every 7th day with 3 liters of 0.09% saline or 25% glucose-saline for 24-h periods in a double reversal experiment to study the effect of glucose on lipoprotein lipase activity in adipose tissue and milk. The mean enzyme activities (μeq of fatty acids released per h per g of tissue of per ml of milk) for cows during saline and glucose treatments were: 22.2 and 26.8 in the adipose tissue and 332 and 342 in milk. Blood glucose of saline and glucose-infused cows was 54.6 and 96.9 mg/100 ml. Both blood glucose and lipoprotein lipase activity in adipose tissue were higher during glucose treatment than during saline treatment and were correlated, 0.31.

THE BIOSYNTHESIS OF UNSATURATED FATTY ACIDS BY BACILLI. V. IN VIVO SUBSTRATE SPECIFICITIES OF FATTY ACID DESATURASES. J.F. Quint and A.J. Fulco (Dept. of Biol. Chem., UCLA Schl. of Med., Los Angeles, Cal. 90024). *J. Biol. Chem.* 248, 6885–95 (1973). The apparent in vivo substrate specificities for six bacilli desaturases, previously shown to insert a cis-double bond into position five of palmitate and of one which desaturates in position 10 were determined in whole cells by a variety of methods. In addition, the positional specificity of double bond insertion and the rate of temperature-mediated inactivation of these desaturases were also determined. For all desaturases, with the possible exception of the Δ^5-desaturase of *B. licheniformis* 9259, maximal desaturation activity was found with palmitate with activity for the n-saturated substrates decreasing in the order $C_{16} > C_{17} > C_{18}$. The Δ^{10}-desaturase of *B. licheniformis* 9259 showed almost absolute specificity for palmitate while the Δ^5-desaturases of the other species showed quantitative variations in their preferences for these three substrates ranging from that of *Bacillus megaterium* 14581, whose relative desaturation activity was 1.00, 0.57, and 0.16 toward C-16:0, C-17:0 and C-18:0, respectively. to that of *Bacillus pumilis* 7061 (1.00, 0.81, and 0.74 for the same three fatty acids).

CHOLESTEROL-ESTERIFYING ENZYMES OF FOAM CELLS ISOLATED FROM ATHEROSCLEROTIC RABBIT INTIMA. J.W. Proudlock, A.J. Day and R.K. Tume (Dept. of Physiol., Univ. of Melbourne, Melbourne, Vict., Australia). *Atherosclerosis* 18, 451–7 (1973). The cholesterol-esterifying activity of whole and fractionated homogenates of foam cells isolated from atherosclerotic rabbit aortic intima was investigated using [1-^{14}C]oleate and [4-^{14}C] cholesterol as substrates. Two cholesterol-esterifying enzymes were demonstrated in the foam cell homogenates. The first had a pH optimum of 5.0; it incorporated both [1-^{14}C]oleic acid and [4-^{14}C]cholesterol into cholesterol ester without requirement for CoASH and ATP. Enzyme activity was present in both the supernatant and the particulate fractions. The second enzyme had a pH optimum of 7.5; it incorporated both [1-^{14}C] oleic acid and [4-^{14}C]cholesterol into cholesterol ester in the

Train trip to Mexico City proposed by Reiser

AOCS past president Raymond Reiser has expressed an interest in forming an AOCS group trip to Mexico City on the Mexican National Railways crack train, the *Aztec Eagle*. The train runs daily from Nuevo Laredo, Mexico (across the border from Laredo, Tex.), to Mexico City. The current published schedule has the *Aztec Eagle* leaving Nuevo Laredo at 6:25 p.m. Standard Time daily and arriving in Mexico City at 6:25 p.m. the next day. If a group could be formed it would leave Nuevo Laredo on Friday, April 26.

AOCS members interested in the trip can fly one way between their homes and Laredo where they can transfer by taxi across the border to Mexico to catch the train. Also there are connecting *Amtrak* trains from Dallas-Fort Worth to Laredo. Members would be able to fly back to their homes from Mexico City. Currently one-way fares between Nuevo Laredo and Mexico City are $10.86 U.S. Sleeping car fares range from $10.35 additional for a private roomette for one person to $14.79 additional for a bedroom (upper and lower berth) for two persons. Of course, dining facilities are available on the train.

Anyone wishing to make reservations on the *Aztec Eagle* can do so by notifying Travel Consultants Inc., 1025 Connecticut Ave., NW, Washington, D.C. 20036, or by making note of their wishes on the reservation form in the Mexico City meeting brochure that has been mailed to all AOCS members. TCI has agreed to make both airline and rail reservations for AOCS members traveling to Mexico. However reservations must be made early. ■

presence of CoASH and ATP, but not in their absence; most of this enzyme activity was present in the particulate fraction.

STRINGENT CONTROL OF FATTY ACID SYNTHESIS IN ESCHERICHIA COLI. POSSIBLE REGULATION OF ACETYL COENZYME A CARBOXYLASE BY PPGPP. S.E. Polakis, R.B. Guchhait and M.D. Lane (Dept. of Physiol. Chem., Johns Hopkins Univ. Schl. of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 248, 7957–66 (1973). The effect of amino acid starvation on the rate of fatty acid synthesis was examined in stringent (CP 78, rel$^+$) and relaxed (CP 79, rel$^-$) isogenic strains of *Escherichia coli (leu$^-$, his$^-$, arg$^-$, thr$^-$, thi$^-$)*. Rates of incorporation of [U-^{14}C]glucose, [1-^{14}C]acetate and ^3H_2O into chloroform-methanol soluble lipids (>95% phospholipid) were instantly reduced 50 to 60% by leucine starvation of stringent, but not relaxed, cells. These results suggest that stringent control of fatty acid synthesis in *E. coli* is mediated through the inhibitory action of (p)ppGpp on the carboxyltransferase component of the acetyl-CoA carboxylase system.

MICROSOMAL ELECTRON TRANSPORT. THE ROLE OF REDUCED NICOTINAMIDE ADENINE DINUCLEOTIDE PHOSPHATE-CYTOCHROME C REDUCTASE IN LIVER MICROSOMAL LIPID PEROXIDATION. T.C. Pederson, J.A. Buege and S.D. Aust (Dept. of Biochem., Michigan State Univ., East Lansing, Mich. 48823). *J. Biol. Chem.* 248, 7134–41 (1973). NADPH-cytochrome c reductase in rat liver microsomes was solubilized by bromelain digestion and purified to homogeneity. An antibody preparation obtained by immunization with this enzyme was found to inhibit the NADPH-cytochrome c reductase activity of both the purified enzyme and intact microsomes by more than 90%. A purified preparation of the microsomal enzyme, NADH-cytochrome b_5 reductase, which reduces EDTA-Fe, will also promote the peroxidation of extracted microsomal lipid. Intact microsomes, in the presence of ADP-FE, are specific for NADPH instead of NADH in promoting the peroxidation of microsomal lipids; however, in the presence of both EDTA-Fe and ADP-Fe, both NADH and NADPH promote lipid peroxidation. These results indicate that the NADPH-dependent peroxidation of microsomal lipid involves the activity of NADPH-cytochrome c reductase, and suggest that an additional microsomal electron transport component is involved. The function of this additional component in the lipid peroxidation reaction can apparently be replaced by EDTA-Fe.

STRUCTURAL AND METABOLIC RELATION BETWEEN MOLECULAR CLASSES OF PHOSPHATIDYLCHOLINE IN MITOCHONDRIA AND ENDOPLASMIC RETICULUM OF GUINEA PIG LIVER. J.G. Parkes and W. Thompson (Dept. of Biochem., Univ. of Toronto, Toronto, Canada M5S 1A8). *J. Biol. Chem.* 248, 6655–62 (1973). Phosphatidylcholine from mitochondria and microsomes of guinea pig liver was separated by thin-layer chromatography into eight classes differing in degree of unsaturation. No significant differences were observed in the molar proportions and fatty acid compositions of each of the classes in mitochondrial phosphatidylcholine when compared to the corresponding classes of microsomal origin. It is concluded that the profile of molecular classes of phosphatidylcholine in guinea pig liver mitochondria is regulated primarily through mechanisms involving transfer of lipid from endoplasmic reticulum.

POSITIONAL SPECIFICITY OF PURIFIED MILK LIPOPROTEIN LIPASE. P. Nilsson-Ehle, T. Egelrud, P. Belfrage, T. Olivecrona and B. Borgstrom (Dept. of Phys. Chem., Univ. of Lund, Lund, Sweden). *J. Biol. Chem.* 248, 6734–7 (1973). Highly purified lipoprotein lipase from bovine milk has been incubated with emulsified 1,3-dioleoyl-2-[1-^{14}C]oleoyl-[^{3}H]glycerol, and the reaction products have been separated by thin-layer chromatography on silicic acid impregnated with boric acid. There was an appreciable accumulation of monoacylglycerol, preponderantly of the 2 configuration. The 1(3)-monoacylglycerol found must have been formed by isomerization from the 2 isomer. A small but constant amount of 1,2(2,3)-diacylglycerol was found among the reaction products, but no 1,3-diacylglycerol. In incubations of albumin-bound 1(3)-monooleoylglycerol and 2-monooleoylglycerol with the enzyme, glycerol was produced by hydrolysis of the 1(3) isomer exclusively. In the incubations with trioleoylglycerol substrate, glycerol thus must have been obtained by hydrolysis of 1(3)-monoacylglycerol formed by isomerization from the 2 isomer.

PLASMA LIPOPROTEINS OF TURKEYS INJECTED WITH A SINGLE DOSE OF DIETHYLSTILBESTROL. J.T. McL. Neilson and C.F. Simpson (Dept. of Vet. Sci., Univ. of Florida, Gainesville, Fla. 32611). *Atherosclerosis* 18, 445–50 (1973). Turkeys injected with a single dose of diethylstilbestrol (DES) (15, 30 or 60 mg) develop a hyperlipoproteinemia which is characterized by a large increase in chylomicrons, a weak pre-beta lipoprotein concentration and an absence of beta- and alpha-lipoproteins. The hyperlipoproteinemia was pronounced between 3 and 12 days post injection. The rate and degree of development of the induced hyperlipoproteinemia is similar for the 3 levels of DES injected. Increased concentrations of cholesterol and protein are found in the low-density lipoproteins (LDL) between 4 and 20 days post injection, while the cholesterol and protein content of the high-density lipoproteins (HDL) are greatly reduced. The levels of cholesterol and protein in the LDL and HDL return to normal on day 44 post injection.

CAPACITY FOR STEROIDOGENESIS OF ADRENALS IN HYPOPHYSECTOMIZED AND ADRENOCORTICOTROPIC HORMONE-TREATED HYPOPHYSECTOMIZED RATS. IMPLICATION OF A RIBONUCLEIC ACID FOR HORMONE-INDUCED STEROIDOGENESIS. M.K. Mostafapour and T.T. Tchen (Dept. of Chem., Wayne State Univ., Detroit, Mich. 48202). *J. Biol. Chem.* 248, 6674–8 (1973). The steroidogenic capacity, determined by in vitro superfusion with adrenocorticotropic hormone (ACTH), of adrenals in hypophysectomized rats decays with a half-life of approximately 6 hours. In vivo ACTH treatment of rats within 12 hours posthypophysectomy leads to regeneration of this capacity with little or no lag period. In vivo ACTH treatment of rats 24 hours posthypophysectomy leads to regeneration of this capacity with a lag period of 3 to 6 hours, indicating some unknown changes in the adrenals between 12 and 24 hours posthypophysectomy. With 36 hours posthypophysectomized rats, no regeneration of this capacity was observed for 24 hours of in vivo ACTH treatment. The regenerative effect of ACTH is blocked by actinomycin D but not by puromycin, indicating that an RNA factor is involved.

CONTROL OF STEROIDOGENESIS IN PRE-OVULATORY CELLS. LUTEINIZING HORMONE STIMULATION OF [^{14}C]ACETATE INCORPORATION INTO STEROLS. P.W. Morris and J. Gorski (Dept. of Physiol. and Biophys. and the Dept. of Biochem., Univ. of Ill., Urbana, Ill. 61801). *J. Biol. Chem.* 248, 6920–7 (1973). Cell suspensions prepared from gonadotropin primed rabbit ovaries were characterized according to their ability to incorporate labeled acetate into the various intermediates of cholesterol biosynthesis. The suspensions respond typically to luteinizing hormone (LH), with a reduction in labeled acetate incorporation into both esterified and nonesterified cholesterol. In contrast, radioactivity accumulated more rapidly and more extensively in lanosterol, as well as two unidentified sterols, in the LH-treated suspensions; squalene also demonstrates an enhanced labeled acetate concentration. LH does not affect the transport of acetate into the cells nor the incorporation of acetate into free fatty acids. It does seem probable from these studies that LH stimulates steroidogenesis at sites prior to cholesterol synthesis in addition to its other sites of action.

CHLORINATION AND SULFATION REACTIONS IN THE BIOSYNTHESIS OF CHLOROSULFOLIPIDS IN OCHROMONAS DANICA, IN VIVO. C.L. Mooney and T.H. Haines (Dept. of Chem., City Coll. of the City Univ. of N.Y., 10031). *Biochemistry* 12, 4469–72 (1973). The phytoflagellate, *Ochromonas danica*, produces large amounts of chlorosulfolipids. These compounds are derivatives of docosane 1,14-disulfate and tetracosane 1,15-disulfate, in which one to six chlorine atoms have been substituted for the equivalent number of hydrogens. ^{14}C-Labeled docosanediol 1,14-disulfate and ^{14}C-labeled tetracosanediol 1,15-disulfate were incorporated into the chlorinated sulfatides directly. Since the sulfatide is not degraded or desulfated by the organism, this demonstrates that chlorination of the chain occurs without cleavage of the sulfate group. Thus, chlorination occurs after sulfation in the in vivo biosynthesis of the chlorosulfolipids. The positions at which chlorination occurs are not chemically activated. The

chlorination reaction almost surely occurs via a free-radical intermediate. Enzymatic halogenations described to date occur on activated carbons and these chlorination reactions have considerably lower energy requirements.

A ROLE FOR THE MICROTUBULAR SYSTEM IN THE RELEASE OF VERY LOW DENSITY LIPOPROTEINS BY PERFUSED MOUSE LIVERS. Y. Le Marchand, A. Singh, F. Assimacopoulos-Jeannet, L. Orci, Ch. Rouiller and B. Jeanrenaud (Labs. de Recherches Med. and Inst. d'Hist. et d'Embryol., Geneva Univ. Med. Schl., Geneva, Switzerland). *J. Biol. Chem.* 248, 6862–70 (1973). Normal mouse livers have been perfused in situ and the release of triglycerides in the perfusate has been measured as an index of very low density lipoprotein secretion. Vincristine or colchicine, drugs known to interfere with the microtubular system, were found to inhibit markedly triglyceride release by perfused livers. When used at appropriate concentrations, these drugs did not change glucose production, ureogenesis, ATP levels or oxygen consumption. The uptake and oxidation of fatty acids by livers perfused with either drugs remained unaffected. Labeled oleate incorporation into total triglycerides (*i.e.* liver plus perfusate) as well as that of labeled amino acids into total proteins were not changed by vincristine or colchicine. The ultrastructure of livers perfused with these drugs appeared normal except that the microtubules could no longer be observed.

AN EFFECT OF INSULIN ON CYCLIC ADENOSINE 3′:5′-MONOPHOSPHATE PHOSPHODIESTERASE ACTIVITY IN FAT CELLS. V. Manganiello and M. Vaughan (Molecular Disease Branch, National Heart and Lung Inst., National Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 248, 7164–70 (1973). Homogenates of rat fat cells were separated into three fractions by centrifugation: P_1 (sedimented at 10,000 × *g* for 7 min), P_2 (sedimented from the 10,000 × *g* supernatant after 20 min at 100,000 × *g*), and S (the 100,000 × *g* supernatant). Incubation of fat cells with 1.0 milliunit per ml of insulin invariably increased the phosphodiesterase activity assayed in homogenates with <10 μM cAMP. These observations are consistent with the view that the effects of insulin and perhaps corticosteroids on cAMP-mediated processes in fat cells may be the result of alterations in the activity of a membrane-associated phosphodiesterase which has a relatively high affinity for cAMP.

BODY WATER KINETICS IN VITAMIN A-DEFICIENT CHICKENS. G.A. Lopez, R.W. Phillips and C.F. Nockels (Depts. of Physiol. and Biophys. and Animal Sci., Colorado State Univ., Fort Collins, Col. 80521). *Proc. Soc. Exp. Biol. Med.* 144, 54–55 (1973). The effect of mild vitamin A deficiency on kinetic parameters associated with the body water pool was studied in five-month-old pullets by isotope dilution techniques, using tritium-labeled water. The body water $T_{1/2}$ was significantly shorter ($p < 0.01$) and the flux through the body water pool greatly increased ($p < 0.01$) in the A-deficient chicks indicating that even under mild vitamin A deficiency, water turnover rates are significantly altered. These changes appear to be due to alterations in the stability and permeability of the cells involved in water transport in the A-deficient chicken, through mechanisms yet to be elucidated.

HYDROLYSIS OF TAY-SACHS GANGLIOSIDE BY β-HEXOSAMINIDASE A OF HUMAN LIVER AND URINE. Yu-Teh Li, M.Y. Mazzotta, Chin-Chin Wan, R. Orth and Su-Chen Li (Dept. of Biochem., Tulane Univ., New Orleans, La. 70112). *J. Biol. Chem.* 248, 7512–5 (1973). A crude β-hexosaminidase fraction prepared by $(NH_4)_2SO_4$ fractionation of human liver extract or urine was found to convert Tay-Sachs ganglioside, GalNAcβ1→4-(NANα2→3)Galβ1→4Glc→ceramide(G_{M2}) into NANα2→3Galβ1→4-Glc→ceramide(G_{M3}). After separation of hexosaminidase A and B by DEAE-cellulose chromatography, only freshly prepared β-hexosaminidase A hydrolyzed G_{M2} although both forms were still active toward p-nitrophenyl-β-D-N-acetylglucosaminide. A heat-stable, nondialyzable preparation obtained from the crude β-hexosaminidase fraction of human liver was found to stimulate the hydrolysis of G_{M2} by β-hexosaminidase A but not B isolated from both sources. Our results explain why β-hexosaminidase A has been previously reported by other investigators to hydrolyze G_{M2} only with great difficulty. Our results also relate the inordinate storage of G_{M2} to the absence of β-hexosaminidase A in the classical form of Tay-Sachs disease.

ORGANIZATION OF THE LIPID PHASE IN VIRAL MEMBRANES. EFFECTS OF INDEPENDENT VARIATION OF THE LIPID AND THE PROTEIN COMPOSITION. F.R. Landsberger, R.W. Compans, P.W. Choppin and J. Lenard (Dept. of Chem., Indiana Univ., Bloomington, Ind. 47401). *Biochemistry* 12, 4498–502 (1973). Spin-label electron spin resonance (esr) methods have been used to investigate the effects of independent variation of the lipid and protein composition on the organization of the lipid in viral membranes. Influenza and parainfluenza SV5 virions were grown in BHK21-F and MDBK cells and labeled with stearic acid derivative spin labels. Since the lipid composition of the virus reflects that of the plasma membrane of the host cell but the proteins are virus specified, two different viruses grown in the same cell line contain membranes with similar lipids and different proteins. The esr spectral splittings of such virions were found to be indistinguishable. Growing the same virus in different cells permitted a comparison of membranes with similar proteins but different lipids. The esr spectra of these virions showed significant differences. These results indicate that the rigidity of the viral membrane depends largely on the lipid composition, and is not affected by the differences in the protein composition of the two viruses. Evidence is presented that the lipids of parainfluenza virions are arranged in a bilayer structure.

NUTRITIONAL EVALUATION OF RAPESEED OILS AND RAPESEED SOAPSTOCKS FOR LAYING HENS. S.P. Lall and S.J. Slinger (Dept. of Nutr., Univ. of Guelph, Guelph, Ontario, Canada). *Poultry Sci.* 52, 1729–40 (1973). An experiment was conducted to determine the effect of regular *Brassica napus, Brassica campestris* and low erucic acid (Oro variety) rapeseed oils (RSO) on the performance of laying hens. Feed grade tallow and corn oil were used as controls. The response was measured in terms of egg production, egg size, hatchability and fatty acid and cholesterol levels in egg yolk. The metabolizable energy content of the oils was also determined. When included in the diets of laying hens at levels of 10 and 20% *B. napus* and *B. campestris* RSO exerted a depressing effect on egg production, egg weight, yolk weight and hatchability as compared to the performance of hens on tallow or corn oil. In contrast, the use of low erucic acid rapeseed oil exerted no detrimental effects on reproductive performance thus suggesting that erucic acid is the main factor responsible for the deleterious effects.

ACID β-GLYCEROPHOSPHATASE AND β-GLUCURONIDASE ACTIVITY IN AORTAS OF SWINE FED HIGH-CHOLESTEROL DIET. Y.S. Kwak, D.N. Kim and K.T. Lee (Dept. of Pathol., Albany Med. College, Albany, N.Y. 12208). *Atherosclerosis* 18, 417–27 (1973). The activities of acid β-glycerophosphatase and β-glucuronidase, and the contents of protein, DNA, water and cholesterol have been measured in an intima-inner media preparation of aortas of swine fed either high fat-cholesterol or control stock diets for 0, 14, 28, 120 and 240 days. Increased activities of the two enzymes were demonstrated in the aortas of swine fed the high cholesterol diet, but only after gross atherosclerotic lesions were well established. An increased cholesterol content could be detected in the trifurcation area of the aortas as early as 28 days of cholesterol feeding. No significant changes were noted in the concentration of protein, DNA and water content of aortas after cholesterol feeding.

COMPARISON OF THE EFFECTS OF ADRENOCORTICOTROPIC HORMONE ON THE STEROIDOGENIC ACTIVITY AND ULTRASTRUCTURE OF ADRENAL CORTEX. T.H. Kuo and T.T. Tchen (Dept. of Chem., Wayne St. Univ., Detroit, Mich. 48202). *J. Biol. Chem.* 248, 6679–83 (1973). Comparison of ultrastructural and biochemical response to adrenocorticotropic hormone (ACTH) in superfused adrenals or cell suspension and in adrenals of hypohpysectomized rats showed that (a) steroidogenic response can take place in superfused glands that have suffered gross struc-

tural damage and contained no detectable intact mitochondria; (b) steroidogenesis of cell suspensions takes place without dilation of the endoplasmic reticulum; (c) adrenals of 1-day posthypophysectomized rats respond normally to ACTH in terms of ultrastructural changes even though they have lost their responsiveness to ACTH in terms of steroidogenesis; (d) these ACTH-induced ultrastructural changes in adrenals of hypophysectomized rats are blocked by the prior administration of cycloheximide and postulated to be dependent upon the translation of preformed mRNA with a longer half-life than the mRNA coding for the labile steroidogenic protein.

THE EFFECT OF DIETARY FAT LEVEL ON HEAT PROSTRATION OF BROILERS. L.F. Kubena, F.N. Reece, J.W. Deaton and J.D. May (USDA, ARS, South Central Poultry Res. Lab., State College, Miss. 39762). *Poultry Sci.* 52, 1691–3 (1973). Three trials were conducted to study the effect of dietary fat level on mortality that was due to heat prostration in 8-week-old male broilers. The four diets contained 1, 3, 7 and 10% added animal fat and were ad libitum for the 4- to 8-week experimental period. At 8 weeks of age, the dry-bulb temperature was increased from 21.1C with a dew point temperature of 10.0C to 40.6C over 6 hours, with a dewpoint temperature of 23.9C. The temperature was held at 40.6C for 2 hours, then decreased to 26.7C over 30 minutes. Mortality that was due to heat prostration was recorded at 30-minute intervals during the stress test. The results obtained indicate that the dietary level of animal fat did not affect mortality due to heat prostration. This finding is significant since more concentrated rations are sometimes fed to commercial broilers during the summer in an attempt to improve growth and feed utilization.

EFFECTS OF INSULIN ON THE LEVELS OF ADENOSINE 3′:5′-MONOPHOSPHATE AND LIPOLYSIS IN ISOLATED RAT EPIDIDYMAL FAT CELLS. T. Kono and F.W. Barham (Dept. of Physiol., Schl. of Med., Vanderbilt Univ., Nashville, Tenn. 37232). *J. Biol. Chem.* 248, 7417–26 (1973). Effects of insulin on the level of adenosine 3′:5′-monophosphate (cyclic AMP) and the rate of lipolysis in isolated rat epididymal fat cells were determined under various conditions. Under the given in vitro conditions, insulin (rather than its possible contaminants) induces multiple effects on the levels of cyclic AMP and lipolysis depending on its concentration and on the nature and concentrations of the lipolytic agent used. Part of the difference in the effects of lipolytic agents might by explained by the difference in the cyclic AMP levels elevated by these agents. Since all the insulin effects tested seem to be mediated by the cellular insulin receptor or receptors, it is suggested that the insulin receptor system of fat cells can respond to a wide concentration range (approximately from 0.01 to 100 nM) of this hormone.

HYPERCHOLESTEROLEMIA IN RATS PRODUCED BY AN INCREASE IN THE RATIO OF ZINC TO COPPER INGESTED. L.M. Klevay (Dept. of Environmental Health, Univ. of Cincinnati Coll. of Med., Cincinnati, Ohio 45219). *Am. J. Clin. Nutr.* 26, 1060–8 (1973). Data are cited supporting the hypothesis that increased consumption of sugar, decreased consumption of vegetable fiber, consumption of soft water and lack of exercise result in an increase of the ratio of zinc to copper available for absorption from the intestinal tract, an increase in the ratio of zinc to copper retained in the body following absorption, or an alteration in the distribution of these elements in certain important organs. This increased ratio of zinc to copper then causes an increased concentration of cholesterol in plasma, and presumably, results in increased risk of coronary heart disease. Such increased risk may add to genetic, dietary, and other factors that influence the atherogenic process(es).

LOCATION OF AROMATIC AMINO ACID RESIDUES IN BOVINE SERUM HIGH-DENSITY LIPOPROTEIN. A. Jones (Dept. of Biochem., Schl. of Chem. Sci., Univ. of Ill., Urbana, Ill. 61801). *Biochemistry* 12, 4503–7 (1973). The location of tyrosine and tryptophan residues in intact bovine serum high-density lipoprotein (BHDL) and in the delipidated protein component (apo-BHDL) was determined by solvent perturbation of the chromophores, using difference absorption spectroscopy. The changes in the chromophore environment upon delipidation of the lipoprotein were confirmed by spectrophotometric titration of the tyrosine residues and by changes in the intrinsic fluorescence spectra. It was found that in BHDL, 75% of the tyrosine residues and 40% of the tryptophan are exposed to solvent, whereas in apo-BHDL 100% of the tyrosine and nearly 70% of the tryptophan residues are exposed. The present results suggest a model of BHDL where most of the protein is located on the surface of the lipoprotein in an extended form and imply the existence of specific protein-lipid interactions rather than bulk hydrophobic interactions.

EFFECT OF VITAMIN A DEPRIVATION ON THE CHOLESTEROL SIDE-CHAIN CLEAVAGE ENZYME ACTIVITY OF TESTES AND OVARIES OF RATS. M. Jayaram, S.K. Murthy and J. Ganguly (Dept. of Biochem., Indian Inst. of Sci., Bangalore-560012, India). *Biochem. J.* 136, 221–3 (1973). The cholesterol side-chain cleavage enzyme activity is decreased considerably at the mild stage of vitamin A deficiency in rat testes and ovaries and the decrease in activity becomes more pronounced with progress of deficiency. Supplementation of the deficient rats with retinyl acetate, but not retinoic acid, restores the enzyme activity to normal values. The cholesterol side-chain cleavage enzyme of adrenals is not affected by any of the above treatments.

A PHOSPHOLIPID-REQUIRING ENZYME, MALATE-VITAMIN K REDUCTASE. PURIFICATION AND CHARACTERIZATION. Katsuyuki Imai and A.F. Brodie (Dept. of Biochem., Univ. of Southern Cal. Schl. of Med., Los Angeles, Cal. 90033). *J. Biol. Chem.* 248, 7487–94 (1973). Malate-vitamin K reductase has been purified to near homogeneity from *Mycobacterium phlei*. The purified enzyme is dependent upon an added phospholipid for activity and requires FAD as a cofactor. The enzymatic activity was found to be affected by the degree of enzyme aggregation. At high salt concentrations the enzyme existed in a monomeric form which was more active than the aggregated form. The enzyme was reversibly aggregated into a less active form by either dilution or dialysis against a buffer of low salt concentration. An enzyme-phospholipid complex was isolated by glycerol gradient centrifugation. It is suggested that a phospholipid binding site (or sites) seems to be involved in the aggregation-disaggregation process. The molecular weight of the monomeric form was determined to be 53,000 by Sephadex G-200 chromatography and 51,000 by sodium dodecyl sulfate gel electrophoresis, whereas the aggregated form had a molecular weight of approximately 164,000, as estimated by Sephadex-G-200.

EFFECTS OF HYPOXIC AND AEROBIC INCUBATION OF LIPOGENESIS FROM [U-^{14}C]GLUCOSE IN SECTIONS OF NORMAL AND ATHEROSCLEROTIC AORTA FROM THE RABBIT. C.F. Howard, Jr. and L. Bonnett (Div. of Nutr. and Metab. Diseases, Oregon Reg. Primate Res. Center, Beavertown, Ore. 97005). *Atherosclerosis* 18, 469–77 (1973). Lipogenesis from [U-^{14}C]glucose was measured during hypoxic and aerobic incubation of sections of rabbit aorta. The studies were designed to determine the in situ lipogenic capabilities of each portion of normal and atherosclerotic aorta to provide further insight into the source of the lipids that accumulate during atherosclerosis. Sections of atherosclerotic lesions (AL) incorporated more radiosubstrate into lipids than any other sections and this incorporation was increased under hypoxic conditions. AL had greater synthetic capacity than atherosclerotic adventitia (AA), and both were greater than the media (AM) between the lesion and adventitia. AM was not significantly different from the intima + media from normal rabbit aorta. It was concluded that AL has sufficient capabilities for lipogenesis to account for lipid accumulation exclusive of any AA contributions; accumulation in vivo would represent both this de novo synthesis in situ plus exogenous lipid available to the atherosclerotic intima from the blood supply.

LIPID REQUIREMENT FOR RHODOPSIN REGENERABILITY. Keelung Hong and W.L. Hubbell (Dept. of Chem., Univ. of Cal., Berkeley, Cal. 94720). *Biochemistry* 12, 4517–23 (1973). The regenerability of purified rhodopsin has been determined in phospholipid bilayers, in digalactosyl diglyceride bilayers and in phospholipid-free solutions of digitonin. A high regenerability in the latter system indicates the lack of an absolute requirement for phospholipid. In lipid bilayers, there is no specific requirement for a particular polar head group or fatty acid species. It is suggested that structural rather than specific chemical requirements are important in maintaining a regenerable configuration of the molecule.

BIOCHEMICAL EFFECTS OF THE HYPOGLYCAEMIC COMPOUND PENT-4-ENOIC ACID AND RELATED NON-HYPOGLYCAEMIC FATTY ACIDS. EFFECTS OF THE FREE ACIDS AND THEIR CARNITINE ESTERS ON COENZYME A-DEPENDENT OXIDATIONS IN RAT LIVER MITOCHONDRIA. P.C. Holland and H.S.A. Sherratt (Dept. of Pharmacol., Med. Schl., Univ. of Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, U.K.). *Biochem. J.* 136, 157–71 (1973). The synthesis of pent-4-enoyl-L-carnitine, cyclopropanecarbonyl-L-carnitine and cyclobutanecarbonyl-L-carnitine is described. Pent-4-enoate strongly inhibits palmitoyl-L-carnitine oxidation

in coupled but not in uncoupled mitochondria. Pent-4-enoyl-L-carnitine strongly inhibits palmitoyl-L-carnitine oxidation in uncoupled mitochondria. Prior intramitochondrial formation of pent-4-enoyl-CoA is therefore necessary for inhibition. It is concluded that pent-4-enoate causes a specific inhibition of β-oxidation after the formation intramitochondrially of its metabolites.

BIOCHEMICAL EFFECTS OF THE HYPOGLYCAEMIC COMPOUND PENT-4-ENOIC ACID AND RELATED NON-HYPOGLYCAEMIC FATTY ACIDS. EFFECTS OF THEIR COENZYME A ESTERS ON ENZYMES OF FATTY ACID OXIDATION. P.C. Holland, A.E. Senior and H.S.A. Sherratt. *Ibid.*, 173–84 (1973). Pent-4-enoyl-CoA and its metabolites penta-2,4-dienoyl-CoA and acryloyl-CoA, as well as *n*-pentanoyl-CoA, cyclopropanecarbonyl-CoA and cyclobutanecarbonyl-CoA, were examined as substrates or inhibitors of purified enzymes of β-oxidation in an investigation to locate the site of inhibition of fatty acid oxidation by pent-4-enoate. The reactions of various acyl-CoA derivatives with L-carnitine and of various acyl-L-carnitine derivatives with CoA, catalysed by carnitine acetyltransferase, were investigated and V_{max} and K_m values were determined. Pent-4-enoyl-CoA and *n*-pentanoyl-CoA were good substrates, whereas cyclobutanecarbonyl-CoA, cyclopropanecarbonyl-CoA and acryloyl-CoA reacted more slowly. The formation of penta-2,4-dienoyl-CoA could explain the strong inhibition of fatty acid oxidation in intact mitochondria by pent-4-enoate.

1,24,25-TRIHYDROXYVITAMIN D_3. A METABOLITE OF VITAMIN D_3 EFFECTIVE ON INTESTINE. M.F. Holick, A. Kleiner-Bossaller, H.K. Schnoes, P.M. Kasten, I.T. Boyle and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisc.-Madison, Madison, Wisc. 53706). *J. Biol. Chem.* 248, 6691–6 (1973). A polar metabolite of 24,25-dihydroxyvitamin D_3 has been generated both in vivo in rats from 25-hydroxyvitamin D_3 and in vitro from 24,25-dihydroxyvitamin D_3 with chicken kidney homogenates. This metabolite has been isolated in pure form and identified as 1,24,25-trihydroxyvitamin D_3 by means of ultraviolet absorption spectrophotometry, mass spectrometry and its reactivity to periodate treatment. 1,24.25-Trihydroxyvitamin D_3 is 60% as active as vitamin D_3 in curing rickets. It is less active on a weight basis than 1,25-dihydroxyvitamin D_3 in stimulating and sustaining intestinal calcium transport and bone calcium mobilization but appears to have preferential action on the intestine.

MECHANISM OF ION ESCAPE FROM PHOSPHATIDYLCHOLINE AND PHOSPHATIDYLSERINE SINGLE BILAYER VESICLES. H. Hauser, D. Oldani and M.C. Phillips (Biophysics Div., Unilever Res. Lab. Colworth/Welwyn, the Frythe, Welwyn, Herts, England). *Biochemistry* 12, 4507–17 (1973). The escape of $^{22}Na^+$ and $^{36}Cl^-$ from egg lecithin and ox-brain phosphatidylserine single-shelled vesicles has been measured at 4C. The mechanism of Cl^- escape involves diffusion across the phospholipid bilayer; this follows first-order kinetics. At pH 5.5 the first-order rate constant (k_1) is about three orders of magnitude higher than that for Na^+ diffusion and the enhanced Cl^- diffusion probably involves the covalent association of Cl^- ions and protons at the lipid-water interface. This is consistent with the finding that log k_1 is inversely proportional to pH. From a kinetic analysis of the Na^+ escape and from energetic considerations of the transport of ions across bilayers it is concluded that there are two contributions to the measured cation flux.

FATTY ACYL-COENZYME A ELONGATION IN BRAIN OF NORMAL AND QUAKING MICE. I. Goldberg, I. Shechter, and K. Bloch (J. B. Conant Labs., Harvard Univ., Cambridge, Mass. 02138). *Science* 182, 497–9 (1973). Microsomal enzyme systems from mouse brain that catalyze, respectively, the elongation of palmitoyl-coenzyme A (palmitoyl-CoA), stearoyl-CoA or arachidyl-CoA appear and reach maximal activity at different times after birth of the animal. A specific C_{20}-CoA elongating system exists in mouse brain in addition to the previously recognized C_{16}-CoA and C_{18}-CoA elongating enzymes. The C_{20}-CoA elongation system is severely reduced in the mutant quaking mouse.

NATURE AND POSSIBLE FUNCTIONS OF ASSOCIATION BETWEEN GLUTAMATE DEHYDROGENASE AND CARDIOLIPIN. C. Godinot (Inst. for Enzyme Res., Univ. of Wisc., Madison, Wis. 53706). *Biochemistry* 12, 4029–34 (1973). Addition of cardiolipin to glutamate dehydrogenase inhibited the enzyme and induced aggregation of lipid and protein. The inhibition was dependent on enzyme concentration. Both apolar and polar parts of cardiolipin were implicated in the binding. Indeed, hydrolysis of cardiolipin fatty acid chains or addition of a detergent such as Lubrol WX which destroyed hydrophobic bonds prevented the inhibition. The fact that acetylation of glutamate dehydrogenase amino groups hindered the aggregation suggested that they were involved in binding the cardiolipin polar head. The possible role that this association can play in the assembly of mitochondrial membranes and in the regulation of glutamate dehydrogenase activity in situ is discussed.

IN VIVO INCORPORATION OF ^{14}C INTO LIVER AND KIDNEY STEROLS FROM PARENTERALLY ADMINISTERED [2-^{14}C]D,L-MEVALONIC ACID. J.H. Gans, A.J. Block and M.R. Cater (Dept. of Pharmacol., Univ. of Vt. College of Med., Burlington, Vt. 05401). *Proc. Soc. Exp. Biol. Med.* 144, 609–12 (1973). Twenty-four hr after the iv administration of [2-^{14}C]D,L-mevalonic acid to dogs and to sheep, the specific radioactivity of digitonin precipitatible sterol expressed as cholesterol in the kidney cortex was respectively 10.0- and 5.6-fold greater than the specific radioactivity of plasma cholesterol. Cholesterol of the kidney medulla, by contrast, attained a specific radioactivity which was 20% and 10% less than that of plasma cholesterol. Parenteral administration of [2-^{14}C]D,L-mevalonic acid to gerbils and to hamsters resulted in kidney cortical sterol specific radioactivities, 24 hr after the mevalonic acid had been given, which were, respectively, 34- and 18.7-fold greater than the specific radioactivity of liver cholesterol. Hamster kidney medullary cholesterol, at the same time interval attained a specific radioactivity 30% less than that of liver cholesterol. The apparent half life of the ^{14}C-labeled kidney cortical sterols was 4.3 days in gerbils and 5.5 days in hamsters while the apparent half life of hamster liver cholesterol was 10.8 days.

THE EFFECT OF VITAMIN B_{12} DEPRIVATION ON THE ENZYMES OF FATTY ACID SYNTHESIS. E.P. Frenkel, R.L. Kitchens and J.M. Johnston (E.L. Overton Hematology-Oncology Res. Lab., Depts. of Internal Med. and Biochem., Univ. of Texas Southwestern Med. Schl. and the Vet. Admin. Hosp., Dallas, Tx. 75235). *J. Biol. Chem.* 248, 7540–6 (1973). The enzymes of fatty acid synthesis from liver and brain in normal and B_{12}-deprived rats were studied. Both total and specific activities of fatty acid synthetase and acetyl coenzyme A carboxylase were 2- to 5-fold greater in B_{12} deprivation than in the normal state. Since B_{12} deficiency is associated with an increase in the tissue concentrations of propionic and methylmalonic acid, the effect of the coenzyme A derivatives of these acids on fatty acid synthetase and acetyl-CoA carboxylase activity was studied. Propionyl-CoA was a substrate for fatty acid synthetase, while methylmalonyl-CoA markedly inhibited synthetase activity. Thus, in vitamin B_{12} deprivation propionyl-CoA competes with acetyl-CoA as substrate providing a mechanism for odd chain fatty acid production, and its product, methylmalonyl-CoA, may function as an inhibitor of the enzymes of fatty acid synthesis.

GLYCOSPHINGOLIPIDS OF MEMBRANE FRACTIONS FROM NORMAL AND TRANSPLANTED CANINE KIDNEY. W.J. Esselman, J.R. Ackermann and C.C. Sweeley (Dept. of Biochem. and Dept. of Surgery, College of Human Med., Mich. State Univ., East Lansing, Mich. 48823). *J. Biol. Chem.* 248, 7310–7 (1973). The neutral glycosphingolipids and gangliosides of cell membrane particulate fractions from normal canine kidney and allograft rejected canine kidney have been examined. Intravenous injection of D-[1-^{14}C]glucosamine into a kidney transplant recipient 4 days after transplantation demonstrated a rapid incorporation into the hexosamine-containing glycosphingolipids of the rejected kidney membrane but not normal kidney membrane. Low levels of radioactivity were incorporated into the gangliosides of both control and rejecting kidneys and into the other neutral glycosphingolipids of control kidneys.

CLEARING-FACTOR LIPASE IN MUSCLE AND ADIPOSE TISSUE OF PIGS. M. Enser (Agr. Res. Council, Meat Res. Inst., Langford, Bristol BS18 7DY, U.K.). *Biochem. J.* 136, 381–5 (1973). Clearing-factor lipase was assayed in acetone-ether-dried powders of heart and adipose tissue of pigs. The enzyme activity in heart was higher than that in adipose tissue. The activity in the outer layer of subcutaneous fat was greater than that in the inner subcutaneous fat and the perirenal fat, which had similar activities. Starvation for 48h, but not for 24h, decreased the activity of the heart enzyme. Starvation for 24h caused a rapid decrease in the activity in all three adipose tissues, but even after 72h of starvation the activity was still highest in the outer subcutaneous fat. Plasma fatty acid, glucose and insulin concentrations were determined in fed and starved pigs. Starvation decreased the plasma insulin concentration and increased the non-esterified fatty acid concentration.

CHEMICAL SYNTHESIS OF $\Delta^{7,24}$-[3α-^3H]CHOLESTADIEN-3β-OL AND ITS CONVERSION TO CHOLESTEROL IN THE RAT. M.A. Ener and I.D. Frantz, Jr. (Depts. of Med. and Biochem., Medical Schl.,

Univ. of Minn., Minneapolis, Minn. 55455). *J. Biol. Chem.* **248**, 6697–700 (1973). $\Delta^{7,24}$-[3α-^{3}H]Cholestadien-3β-ol was synthesized by catalytic hydrogenation of $\Delta^{5,7,24}$-[3α-^{3}H]cholestatrien-3β-ol. The elemental composition was proved correct by high resolution mass spectrometry. The mass spectrum of $\Delta^{7,24}$-[3α-^{3}H]cholestadien-3β-ol was compared with the spectra of Δ^5- and Δ^2-cholesten-3β-ol and $\Delta^{5,24}$-[3α-^{3}H]cholestadien-3β-ol. The infrared spectrum of synthetic $\Delta^{7,24}$-[3α-^{3}H]cholestadien-3β-ol is compatible with that of the biological sterol. Their metabolic behavior is also similar.

THE TRANSPORTING PROTEINS OF CHOLECALCIFEROL AND 25-HYDROXYCHOLECALCIFEROL IN SERUM OF CHICKS AND OTHER SPECIES. PARTIAL PURIFICATION AND CHARACTERIZATION OF THE CHICK PROTEINS. S. Edelstein, D.E.M. Lawson and E. Kodicek (Dunn Nutr. Lab., Univ. of Cambridge and Med. Res. Council, Milton Rd., Cambridge CB4 1XJ, U.K.). *Biochem. J.* **135**, 417–26 (1973). Chick serum contains two cholecalciferol-binding proteins, one of which binds mainly cholecalciferol (cholecalciferol-binding protein). By means of Cohn fractionation, $(NH_4)_2SO_4$ precipitation, gel filtration on Sephadex G-200, ion-exchange chromatography on DEAE-Sephadex and an additional gel-filtration step on Sephadex G-100, these two binding proteins were purified. Both proteins possess β-globulin mobility on analytical polyacrylamide-disc-gel electrophoresis, a sedimentation coefficient of 3.5S and approximate molecular weights of 60,000 for the cholecalciferol-binding protein and 54,000 for the 25-hydroxycholecalciferol-binding protein. Sera obtained from rat, pig, human and monkey were shown to contain a single binding protein that is responsible for the transport of both cholecalciferol and 25-hydroxycholecalciferol. In the toad the lipoproteins are used for the transport of these two steroids.

MUSCLE CARNITINE PALMITYLTRANSFERASE DEFICIENCY AND MYOGLOBINURIA. S. DiMauro and P.M. Melis DiMauro (Dept. of Neurol. and Clin. Res. Center, Univ. of Pa., Philadelphia, Pa. 19174). *Science* **182**, 929–31 (1973). Muscle carnitine palmityltransferase activity, measured by three different methods, was very low (0 to 20% of controls) in a patient with a familial syndrome of recurrent myoglobinuria. Long-chain fatty acyl CoA synthetase activity was normal; acetylcarnitine transferase activity was decreased by 40%, and carnitine content was 1.7 times higher than the mean control value. Utilization of palmitate by isolated mitochondria was more impaired than utilization of palmitylcarnitine, suggesting a more severe defect of carnitine palmityltransferase I than transferase II. Thus, myoglobinuria may be due to a genetic defect of lipid metabolism in skeletal muscle.

EXTENSIVE INCORPORATION OF [2-^{14}C]MEVALONIC ACID INTO CHOLESTEROL PRECURSORS BY HUMAN PLATELETS IN VITRO. A. Derksen and P. Cohen (Dept. of Nutr., Harvard Univ. Schl. of Public Health, Boston, Mass, 02115). *J. Biol. Chem.* **248**, 7396–403 (1973). Human platelets convert [1-^{14}C]- or [2-^{14}C]acetate to labeled CO_2 and fatty acids; the latter, in turn, become esterified to acylglycerols and phospholipids. However, acetate apparently does not reach mevalonate in the sterol pathway. The platelets cannot produce any $^{14}CO_2$ whatever from [^{14}C]lanosterol, as evidence of demethylation, whereas the liver has no problem with CO_2 and cholesterol production from the same substrate. Interestingly, platelets can convert [^{14}C] desmosterol to cholesterol, although not nearly as efficiently as liver. This fact suggests that a major block exists in vitro in demethylation of lanosterol by human platelets.

THE EFFECTS OF LIGATURE OF THE THORACIC DUCT ON SERUM AND LIVER LIPIDS IN NORMOTENSIVE AND HYPERTENSIVE RATS. H. Cremer, N. Muller and G. Bartsch (Dept. of Pathol., Univ. of Bonn (GFR) and Div. of Med. Chem., A. Nattermann & Cie, GmbH, Cologne (GFR)). *Atherosclerosis* **18**, 363–8 (1973). After development of an experimentally induced renal hypertension in rats, elevated concentrations of cholesterol and phospholipids in serum were observed. The additional ligature of the thoracic duct in normotensive and hypertensive animals further increased the lipid content of serum in hypertensive rats and promoted an even more severe hyperlipaemia in normotensive animals. In both experimental groups the hyperlipaemia took a biphasic course. The lipids measured approached their initial values on the 15th day following the ligature of the ductus thoracicus. Moreover the ligature of the thoracic duct modified the total lipid content of the liver and induced pronounced morphological alterations of liver tissue.

SUBSTRATE-INDUCED DIFFERENCE SPECTRAL, ELECTRON PARAMAGNETIC RESONANCE AND ENZYMATIC PROPERTIES OF CHOLESTEROL-DEPLETED MITOCHONDRIAL CYTOCHROME P-450 OF BOVINE ADRENAL CORTEX. S.C. Cheng and B.W. Harding (Depts. of Med. and Biochem., Univ. of Southern Cal., Schl. of Med., Los Angeles, Cal. 90033). *J. Biol. Chem.* **248**, 7263–71 (1973). The steroid substrate-induced difference spectra, electron paramagnetic resonance (EPR) properties, reduction of cytochrome P-450, and hydroxylation activities were studied in acetone-extracted mitochondrial preparations of bovine adrenal cortex. Cholesterol, 20α-hydroxycholesterol, 22R-hydroxycholesterol, 17α-hydroxypregnenolone, progesterone, deoxycortisol and deoxycorticosterone all exhibited a type I difference spectrum with characteristic K's values. These preparations were active in side chain cleavage of cholesterol and 20α-hydroxycholesterol, as well as 11β-hydroxylation of deoxycortisol. The results suggest that substrate-induced high spin formation of P-450 appears to be an essential step for acceptance of reducing equivalents for oxygen activation and hydroxylations of steroid substrates.

ELEVATED STEROL SYNTHESIS IN LYMPHOCYTIC LEUKEMIA CELLS FROM TWO INBRED STRAINS OF MICE. H.W. Chen, A.A. Kandutsch, H.J. Heiniger and H. Meier (Jackson Lab., Bar Harbor, Maine 04609). *Cancer Res.* **33**, 2774–8 (1973). Cell suspensions of normal and leukemic mouse lymphocytes from spleens, thymuses and mesenteric lymph nodes actively incorporate acetate into cellular lipids. The de novo synthesis of digitonin-precipitable sterols in leukemic cells is tenfold greater than that of normal cells and is associated with a correspondingly increased activity of the rate-limiting enzyme, 3-hydroxy-3-methylglutaryl co-enzyme A reductase. In contrast, synthesis of fatty acids is only slightly enhanced and production of CO_2 is not affected because of leukemogenesis.

THE TRITIUM ISOTOPE EFFECT OF SN-GLYCEROL 3-PHOSPHATE OXIDASE AND THE EFFECTS OF CLOFENAPATE AND N-(2-BENZOYLOXYETHYL)NORFENFLURAMINE ON THE ESTERIFICATION OF GLYCEROL PHOSPHATE AND DIHYDROXYACETONE PHOSPHATE BY RAT LIVER MITOCHONDRIA. M. Bowley, R. Manning and D.N. Brindley (Dept. of Biochem., Univ. of Nottingham Medical Schl., Nottingham NG7 2RD, U.K.). *Biochem. J.* **136**, 421–7 (1973). Owing to a ^{3}H isotope effect, the mitochondrial *sn*-glycerol 3-phosphate oxidase (EC 1.1.99.5) had a mean activity which was 8.4 times less with *sn*-[2-^{3}H]-rather than with *sn*-[1-^{14}C]glycerol 3-phosphate as a substrate. A method for measuring the simultaneous synthesis of lipid from glycerol phosphate and dihydroxyacetone phosphate in rat liver mitochondria is described. The lipid synthesized by rat liver mitochondria from *sn*-[1-^{14}C]glycerol 3-phosphate was mainly phosphatidate and lysophosphatidate, whereas that synthesized from dihydroxy [1-^{14}C]acetone phosphate was mainly acyldihydroxyacetone phosphate. Additions of NADPH facilitated the conversion of acyldihydroxyacetone phosphate into lysophosphatidate. Hydrazine (1.4mM) or KCN (1.4mM) inhibited the synthesis of lipids from dihydroxyacetone phosphate but not from glycerol phosphate. Clofenapate (1–2.5mM) inhibited the synthesis of lipids from dihydroxyacetone phosphate but slightly stimulated synthesis from glycerol phosphate. The methanesulphonate of N-(2-benzoyloxyethyl)norfenfluramine, at 0.25–0.75mM, inhibited lipid synthesis from both glycerol phosphate and dihydroxyacetone phosphate.

FATTY ACID SYNTHESIS IN SHEEP MAMMARY TISSUE. D.E. Bauman, R.W. Mellenberger and R.G. Derrig (Dept. of Dairy Sci., Univ. of Illinois, Urbana, Ill. 61801). *J. Dairy Sci.* **56**, 1312–8 (1973). Biochemical pathways of fatty acid synthesis in sheep mammary tissue were investigated. Ewes were sacrificed (3 to 4 wk postpartum) for mammary tissue, for tissue slice incubations and enzyme assays. Acetate was readily incorporated into fatty acids by sheep mammary slices. However, lipogenesis from glucose, glycerol and pyruvate was limited, indicating inability to utilize acetyl coenzyme A generated in the mitochondria for fatty acid synthesis. Coinciding with lack of mitochondrial acetyl coenzyme A utilization for fatty acid synthesis was an absence of two citrate-cleavage pathway enzymes (ATP-citrate lyase and NADP-malate dehydrogenase).

PALMITOYL-COENZYME A SYNTHETASE. ISOLATION OF AN ENZYME-BOUND INTERMEDIATE. J. Bar-Tana, G. Rose and B. Shapiro (Dept. of Biochem., Hebrew Univ.-Hadassah Med. Schl., Jerusalem, Israel). *Biochem. J.* **135**, 411–6 (1973). An enzyme-bound intermediate of the overall reaction catalysed by rat liver microsomal long-chain fatty acyl-CoA synthetase is described. It was found to contain equimolar amounts of adenylate and fatty acid moieties bound to protein, and was stabilized by ATP. The intermediate reacted with CoA to give palmitoyl-CoA.

RECEPTOR FOR THYROTROPIN-RELEASING HORMONE IN PLASMA

MEMBRANES OF BOVINE ANTERIOR PITUITARY GLAND. ROLE OF LIPIDS. N. Barden and F. Labrie (Lab. of Molecular Endocrinology, Centre Hosp. de l'Univ. Laval, Quebec 10, Canada). *J. Biol. Chem.* 248, 7601–6 (1973). The receptor for thyrotropin-releasing hormone has been located in the plasma membranes of bovine anterior pituitary gland. Treatment of membranes with phospholipase A, phospholipase C, or digitonin or addition of lysophosphatidylcholine diminishes or completely destroys the ability of membranes to bind ^{3}H-labeled thyrotropin-releasing hormone. Inhibition of thyrotropin-releasing hormone binding by phospholipid addition to intact membranes is mediated by a decrease in the V_{max} of the reaction. These data show membrane phospholipids to be intimately involved in the receptor for thyrotropin-releasing hormone.

LOW DENSITY LIPOPROTEINS OF CHICKEN, TURKEY AND QUAIL EGG YOLK. W.L. Bacon, K.I. Brown and M.A. Musser (Dept. of Poultry Sci., Ohio Agr. Res. and Dev. Center, Wooster, Ohio). *Poultry Sci.* 52, 1741–44 (1973). The major low density lipoprotein fraction (LDF) of chicken, turkey and quail egg yolk has been isolated by preparative centrifugation and the molecular weight estimated by molecular sieve chromatography. In addition, rate zonal density gradient centrifugation has been used to examine the LDF preparations for homogeneity and to estimate their $S_{f,20,M\ NaCl}$ values. The LDF preparations of all three species contained at least two major fractions. The major LDF of chicken was about 25% lower weight (3.0×10^6), as indicated by molecular sieve chromatography, and had an $S_{f,20,M\ NaCl}$ value about 25% lower (20–21), as indicated by rate zonal centrifugation, than either the turkey (molecular weight of 3.9×10^6 and $S_{f,20,M\ NaCl}$ 26) or the quail (molecular weight of 4.2×10^6 and $S_{f,20,M\ NaCl}$ 26) LDF's.

POSITIONAL SPECIFICITY OF TRIGLYCERIDE LIPASES IN POST-HEPARIN PLASMA. G. Assmann, R.M. Krauss, D.S. Fredrickson and R.I. Levy (Molecular Disease Branch, Natl. Heart and Lung Inst., Natl. Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 248, 7184–90 (1973). The stereochemistry of the hydrolysis of radioactive glyceryl trioleate and glyceryl diethermonoesters by lipase activity in post-heparin plasma from man, normal and hepatectomized rats, and rat liver perfusate was determined. The following substrates were chemically synthesized and employed in albumin-Triton X-100 emulsions: 1,2-dioleoyl-3-[9,10-^{3}H]oleoyl-*sn*-glycerol; 1,3-dioleoyl-2-[1-^{14}C]oleoyl-*sn*-glycerol; *rac*-1,2-octadecenyl-3-[9,10-^{3}H]oleoyl-*sn*-glycerol; 2,3-octadecenyl-1-[9,10-^{3}H]oleoyl-*sn*-glycerol; and 1,3-octadecenyl-2-[9,10-^{3}H]oleoyl-*sn*-glycerol. The yields of free fatty acid and glycerol varied with different enzyme sources. K_m values were determined. Lipases in post-heparin plasma of hepatic and extrahepatic origins attack preferentially positions 1 and 3 in *sn*-glycerides and do not appear to distinguish between them. The presence in plasma of monoglyceride hydrolase activity that is primarily derived from the liver was confirmed.

ADRENAL MITOCHONDRIAL CYTOCHROME P-450 AND CHOLESTEROL SIDE CHAIN CLEAVAGE ACTIVITY. DIFFERENCES IN THE RESPONSE OF THE ZONA GLOMERULOSA AND ZONA FASCICULATA-RETICULARIS TO ADRENOCORTICOTROPIC HORMONE AND ITS WITHDRAWAL. J. Alfano, A.C. Brownie, W.H. Orme-Johnson and H. Beinert (Depts. of Biochem. and Pathol., State Univ. of New York at Buffalo, Buffalo, N.Y. 14207). *J. Biol. Chem.* 248, 7860–4 (1973). A comparison of the effects of adrenocorticotropic hormone (ACTH) on the cholesterol side chain cleavage system of zona glomerulosa and zona fasciculata-reticularis tissue of the rat adrenal is presented. Following hypophysectomy, the rate of pregnenolone formation from endogenous cholesterol in mitochondria from zona fasciculata-reticularis was lower than in mitochondria from zona glomerulosa. Also, the proportion of high spin, cholesterol-bound side chain cleavage cytochrome P-450 was smaller, as measured by spectrophotometry and electron paramagnetic resonance spectroscopy. It is concluded that although both zones are affected by ACTH, the cholesterol side chain cleavage system of the zona fasciculata-reticularis is much more sensitive than that of the zona glomerulosa to this hormone.

THE FUSION OF ERYTHROCYTES BY FATTY ACIDS, ESTERS, RETINOL AND α-TOCOPHEROL. Q.F. Ahkong, D. Fisher, W. Tampion and J.A. Lucy (Dept. of Biochem., Royal Free Hosp. Schl. of Med., Univ. of London, 8 Hunter St., London WC1N 1BP, U.K.). *Biochem. J.* 136, 147–55 (1973). The ability of a number of carboxylic acids, their esters, retinol and α-tocopherol to induce fusion of hen erythrocytes in vitro was investigated. Some 30 different fat-soluble substances (100 μg/ml) were found to cause the formation of multinucleated erythrocytes with a suspension of 3×10^8 erythrocytes—ml. The most effective agents induced fusion within 5–10 min at 37C; some substances required about 1 h. Inclusion of Dextran 60C in the test medium minimized colloid osmotic lysis caused by exogenous lipids that induce cell fusion. Fusion occurred with C_{10}-C_{14} saturated carboxylic acids, with unsaturated, longer-chain carboxylic acids and their mono-esters; retinol, and to a lesser extent α-tocopherol, also caused cell fusion. C_6-C_9, C_{15}, C_{16} and C_{18} saturated carboxylic acids did not induce fusion within 4h; glyceryl dioleate was only weakly active, and glyceryl trioleate was inactive in the test systems.

NO REGRESSION OF ATHEROMA OVER ONE YEAR IN RABBITS PREVIOUSLY FED A CHOLESTEROL-ENRICHED DIET. C.W.M. Adams, R.S. Morgan and O.B. Bayliss (Dept. of Pathol., Guy's Hosp. Med. Schl, London SE1 9RT, U.K.). *Atherosclerosis* 18, 429–44 (1973). Rabbits were fed a cholesterol-enriched diet for 12 weeks and then injected intravenously with a pulse-label of tritium cholesterol. Animals were killed at intervals from 1 day to 1 year after stopping the experimental diet. The inner aorta, outer aorta, plasma and liver were estimated for content and specific activity of cholesterol in both free and esterified forms. The aorta showed slow uptake of cholesterol, reaching plasma specific activity at about 3 weeks; thereafter it maintained its specific activity and cholesterol content at about the same level for 1 year. In the later part of the regression-period the amount of free cholesterol rose at the expense of esterified. By contrast, the plasma and liver showed a relatively rapid fall in cholesterol content and specific activity; the content falling to normal at about 1 month after stopping the diet. Histological and histochemical studies confirmed that the atheroma lipids had not been resorbed, and also revealed that atheromatous lesions were progressively converted into fibrous atherosclerosis over the 1-year regression-period.

PATHOLOGICAL EFFECTS OF DIETARY RAPESEED OILS WITH HIGH OR LOW ERUCIC ACID CONTENT IN DUCKLINGS. A.M.M. Abdellatif and R.O. Vles (Unilever Res., Vlaardingen, The Netherlands). *Poultry Sci.* 52, 1932–6 (1973). A rapeseed oil containing 50% erucic acid (RSO) and one containing 8.5% erucic acid (LER) were compared for pathogenicity in ducklings after feeding for 2 weeks or 3 months. RSO caused growth retardation, severe mortality, hydropericardium and pathological changes especially in heart, liver, skeletal muscles and spleen. After 3 months, cardiac fibrosis was observed. The animals fed LER for 2 weeks showed normal growth and no mortality, but some of them exhibited vacuolar changes of the heart and skeletal muscles. Hydropericardium was absent. After 3 months the lesions had largely disappeared leaving no permanent tissue alterations. These data show that an intake of ca. 4 cal % erucic acid is well tolerated by ducklings.

CHEDDAR CHEESE WITH INCREASED POLYUNSATURATED FATTY ACIDS. N.P. Wong, H.E. Walter, J.H. Vestal, D.E. Lacroix and J.A. Alford (USDA, Dairy Foods Nutr. Lab., Nutr. Inst., ARS, Beltsville, Md. 20705). *J. Dairy Sci.* 56, 1271–5 (1973). Cheddar cheese was made from milk of cows fed a diet supplemented with formaldehyde-treated safflower oil-casein particles. Cheeses containing 30% linoleic acid possessed body and flavor defects. These defects were less noticeable in cheese samples with 12 to 16% linoleic acid, but the cheese was significantly lower in flavor score and cheese flavor than the control. Process cheese, manufactured by blending lots of normal cheese with cheese containing increased polyunsaturated fatty acids to obtain a linoleic acid content of 10 to 12%, was liked as well by a consumer panel as commercial process cheese.

BIOSYNTHETIC STUDIES ON AROMATIC CAROTENOIDS. BIOSYNTHESIS OF CHLOROBACTENE. S.E. Moshier and D.J. Chapman (Depts. of Biochem. and Biology, Univ. of Chicago, 5630 S. Ingleside Ave., Chicago, Ill. 60637). *Biochem. J.* 136, 395–404 (1973). The incorporation of [2-^{14}C]mevalonic acid by *Chloropseudomonas ethylica* strain 2K into chlorobactene was studied. Oxidative degradation of chlorobactene of constant specific radioactivity produced labelled benzenecarboxylic acids and indicated that the benzene ring originates from mevalonic acid. Decarboxylation studies demonstrated a stereospecific methyl migration in the formation of the 1,2,5-trimethylphenyl group of chlorobactene. The migrating methyl group was derived from the C-3′ position of mevalonic acid.

MILK ULTRACENTRIFUGAL OPALESCENT LAYER. 3. YIELD AND CASEIN AND LIPID COMPOSITION AS A FUNCTION OF CENTRIFUGATION TIME. C.V. Morr and P.E. Swenson (Dept. of Food Sci. and Nutr., Univ. of Minnesota, St. Paul, Minn. 55101). *J. Dairy Sci.* 56, 1389–95 (1973). The yield and composition of

opalescent layer, pellet and supernatant fractions from skim milk (0 to 5C) were investigated as a function of ultracentrifugation time from 1 to 8 h at 147,000 × *g*. The lipoprotein and lipid content of opalescent layer casein micelles increased from 1 to 13% and from 1 to 19% by increase of centrifugation time from 1 to 8 h. Lipids extracted from opalescent layer pellet and supernatant contained 4.7 to 11.4% cholesterol.

BIOSYNTHESIS OF THE C_{18} FAMILY OF CUTIN ACIDS: ω-HYDROXY-OLEIC ACID, ω-HYDROXY-9,10-EPOXYSTEARIC ACID, 9,10,18-TRIHYDROXYSTEARIC ACID AND THEIR Δ^{12}-UNSATURATED ANALOGS. P.E. Kolattukudy, T.J. Walton and R.P.S. Kushwaha (Res. Center, Coll. of Agr., Washington State Univ., Pullman, Wash. 99163). *Biochemistry* 12, 4488–98 (1973). Biosynthesis of the hydroxy-C_{18} acids which constitute the major components of the polymer, cutin, was studied with specifically labeled fatty acids. Skin slices (but not internal tissue) of rapidly growing apple fruits incorporated exogenous fatty acids into cutin. [1-^{14}C]Acetate was incorporated into all classes of hydroxy acids, whereas [1-^{14}C]palmitic acid specifically labeled ω-hydroxy-palmitic acid and 10,16-dihydroxypalmitic acid. [1-^{14}C]Stearic acid, on the other hand, was not incorporated into polyhydroxy C_{18} acids.

MECHANISM OF OXIDATIVE CYCLIZATION OF SQUALENE. EVIDENCE FOR CYCLIZATION OF SQUALENE FROM EITHER END OF THE SQUALENE MOLECULE IN THE IN VIVO BIOSYNTHESIS OF FUSIDIC ACID BY FUSIDIUM COCCINEUM. R.C. Ebersole, W.O. Godtfredsen, S. Vangedal and E. Caspi (Worcester Found. for Exp. Biol., Shrewsbury, Mass. 01545). *J. Amer. Chem. Soc.* 95, 8133–40 (1973). Fusidic acid biosynthesized by *F. coccineum* from (3RS,5S)-[s-^{14}C,5-^{3}H] mevalonic acid was shown to contain 0.5 atom of tritium at the C-11β and C-12 positions. From the known mechanism of squalene formation the 0.5 atom of tritium at C-12 must have the α configuration. Our results indicate that either one of the terminal double bonds of squalene is epoxidized to an equal degree, and that the ensuing cyclization to prosterol occurs from either end of the squalene molecule. This shows that the geometrical asymmetry imparted to the squalene on the squalene synthetase is not retained during the conversion to oxidosqualene. These observations are consistent with the hypothesis of the release of squalene into a free squalene pool prior to epoxidation.

METABOLISM OF [U-^{14}C]LAURIC ACID TO METHYL KETONES BY THE SPORES OF PENICILLIUM ROQUEFORTI. C.K. Dartey and J.E. Kinsella (Dept. of Food Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Agr. Food Chem.* 21, 933–6 (1973). Cultures of *Penicillium roqueforti* spores oxidized [U-^{14}C]lauric acid into carbonyl compounds including a series of n-methyl ketones. Spore concentrations of 6.3 × 10^8 spores/ml in the presence of 2 mM of D-glucose under optimum conditions of pH and temperature, i.e., pH 6.5 and 30C, oxidized 16–20% of [U-^{14}C] lauric acid (5 mM) to carbonyl compounds. D-Glucose stimulated the formation of carbonyls and suppressed the complete oxidation of the lauric acid. A homologous series of methyl ketones C_3 to C_{11} inclusive was formed. Some unidentified carbonyl compounds other than methyl ketones were also produced. Metabolic CO_2 increased the conversion of [U-^{14}C]lauric acid into labeled methyl ketones by the *Penicillium* spores.

EFFECTS OF FEEDING FISH MEAL AND TOCOPHEROL ON FLAVOR OF PRECOOKED, FROZEN TURKEY MEAT. J.E. Webb, C.C. Brunson and J.D. Yates (Campbell Inst. for Agr. Res., Campbell Soup Co., Fayetteville, Ark. 72701). *Poultry Sci.* 52, 1029–34 (1973). The effects of feeding fish meal (0–10% of diet) and/or dl-α-tocopherol acetate (22 I U/kg of diet) on fishiness and rancidity in pre-cooked, sliced, frozen turkey meat were investigated through the use of TBA Nos. and taste panel. Feeding turkeys 7.5 or 10.0% fish meal (FM) for 65 days pre-slaughter produced breast meat that was significantly ($P < 0.01$) more fishy than control meat. For thigh-leg meat only the 10.0% FM level differed from the control ($P < 0.01$). TBA No. means for meat from 0 and 2.5% FM diets were lower ($P < 0.01$) than means from the 10.0% FM diet. In general, both TBA Nos. and panel scores indicated a more undesirable product with each increase in FM level. Including 22 IU vit E/kg of diet in the 10.0% FM diet significantly ($P < 0.01$) reduced TBA Nos. for meat. The same trend held ($P < 0.05$) for thigh-leg meat but not for breast meat from birds fed 5% FM. Panel scores indicated a consistent trend for a more desirable product when 22 I U vit E/kg of diet was fed. Feeding FM at the rate of more than 5.0% of the diet during the latter part of the growing period had a detrimental effect on flavor quality of pre-cooked, sliced, frozen turkey. Including dl-α-tocopherol acetate in high-level-FM diets reduced the magnitude of TBA Nos. and severity of off-flavors.

STUDIES ON CALCIFEROL METABOLISM. VIII. EVIDENCE FOR A CYTOPLASMIC RECEPTOR FOR 1,25-DIHYDROXY-VITAMIN D_3 IN THE INTESTINAL MUCOSA. H.C. Tsai and A.W. Norman (Dept. of Biochem., Univ. of Cal., Riverside, Cal. 92502). *J. Biol. Chem.* 248, 5967–75 (1973). The present report describes efforts to study via in vitro techniques the properties, specificity and requirements of an intestinal homogenate system capable of effecting the localization of 1,25-dihydroxycholecalciferol in the intestinal chromatin fraction. Incubation of intestinal homogenates in 0.25 M sucrose, 0.02 M KCl, 0.05 M $MgCl_2$ and 0.05 M Tris-Cl, pH 7.5, with 32 to 325 pmoles of 1,25-dihydroxy [^{3}H]cholecalciferol at 0–4C for 30 min resulted in the saturation of the subsequently isolated chromatin fraction at a level of 6.2 pmoles of steroid per chick intestinal chromatin. These results describing the in vitro conditions which permit the sequential binding of 1,25-dihydroxycholecalciferol to first a cytoplasmic and then a nuclear receptor are analogous both to the results obtained in vivo with this steroid and to those reported to occur under in vivo and in vitro conditions for many other steroid hormones.

INACTIVATION OF HORMONE-SENSITIVE LIPASE FROM ADIPOSE TISSUE WITH ADENOSINE TRIPHOSPHATE, MAGNESIUM AND ASCORBIC ACID. Su-Chen Tsai, H.M. Fales and M. Vaughan (Molec. Disease Branch and Lab. of Chem., Natl. Heart and Lung Inst., Natl. Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 248, 5278–81 (1973). Inactivation of ammonium sulfate-precipitated lipase requires, in addition to ATP and Mg^{2+} ion, a dialyzable factor present in homogenates of adipose tissue and liver which has now been identified as ascorbic acid. Lipase inactivation was proportional to ascorbic acid concentration in the range of 0.3 to 3 μM in the presence of 2 mM ATP and 4 mM $MgCl_2$. In the absence of the latter, ascorbic acid, like the inactivation factor, did not alter lipase activity. Identification of ascorbic acid as the tissue factor required for Mg^{2+} ATP-dependent inactivation of the hormone-sensitive lipase should facilitate further characterization of this process. In addition, because the requirement for ascorbic acid appears to be rather specific and the effective concentrations low relative to those employed in many other enzymatic systems, these observations may lead to the demonstration of a role for ascorbic acid in reactions of a type not hitherto associated with this compound.

VITAMIN D AND THE BIOSYNTHESIS OF PROTHROMBIN. III. STRUCTURAL COMPARISON OF AN NH_2-TERMINAL FRAGMENT FROM NORMAL AND FROM DICOUMAROL-INDUCED BOVINE PROTHROMBIN. J. Stenflo (Dept. of Clin. Chem., Univ. of Lund, Malmo General Hosp., Malmo, Sweden). *J. Biol. Chem.* 248, 6325–32 (1973). An NH_2-terminal fragment produced by thrombin digestion of purified normal and of dicoumarol-induced prothrombin was isolated and characterized. These fragments which were found to have a molecular weight of approximately 27,000 had an identical amino acid and carbohydrate composition. The fragment from normal prothrombin binds Ca^{2+} while the corresponding fragment from the dicoumarol-induced prothrombin does not. Furthermore the fragment from normal prothrombin had Ca^{2+}-dependent antigenic determinants but not the fragment from the dicoumarol-induced prothrombin. In addition a large COOH-terminal fragment was produced by thrombin digestion, which had identical electrophoretic and immunochemical properties from both prothrombins. In peptide maps prepared from thermolysin digests of the NH_2-terminal fragments, untreated as well as reduced and aminoethylated, clear-cut differences were observed. These differences presumably reflect a postribosomal vitamin K-dependent modification of the normal prothrombin molecule.

SERUM VITAMIN A, RETINOL-BINDING PROTEIN, AND PREALBUMIN CONCENTRATIONS IN PROTEIN-CALORIE MALNUTRITION. I. A FUNCTIONAL DEFECT IN HEPATIC RETINOL RELEASE. F.R. Smith, D.S. Goodman, M.S. Zaklama, M.K. Gabr, S. El Maraghy, and V.N. Patwardhan (Dept. of Med., Columbia Univ., Coll. of Physicians and Surgeons, New York, N.Y.). *Am. J. Clin. Nutr.* 26, 973–81 (1973). The components of the plasma vitamin A transport system have been examined in 33 Egyptian children with protein-calorie malnutrition and in 15 control children. Over the wide concentration range observed in kwashiorkor during treatment, the serum vitamin A, RBP, and PA concentrations were highly significantly correlated with each other. These findings suggest that the low serum vitamin A levels in kwashiorkor largely reflect a functional impairment in the hepatic release of vitamin A rather than vitamin A deficiency per se. Hepatic release of vitamin A is apparently impaired

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• Abstracts. . .

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because of defective hepatic production of plasma proteins including the plasma transport proteins for retinol because of a limiting supply of substrate for protein synthesis. When substrate is provided by dietary calories and protein the hepatic production of plasma proteins increases, plasma RBP and PA concentrations rise, and hence, plasma vitamin A concentration increases.

II. TREATMENT INCLUDING SUPPLEMENTAL VITAMIN A. F.R. Smith, D.S. Goodman, G. Arroyave and F. Viteri. *Ibid.*, 982–7. The serum retinol transport system has been studied in eight Central American children with marasmic kwashiorkor treated with protein, calories and supplemental vitamin A. With therapy, the serum concentrations of vitamin A, retinol-binding protein (RBP) and prealbumin (PA) all increased significantly as did the concentrations of serum albumin and total protein and the creatinine-height index (CHI). The levels of vitamin A, RBP, and PA were highly significantly correlated with each other ($P < 0.001$) over the wide concentration range observed during treatment, suggesting that the RBP holo-protein and PA were similarly influenced by the nutritional therapy. The serum concentrations of vitamin A, RBP and PA failed to correlate with the concentration of serum albumin or with the CHI. Whereas the concentrations of serum albumin and total protein and the CHI rose progressively in most patients throughout the period of therapy, the vitamin A, RBP, and PA concentrations generally rose to a maximum at approximately days 20 to 40, then decreased by days 60 to 90. Factors in addition to the availability of amino acid and protein substrate influence serum retinol transport in protein-calorie malnutrition.

A RELATIONSHIP BETWEEN COCCIDIOSIS AND DIETARY VITAMIN A LEVELS IN CHICKENS. S.P. Singh and G.A. Donovan (Agr. Exp. Station, Univ. of Vermont, Burlington, Vt. 05401). *Poultry Sci.* 52, 1295–1301 (1973). Broiler-cross male chickens, reared for two weeks on vitamin A-free diet, were administered vitamin A at 165, 495, 1485, 4455 and 13,365 U.S.P. units per kg of feed. Seven days later the chickens on each dietary vitamin A level were administered inoculum of coccidial suspensions. All chickens were maintained in wire floor batteries during the experimental period. The calculated vitamin A requirement for optimum growth for coccidiosis-infected chickens were higher than non-infected chickens. The coccidiosis-infected chickens had lower blood plasma and liver levels of vitamin A than non-infected chickens at the end of the first week post-infection. The severity of coccidiosis was greater in chickens receiving low vitamin A levels than chickens receiving higher levels of vitamin A. There was an inverse linear relationship between dietary vitamin A level and fecal sporulated oocyst count.

EFFECT OF NEOMYCIN AND OTHER ANTIBIOTICS ON SERUM CHOLESTEROL LEVELS AND ON 7α-DEHYDROXYLATION OF BILE ACIDS BY THE FECAL BACTERIAL FLORA IN MAN. P. Samuel, C.M. Holtzman, E. Meilman and I. Sekowski (Rockefeller Univ., New York, N.Y. 10021). *Circulation Res.* 33, 393–402 (1973). Fresh feces from 25 patients were homogenized and incubated with labeled cholic or chenodeoxycholic acid. After 24 hours of incubation, the percent change to the 7α-dehydroxylated form was measured. In 11 patients, the oral administration of 2g of neomycin daily significantly reduced the levels of serum cholesterol (from an average of 316 mg/100 ml plasma to 237 mg/100 ml plasma) and markedly inhibited the extent of 7α-dehydroxylation of cholic acid (from 89% to 9%); in 2 patients whose serum cholesterol levels were not lowered, the degradation of cholic acid remained unchanged (control 93%, neomycin 91%). The correlation coefficient between undegraded cholic acid and percent decrease in serum cholesterol concentrations ($r = 0.732$) was statistically significant ($P < 0.001$). It is proposed that serum cholesterol levels might be controlled in part by the prevalence of bile acid-degrading bacteria within the gastrointestinal tract.

THE METABOLISM OF ^{14}C AFLATOXINS IN LAYING HENS. D.S. Sawhney, D.V. Vadehra and R.C. Baker (Dept. of Poultry Sci., Cornell Univ., Ithaca, N.Y. 14850). *Poultry Sci.* 52, 1302–9 (1973). Sodium acetate-1-^{14}C labeled aflatoxins were produced by growing *Aspergillus flavus* strain NRRL-2999 on rice. A single 0.29 μCi oral dose of aflatoxins was administered to laying White Leghorn hens. The radioactivity distribution and its equivalents in various tissues, at one, four and seven days after the administration of the dose were determined. Seven days after treatment, 70.61% of the dose was recovered in the excrement. The excretion of aflatoxins or their metabolites into the intestine via the bile seemed to be the major pathway by which absorbed aflatoxins were excreted. All the components of eggs laid at various intervals showed ^{14}C activity. Edible parts of the carcass showed varied amounts of ^{14}C aflatoxins and/or their metabolites at all the periods studied. The time necessary to eliminate one-half of the radioactive aflatoxins from the body was found to be 66.82 hours. The liver, crop, gizzard and fecal material when fed in the diets were toxic to the duckling.

INFLUENCE OF VITAMINS A AND C ON CORTICOSTERONE AND CARBOHYDRATE METABOLISM IN CHICKENS. C.F. Nockels, G.A. Lopez and R.W. Phillips (Dept. of Animal Sci., Colorado State Univ., Fort Collins, Col. 80521). *Poultry Sci.* 52, 1261–9 (1973). Day-old Single Comb White Leghorn chicks were randomly allotted to one of the following rations: control, control + 150 p.p.m. ascorbic acid, vitamin A-deficient or vitamin A-deficient + 150 p.p.m. ascorbic acid. Vitamin A-deficient chickens were significantly lighter ($P < 0.05$) in weight than controls at 5, 6 and 7 weeks of age. Adding ascorbic acid to the vitamin A-deficient diet prevented the adrenal hypertrophy produced by the deficiency. Supplementing the control ration with ascorbic acid produced significant decreases in plasma corticosterone ($P < 0.01$) and percent liver glycogen ($P < 0.05$) but did not generally affect total adrenal corticosterone levels. Vitamin A deficiency produced an initial significant increase ($P < 0.05$) in plasma corticosterone followed by a significant decrease ($P < 0.01$) in plasma corticosterone and percent liver glycogen as the deficiency progressed. Supplementing the vitamin A-deficient diet with ascorbic acid did not generally improve the deficient chicks' plasma corticosterone except at six weeks of age ($P < 0.05$), and significantly reduced ($P < 0.05$) the percent liver glycogen at seven weeks of age.

RESPONSE OF BLOOD PLASMA GLUCOSE, FREE FATTY ACIDS, TRIGLYCERIDES, INSULIN AND FOOD INTAKE TO BOVINE INSULIN IN GEESE AND COCKERELS. I. Nir and V. Levy (Dept. of Poultry Sci. and Animal Hygiene, Faculty of Agr., Hebrew Univ. of Jerusalem, Rehovot, Israel). *Poultry Sci.* 52, 886–92 (1973). The effects of insulin (5 μ/kg B.W.) injected intravenously were investigated in both geese and chickens, 1 hour, 3 hours and 6 hours after the injection. Food consumption, plasma insulin, plasma glucose, plasma FFA and plasma triglycerides were measured. Geese showed much more sensitivity to the same dose of insulin injected, despite the fact that the insulin injected was degraded or left the plasma at the same rate in both species. Plasma glucose levels decreased in response to the injection of insulin in both species but the depression was sharper in the geese. A sharper decrease in food consumption was also noticed in the geese. Insulin administration increased the plasma FFA levels in the geese and provoked a substantial rise in the plasma triglycerides 3 and 6 hours after the injection. No change in plasma triglycerides was noticed in the cockerels.

VITAMIN A AND CAROTENE LEVELS OF A SELECTED POPULATION IN METROPOLITAN WASHINGTON, D.C. G.V. Mitchell, M. Young and C.R. Seward (Dept. of Health, Educ. and Welfare, Food and Drug Admin., Office of Sci., Bureau of Foods, Div. of Nutr., Washington, D.C. 20204). *Am. J. Clin. Nutr.* 26, 992–7 (1973). Liver samples obtained from subjects who died acute traumatic deaths or who died from various diseases in metropolitan Washington, D.C. were analyzed for vitamin A and carotene. Children under 2 months old had the lowest mean liver concentrations of vitamin A and carotene; children from 2 months to 10 years old and adults over 70 years old had the highest mean concentrations. Of the samples analyzed, 24% had less than 50 μg vitamin A/g liver and 3.3% of the samples had over 1,000 μg/g. Mean values of 211 μg of vitamin A/g and 5.6 μg of carotene/g were found in the livers of accident victims. The black male had a considerably lower concentration of vitamin A and carotene than did other groups within certain age ranges. Diseases, especially hepatic disease, appear to present an additional burden on vitamin A reserves. The large percentage of low levels of vitamin A found can probably be ascribed to some nutritional inadequacies, whereas the high levels may be due to the wide use of vitamin supplements by infants, children, and adults over 70 years old.

INEFFICACY OF DIETARY DEFICIENCIES OF VITAMINS A, D_3 AND RIBOFLAVIN ON THE REPRODUCTIVE PERFORMANCE OF MATURE COCKERELS. R.J. Lillie (ARS-NE, Nutr. Inst., U.S. Dept. of Agr., Beltsville, Md. 20705). *Poultry Sci.* 52, 1629–36 (1973). Two studies were conducted with 10 caged White Leghorn males per group—5 groups of 62-week-old birds for a 12-week period in Trial 1 and 4 groups of 32-week-old birds for a 22-week period in Trial 2. In both studies, group 1 males

were fed a wheat basal diet calculated to be devoid of vitamins A and D_3 and low in riboflavin and supplemented with 4405 USP units vitamin A, 1652 IC units vitamin D_3 and 4.05 mg riboflavin per kg diet. The group 1 diet was fed to groups 2, 3 and 4 with vitamin A, D_3 and riboflavin being omitted from groups 2, 3 and 4, respectively. Group 5 males in Trial 1 were continued on the standard breeder diet. The data in both studies showed no effect of a vitamin deficiency on the reproductive performance of cockerels in terms of body weight gains, feed intake, semen characteristics (semen volume, packed sperm volume, methylene blue reduction time) and duration of fertility and hatchability. Vitamin analyses of feed samples, blood serum, livers and testes of males in the second study indicated that depletion in the male had taken place but that the degree of depletion may not have been severe enough to induce a vitamin deficiency, or that the male chicken has a lower requirement for vitamins A, D_3 and riboflavin than the female chicken.

FURTHER OBSERVATIONS ON THE ACTIVATION AND INHIBITION OF LIPOPROTEIN LIPASE BY APOLIPOPROTEINS. R.M. Krauss, P.N. Herbert, R.I. Levy and D.S. Fredrickson (Molec. Disease Branch, Natl. Heart and Lung Inst., Natl. Inst. of Health, Bethesda, Md. 20014). *Circulation Res.* 33, 403–11 (1973). ApoC-II was the only apolipoprotein from human very low density lipoprotein that activated rat adipose tissue lipoprotein lipase. Activation was blocked by antiserum against apoC-II. Addition of increasing amounts of activator did not alter the apparent K_m of lipoprotein lipase (0.32 mM triolein), but it did produce a progressive increase in the apparent V_{max} from 0.8 to 2.2 μmoles free fatty acid/mg hour^{-1}. Substrate concentrations above 1.27 mM triolein diminished activation by 0.25–5.0 μg/ml of apoC-II as much as 20%. Reversal of this apparent substrate inhibition was achieved by increasing the activator concentration to 50.0 μg/ml. Each of five nonactivating apolipoproteins-apoC-I, C-III-1, C-III-2, A-I and A-II-inhibited lipoprotein lipase up to 85–100%. ApoC-II also produced less inhibition under appropriate conditions. Inhibition was dependent on apoprotein concentration, inversely related to substrate triglyceride concentration, and unobserved with nonlipoprotein proteins. The inhibitory capacity of the nonactivating apolipoproteins was about the same, was independent of apoC-II concentration, and occurred when the ratio of nonactivator apoprotein to triglyceride exceeded 3% (w/w).

EFFECTS OF LIPID REMOVAL ON THE MOLECULAR SIZE AND KINETIC PROPERTIES OF BOVINE PLASMA ARYLESTERASE. B.J. Kitchen, C.J. Masters and D.J. Winzor (O. Madsen Dairy Res. Lab., Hamilton, Queensland 4007, Australia). *Biochem. J.* 135, 93–9 (1973). A purified arylesterase preparation from bovine plasma was characterized to the extent that it has a partial specific volume of 0.91 ml/g and an apparent s-average molecular weight of 440,000. The relatively large magnitude of the former reflects the presence of phospholipids, cholesterol, triglycerides and β-carotene, the last-named being responsible for the pronounced yellow color of the preparation. Removal of the lipid material is accompanied by a decrease in the apparent s-average molecular weight to 120,000, the size of the smallest species detected by high-speed sedimentation equilibrium being in the vicinity of 70,000 daltons: denaturation of the lipid-free preparation with 6M-guanidine hydrochloride caused essentially complete breakdown into subunits of this size. In kinetic studies on the enzyme the maximal velocity for the hydrolysis of phenyl acetate was found to increase by 60% on addition of 1 mM-Ca^{2+}, with the K_m showing a concomitant decrease from 6.6 to 2.1 mM. Removal of lipid had no detectable effect on $V_{max.}$ or K_m in either the presence or the absence of Ca^{2+}. It is concluded that the bovine plasma arylesterase preparation is either a lipoprotein or an enzyme-lipoprotein complex with properties very similar to those of the α_1-lipoprotein or high-density lipoprotein fraction of serum.

PERIFUSED FAT CELLS. EFFECT OF LIPOLYTIC AGENTS. A.S. Katoes, Jr., E.E. Largis, D.O. Allen and J. Ashmore (Dept. of Pharmacol., Indiana Univ. Sch. of Med., Indianapolis, Ind. 46202). *J. Biol. Chem.* 248, 5089–94 (1973). In vitro methods currently utilized for the determination of lipolytic responses in adipose tissue have not allowed for the continuous monitoring of rapid successive changes in rates of lipolysis. The perifused fat cell system utilized in this investigation offers a simple, reproducible method by which minute-to-minute changes in the rate of lipolysis of isolated fat cells may be monitored. In this technique, isolated fat cells are placed in a plastic column and perifused with albumin-containing buffer in the absence and presence of various lipolytic agents. The combined administration of theophylline and epinephrine, both at submaximal concentrations, resulted in rates of glycerol release which were significantly greater than the sum of the rates observed during individual administration.

HUMAN HIGH DENSITY LIPOPROTEIN, APOLIPOPROTEIN GLUTAMINE II. THE IMMUNOCHEMICAL AND LIPID-BINDING PROPERTIES OF APOLIPOPROTEIN GLUTAMINE II DERIVATIVES. R.L. Jackson, J.D. Morrisett, H.J. Pownall and A.M. Gotto, Jr. (Depts. of Med. and Biochem., Baylor Coll. of Med. and Methodist Hosp., Houston, Tx. 77025). *J. Biol. Chem.* 248, 5218–24 (1973). Apolipoprotein glutamine II (apoLP-Gln-II) is one of the major protein constituents of human plasma high density lipoproteins. The protein is of known amino acid sequence and contains two identical polypeptide chains of 77 amino acids, linked by a single disulfide bridge at residue 6. We have investigated the effects of chemical modification of this disulfide linkage on the physical, immunological and lipid-binding properties of the protein. Our findings show that, while reduction of the disulfide linkage of apoLP-Gln-II may affect the secondary structure of the protein, this effect is seen only in the absence of lipid. The integrity of the disulfide bond does not appear to be critical for binding of phosphatidylcholine. As assessed by EPR and by fluorescent labels selective for the sulfhydryl group, the environment of apoLP-Gln-II at or near residue 6 does not appear to be significantly altered by the interaction with and binding of phosphatidylcholine by the protein.

THE EFFECT OF DIETARY FAT ON TURKEY HEN RESISTANCE TO HIGH ENVIRONMENTAL TEMPERATURE. J.E. Jones and B.D. Barnett (Dept. of Poultry Sci., Clemson Univ., Clemson, S.C. 29631). *Poultry Sci.* 52, 1506–9 (1973). Two trials were conducted to determine the effect of 0, 3.5 and 7.0% added dietary fat levels on Broad Breasted White Turkey hen resistance to hyperthemia. Level of added dietary fat had no effect on the hen's resistance to hyperthemia as measured by body temperature at death and thermal death time. Thermal death time is defined as the length of time until death after increasing the environmental temperature from the acclimation temperature to the maximum stress temperature.

CONFORMATIONAL CHANGES FOLLOWING INTERACTION BETWEEN RETINOL ISOMERS AND HUMAN RETINOL-BINDING PROTEIN AND BETWEEN THE RETINOL-BINDING PROTEIN AND PREALBUMIN. J. Heller and J. Horwitz (J. Stein Eye Inst., UCLA Schl. of Med., Los Angeles, Cal. 90024). *J. Biol. Chem.* 248, 6308–16 (1973). Apo-retinol-binding protein (apo-RBP) from human plasma was found to be completely dissociated from prealbumin (thyroxine-binding protein) under conditions of physiological ionic strength in which native retinol-retinol-binding protein complex was tightly bound as judged by gel filtration chromatography. It was concluded from this series of experiments that removal of retinol from retinol-binding protein results in a conformational change such as to make apo-RBP unable to bind to prealbumin. The binding of retinol-RBP to prealbumin results in conformational changes in either the retinol-binding protein, the prealbumin, or both. The native retinol-RBP which is isolated from human plasma is the all-*trans* isomer.

INTERACTIONS OF ALL-TRANS-, 9-, 11- AND 13-CIS-RETINAL, ALL-TRANS-RETINYL ACETATE, AND RETINOIC ACID WITH HUMAN RETINOL-BINDING PROTEIN AND PREALBUMIN. J. Horwitz and J. Heller. *Ibid.*, 6317–24. Although the retinals, retinoic acid, and retinyl acetate bind to retinol-binding protein at the same site as the retinol isomers, the binding of these various chromophores resulted in a somewhat altered conformation of the reconstituted retinol-binding protein. This in turn made it impossible for the retinals- and retinyl acetate-RBP complexes to bind to prealbumin and led to the various subtle differences in spectroscopic behavior of the various chromophore-RBP complexes upon changes in ionic strength and interaction with prealbumin.

INTENSIFICATION OF HYPERTRIGLYCERIDEMIA BY EITHER ALCOHOL OR CARBOHYDRATE. M.M. Fry, A.A. Spector, S.L. Connor and W.E. Connor (Clin. Res. Center and Depts. of Int. Med. and Biochem., College of Med., Univ. of Iowa, Iowa City, Iowa 52242). *Am. J. Clin. Nutr.* 26, 798–802 (1973). The serum lipid responses to the feeding of large quantities of either alcohol or carbohydrate were compared in a patient with endogenous hyperglyceridemia. Eucaloric formula diets that contained different amounts of fat and carbohydrate were fed during 60 days of hospitalization in a metabolic unit. In one dietary period, alcohol was given in an amount equal

to 25% of the total calories. The serum cholesterol concentrations remained constant throughout the study. However, the serum triglyceride concentrations were greatly increased over base-line values (200% increase) during those dietary periods containing either 65% of the calories as carbohydrate or 40% of the calories as carbohydrate and 25% as alcohol. The rises in serum triglyceride level were associated with accentuations of the very low density (pre-beta) lipoprotein band on electrophoresis. Therefore, in this patient, a similar hypertriglyceridemic response was produced by feeding formula diets containing a high percentage of either alcohol or carbohydrate.

ISOLATION AND CHARACTERIZATION OF A LYSOLECITHIN-ADENOSINE TRIPHOSPHATASE COMPLEX FROM LOBSTER MUSCLE MICROSOMES. D.W. Deamer (Dept. of Zool., Univ. of Cal., Davis, Cal. 95616). *J. Biol. Chem.* 248, 5477–85 (1973). The ATPase of lobster abdominal muscle microsomes may be partially purified by addition of lysolecithin (1 to 2 mg per mg of protein) followed by differential centrifugation. The pellet contains most of the ATPase activity and the specific activity is increased 2-fold. The ATPase composes half the protein of the crude microsomes and 70 to 80% of the protein of a purified microsome fraction. Lysolecithin displaces much of the lipid of the microsomes and represents 65% of the lipid phosphate in the lysolecithin-ATPase complex. Polyacrylamide gel analysis of the ATPase preparation shows a single major band of 105,000 daltons. This band is not affected by reduction with mercaptoethanol. Freeze-etch microscopy of the microsomes reveals numerous 70- to 80-A particles within the plane of the membranes. In the lysolecithin-ATPase complex similar particles compose essentially all of the membrane fracture surface as viewed by freeze-etching. These results are in agreement with an earlier suggestion that the freeze-etch particles of the microsomes are correlated with calcium transport ATPase sites.

PNEUMOCOCCAL FORSSMAN ANTIGEN. A CHOLINE-CONTAINING LIPOTEICHOIC ACID. E. Barak Briles and A. Tomasz (Rockefeller Univ., New York, N.Y. 10021). *J. Biol. Chem.* 248, 6394–7 (1973). The pneumococcal F-antigen (a substance which cross-reacts with the Forssman series of mammalian surface antigens) contains choline.

SERUM LIPIDS IN CHILDREN WITH PHENYLKETONURIA (PKU). P.B. Acosta (School of Home Economics, Univ. of Nevada, Reno 89107), R.B. Alfin-Slater and R. Koch. *J. Am. Dietetic Assoc.* 63, 631–5 (1973). Serum lipids of 70 dietary-treated and 23 untreated subjects with PKU were measured and compared with those of 31 normal subjects. Total and free serum cholesterol values were significantly lower in untreated and treated PKU subjects than in normal subjects. It appears that in untreated subjects with PKU, where there is decreased synthesis and increased utilization of acetyl coenzyme A, cholesterol production decreases. Total serum lipids did not differ significantly in any of the groups. Some differences among groups were found in the fatty acid distribution in the serum triglycerides, phospholipids, sterol esters and free fatty acids.

• Edible Proteins

EXTRACTION OF PROTEINS FROM SOYBEAN MEAL WITH WATER SOLUTION OF SODIUM HYDROXIDE. V.N. Krasil'nikov et al. *Maslozir. Prom.* 1973(3), 18–20. The authors have determined the optimal conditions for this extraction, which are the following: alkali concentration in the solution 0.47%, ratio between the meal and the solvent 1:17.5, time for extraction 59 minutes, temperature 59C. The yield is 95% of the total soluble protein content of the meal. (Rev. Franc. Corps Gras)

EFFECT OF TEMPERATURE ON LIPID EXTRACTION AND FUNCTIONAL PROPERTIES OF FISH PROTEIN CONCENTRATE (FPC). D.L. Dubrow, A. Kramer and A.D. McPhee (College Park Fishery Prod. Tech. Lab., Natl. Marine Fisheries Service, USDC Natl. Oceanic & Atmospheric Admin., College Park, MD 20740). *J. Food Sci.* 38, 1012–5 (1973). The following conclusions of the effect of processing temperature on lipid extraction and functional properties from whole red hake (*Urophycis chuss*) are presented: IPA performed more efficiently in removing lipid with an increase in extraction temperature. The major component of the residual lipids was triglycerides and the major polar lipid was phosphatidyl choline (lecithin). All FPC's showed a decrease in protein solubility and suspended solids and an increase in pH with increased temperature of extraction. FPC's processed from whole hake at 20C had better functional properties than those processed at either 40 or 50C. FPC's formed stable emulsions when extracted at 20C. All failed to exhibit this property when extraction temperature was 40C or higher. Wettability of FPC was not improved regardless of extraction temperature.

MAJOR NUTRIENTS IN THE TYPE A LUNCH. I. ANALYZED AND CALCULATED VALUES OF MEALS SERVED. M.K. Head, R.J. Weeks and E. Gibbs (Dept. Food Sci., N.C. State Univ., Raleigh, N.C. 27607). *J. Am. Dietetic Assoc.* 63, 620–5 (1973). Meals collected from 23 Type A lunch lines were analyzed for protein, fat, calories, vitamin A, ascorbic acid, thiamine, riboflavin, iron and calcium. Relative to the Type A goal of ⅓ of the RDA for nutrients, all meals were low in ascorbic acid and protein. The average percentage of calories from fat was 43.

DETERMINATION OF RESIDUAL SOLVENT IN OILSEED MEALS AND FLOURS. S.P. Fore, E.T. Rayner and H.P. Dupuy (U.S. Sec'y of Agriculture). *U.S. 3,779,066.* A simple, rapid and direct gas chromatographic procedure for detecting residual solvent and other volatiles present in vegetable oils, peanuts, nut butter products and oilseed meals and flours is described. A sample is placed between glass wool plugs in a glass insert tube of the gas chromatograph. When required, water is added in a prescribed manner to facilitate the release of the volatile materials present. The insert tube is placed in the heated inlet of the gas chromatograph, and the volatiles are then analyzed directly by temperature programmed gas chromatography.

PLANT PROTEIN PRODUCT AND PROCESS. G.W. Edwards and A.W. Edwards. *U.S. 3,780,183.* Alfalfa and clover, containing natural protein, are treated with an aqueous base solution. The resulting extract is digested at a pH of 6–14 with pancreatin, and the undissolved material is separated from the digested extract to form an edible product.

• Drying Oils and Paints

EVALUATION OF PIGMENTED ALIPHATIC POLYURETHANE AND OTHER COATINGS FOR RAILWAY EQUIPMENT. R.A. Fraser and W.J. Fraser (Canadian National Railways, Tech. Res. Center, Montreal 376, Que., Canada). *J. Paint Technol.* 45(586), 54–8 (1973). Correlation between laboratory tests and service performance of aliphatic polyurethane coatings is examined. Results of these in-service tests have brought to light some deficiencies in present laboratory tests and have demonstrated the need for more approximation of service conditions in laboratory testing. Comparison of accelerated weathering tests obtained on single carbon-arc, twin carbon-arc and Dewcycle Weather-Ometer, with outdoor exposure at Montreal and Florida are presented. Alkyd, silicone-alkyd and acrylic coatings are discussed in detail.

FORMULATION OF WATER-REDUCIBLE POLYMERS—USE OF PHENOLIC RESINS IN WATER-BORNE COATINGS. RELATIONSHIP BETWEEN STRUCTURE OF RESIN AND ITS PERFORMANCE IN COATINGS. M.R. Rifi (Union Carbide Corp., Coatings and Adhesives Div., Bound Brook, N.J. 08805). *J. Paint Technol.* 45(586), 73–7 (1973). Water-borne coatings from maleinized linseed oil modified with phenolic resins were prepared and evaluated in spray and electrocoating applications. Since there are several phenolic resins available commercially, a correlation was established between the chemical structure of the phenolics and their performance in coatings. Furthermore, the structure of linseed oil was varied by using several alcohols with linseed fatty acid and a correlation between the structure of the alcohols and their performance in coatings was obtained. The diversity of the reaction between phenolic resins and linseed oil, as well as its practical advantages, are discussed. Spectral as well as chemical data are presented for the elucidation of the reaction mechanism that takes place between the phenolic resin and maleinized oils.

CROSS-LINKING OF PAINT FILMS BY AUTOXIDATION: MECHANISM OF AUTOXIDATION AND AUTOXIDATIVE POLYMERISATION IN OIL AND OIL PAINT. K. Takaoka, *J. Jap. Soc. Col. Mat.* 46, No 1, 37–45 1973). A review in Japanese with 90 references. (World Surface Coatings Abs. No. 375)

POLYMERIC FATTY ACID POLYAMIDE RESINS. D.W. Glaser and R.A. Lovald (General Mills Chemicals, Inc.). *U.S. 3,776,865.* An acid terminated polymeric fatty acid polyamide resin is obtained by reacting an acid component comprising a polymeric fatty acid and another dicarboxylic acid with an amine component comprising isophorone diamine or mixtures thereof

with an alkylene diamine. The resins are particularly useful in flexographic inks where water reducibility of the resins is desirable.

MODIFIED ESTER RESINS. A.L. Cunningham and J. Mathai (Sherwin-Williams Co.). *U.S. 3,776,868.* The resins comprise a modified ester obtained by reacting a fatty acid with an epoxidized fatty acid ester and/or epoxidized fatty oil to obtain a mixed ester which is modified with an aromatic vinyl monomer. The resins are particularly useful in organic media as coating or film-forming materials.

POLYMERIC FATTY ACID POLYAMIDE MODIFIED WITH A ROSIN ADDUCT. R.A. Lovald and D.W. Glaser (General Mills Chemicals Inc.). *U.S. 3,778,394.* A polyamide resin-dicarboxylic acid or anhydride adduct is claimed. The dicarboxylic acid or anhydride component is selected from maleic acid, maleic anhydride and fumaric acid. The adducts have unique properties as ink varnish binders.

• Fatty Acid Derivatives

PHOTOCHEMICAL α-CHLORINATION OF FATTY ACID CHLORIDES BY THIONYL CHLORIDE. R.L. Rodin and H. Gershon (Boyce Thompson Inst., Yonkers, N.Y. 10701). *J. Org. Chem.* 38, 3919–21 (1973). Upon chlorination of long and intermediate chain fatty acid chlorides in refluxing thionyl chloride exposed to visible and ultraviolet light, the orientation of chlorine was primarily to the α position. The more intense the the light source, the more rapid the reaction, and the same reaction in the dark or in ambient light affords no more than a trace of α-chloro-substituted products. The rate of α-chlorination is appreciably accelerated in the presence of benzoyl peroxide, whereas mineral acid causes the rate to decrease very little. It is proposed that the reaction is photochemical and takes place in the liquid phase according to the following course. Irradiation of boiling thionyl chloride with intense visible or ultraviolet light causes it to slowly decompose to chlorine along with other products. α-Chloro acid chlorides are subsequently produced by a Hell-Volhard-Zelinsky type chlorination of the enol of the acyl chloride.

ESTERIFICATION OF STEARIC ACID WITH TRIETHANOLAMINE. M.A. Egorova et al. *Maslozir. Prom.* 1973(6), 22–3. Mixture of stearic acid and triethanolamine, in molar ratio 1.5:1, at normal atmospheric pressure, at 80C and above, forms a complex ester with a yield of 100% at 120C after 14 hours. The authors describe a technique for determination of non-reacting acid and of triethanolamine. The method is based on acid-base titration in water medium. (Rev. Franc. Corps Gras)

CRYSTAL MODIFIER AND METHOD FOR SOLVENT SEPARATION OF FATTY MATERIALS. D.D. Staker, R.H. Plantholt and D.J. Kriege (Emery Industries, Inc.). *U.S. 3,776,928.* The crystal modifiers are prepared in an acidolysis reaction in which polybasic acids are reacted with fatty acid esters of polyhydric alcohols. They are useful in the separation of relatively unsaturated triglycerides into saturated and unsaturated fractions.

PRODUCTION OF HYDROXY FATTY ACID ESTERS. J. Barnstorf (Henkel & Cie). *U.S. 3,778,465.* A process for the production of hydroxy fatty acid esters comprises hydrogenating epoxidized fatty acid esters with hydrogen in the presence of heavy metal catalysts of the eighth group of the Periodic Table at temperatures of 100–250C and a hydrogen pressure of at least 50 atmospheres.

SODIUM PROPIONATE COATED WITH SORBITAN HIGHER FATTY ACID ESTER. R. UENO, T. Mayazaki, S. Inamine, and S. Kishi (Ueno Fine Chemical Inds., Ltd.). *U.S. 3,779,796.* A noncaking product is obtained by coating sodium propionate with a sorbitan higher fatty acid ester such as sodium monolaurate. The coating is performed by adding 10–500 ppm of the sorbitan ester to an aqueous solution of sodium propionate, removing the aqueous medium from the resultant mixture, and drying it. An organic medium may be used instead of the aqueous medium.

ALKALINE OVEN CLEANING COMPOSITION. H.L. Eisen (Glamorene Products Corp.). *U.S. 3,779,933.* The composition comprises an alkali metal hydroxide and water solution having incorporated into it nitrogen containing anionic surfactants combined with a polyhydric alcohol to form the active concentrate. The anionic surfactants have the function of inhibiting the corrosive action of the concentrate on the human skin and mucuous tissues. They consist specifically of the sodium salts of the condensation product of coconut fatty acids with a complex of polypeptides and amino acids.

• Detergents

SURFACE FORCES IN THE DEPOSITION OF SMALL PARTICLES. J.A. Kitchener (Dept. of Mining and Mineral Technol., Imperial College, London, S.W. 7). *J. Soc. Cosmet. Chem.* 24, 709–25 (1973). Surface forces are reviewed which control the properties of dispersions of particles smaller than about 1 μm in diameter. Distinction must be made between processes of deposition of such particles onto solid substrates and their subsequent removal; the latter is more complicated because of deformation of the materials at points of contact, the extreme closeness of the surfaces there, and the possible formation of chemical bonds. The theory of deposition is closely similar to the theory of colloid stability, with allowance being made for "heterocoagulation." The only modifications required are for the shape factor, and the kinetics of collision, both of which are readily treated. The principal surface forces recognized in colloidal systems include: the London-van der Waals "body forces" (generally attractive); electrical double layer forces; these may be attractive or repulsive, depending on the signs of the potentials on particles and substrate, and are often of relatively long range; "steric hindrance" by simple surfactants; protective colloid action of adsorbed, solvated, macromolecules; adhesive bridging by adsorbed macromolecules at low surface coverage (as with polymeric flocculants). Explicit formulae for London-van der Waals and electrical double layer forces are employed in the Derjaguin-Landau-Verwey-Oberbeek theory and several significant developments have been made recently. Schematic formulae for steric hindrance and protective colloid action have been given, but adhesive bridging has not yet been treated quantitatively. Experimental testing of the theory of deposition requires control of the flux particles up to a surface, and means of studying deposition and coagulation. The rotating disc technic provides a definitive method.

DETERMINATION OF TOXICITY OF TENSIDES WITH WATER ORGANISMS. W. Knauf (Farbwerke Hoechst AG., Frankfurt/M-80). *Tenside Detergents* 10(5), 251–55 (1973). The applicability of various toxicity tests for several types of surfactants and the effect of carbon chain length is discussed. Several organisms were examined for their suitability under the parameters important for this test, e.g. temperature, pH value, water hardness and oxygen content.

INDUSTRIAL APPLICATION PROPERTIES OF NATURAL AND SYNTHETIC FATTY ALCOHOL DERIVATIVES OF DIFFERING ORIGINS. H.H. Maag and I. Nöthlich (Chem. Werke Hüls, Marl). *Tenside Detergents* 10(5), 246–50 (1973). Methods of manufacture of fatty alcohols are given and the application and biological properties of their derivatives are discussed. Special attention is paid to products originating from oxo reactions with other than alpha olefins and which thus show a higher degree of cross-linkage than fatty alcohol derivatives obtained from processes known so far. The application characteristics and biological properties are comparable with those of linear products, with certain exceptions, which are noted.

INSTRUMENTAL EVALUATION OF THE EFFECTS OF COSMETIC PRODUCTS ON SKIN SURFACES WITH PARTICULAR REFERENCE TO SMOOTHNESS. J.K. Prall (Unilever Research Isleworth Lab., Middlesex). *J. Soc. Cosmet. Chem.* 24, 693–707 (1973). The objective evaluation of cosmetic properties of skin in vivo can be difficult because of the sensitivity of skin to many variables. Some of the more important variables are discussed resulting from experience in measuring those physical properties which contribute to the overall tactile perception of skin smoothness. New technics have been devised to measure these physical components of smoothness and using these, a psycho-physical equation for skin smoothness has been established. This expresses smoothness in terms of surface topography, friction and hardness. The sensitivity and potential usefulness of these technics is illustrated by reference to some important product treatments which can affect the water content of the stratum corneum.

ON THE ASSOCIATION OF WATER WITH RESPECT TO EXPANDED ALKYLCARBOXYLIC ACID FILMS. III. SURFACE POTENTIAL AND SURFACE DIPOLE MOMENT. H. Steinbach and Chr. Sucker (Farbenfabriken Bayer, Leverkusen). *Koll.-Z. u. Z. Polymere* 251, 653–64 (1973). It was previously reported that alkylcarboxylic acid films definitely absorbed water molecules at

the COOH-group. These alkylcarbonic acids, which are spread on water, are changed to new substances with physical properties different from the properties of the acids and also different from the properties of the underlying water. It is shown that there are some other states of aggregation in respect to the absorbed water. These states could not be found hitherto because the energies to form them or to destroy them are so small that they could not be detected by film pressure measurements but only by film potential measurements. The film potential/area isotherms show slopes and kinks. The A-values of the kinks correspond to arrangements of different numbers of water molecules adsorbed at the COOH-group. The values of the film potential were used for calculations of the dipole moment in the surface. It was found that one, two, four, nine and sixteen water molecules are able to build their own coordination states. The dipole moment depends on the number of water molecules adsorbed at the COOH-group and that the values of the dipole moments are smaller than the values of the freely movable molecules hitherto published.

CONTRIBUTION ON THE INTERFACIAL SURFACE CHEMISTRY OF POLYORGANO SILOXANES. VII. MONOMOLECULAR FILMS OF POLYETHERSILOXANES AND WATER. W. Noll, Chr. Sucker and A. de Montigny. (Inorg. and Phys. Div., Bayer AG, Leverkusen). *Koll.-Z. u. Z. Polymere* 251, 643–52 (1973). The trend of the F/A-isotherms of polyether siloxanes is examined as a function of the type of ether (ethylene oxide, propylene oxide and mixed bulk polymer polyethers) and the siloxane content. The curves have a smooth trend over a wide range of the surface area values and also with higher siloxane contents, which means that they are similar to two straight polyethers which have also been examined. Only under heavy compression is there a salient point which is specific for the copolymer. A surprising feature is that the siloxane character does not become predominant until reaching high levels (80% siloxane). Interpretation of the isotherms is complicated by the character of the curves which have few flexes. However it is possible to show by means of model concepts, backed up by studies of alkyl phenol ethers, that in a polyether siloxane having a polyether component which consists of ethylene oxide units only, the siloxane chain section of both an AB and BAB polymer lies as a spreading chain in the interfacial area, whereas the polyether chains are submerged in the water. The curve's salient point at low A-values corresponds to the closest packing of the siloxane partner in the interfacial area. With increasing PO-contents of the polyether component, a part of the more water repellent polyether also takes part in occupying the interfacial area. The same holds true with increasing siloxane contents of the copolymer. The isotherm of a polyether siloxane containing 80% siloxane and a polyether consisting of equal parts of ethylene oxide and propylene oxide has two flexes which may be interpreted as A_2- and B-structures, similar to those of the isotherm of a straight dimethyl siloxane, except for the difference that in A_2 of the copolymer the entire molecule lies spread out flat on the surface of the water, while only in B the siloxane bulk alone remains in the water. This pattern corresponds to the behavior of a glycide oxypropyl siloxane in an earlier study. From this it follows that the polyethersiloxanes with hydrophilic polyethers behave in an exactly inverse manner to the polycarbonate siloxanes with water repellent polycarbonate bulks studied by Gaines. Here, the "organic" bulks of the chain are pushed out of the interfacial area into the gaseous phase. In both cases the siloxane plays a predominant role by remaining spread and anchored over the surface of the water.

CHANGES IN DETERGENT FORMULATION IN FOREIGN COUNTRIES. Anon. *Pollena-TSPK* 17, 83–6 (1973). Changes in detergent production during the period 1960–1972 are graphically presented. Formulations of different detergents like Persil, Omo, Dash, Fakt, All, Bold 100, Henke-mat, Super-Luzil, Bold 60, X-tra, Ariel, Pril, Lux, Coin, Spüli, Sunlight, and Palmolive-Grün are given. In the most cases, the tendency for decreasing of active material and increasing of perborate can be observed. (Rev. Franc. Corps Gras)

REACTION OF FATTY ACIDS AT HIGHER TEMPERATURES. J. Zajic. *Sbornik E* 35, 219–35 (1972). In this paper, the characteristics of the reaction of fatty acids with glycerol at temperatures above 200C are described. The molar ratio of fatty acid to glycerol was varied, with and without catalyst. It was established that the reaction has a pseudomonomolecular character until the state of equilibrum is obtained. The monoglyceride content in the product was 70–85%, with a 1:4 molar ratio of fatty acid and glycerol. (Rev. Franc. Corps Gras)

INFLUENCE OF THE TEMPERATURE ON THE REACTION SACCHAROSE-METHYL PALMITATE WITH DIMETHYLSULFOXIDE. M. Bares et al. *Sbornik E* 36, 9-24 (1972). The reaction between methyl palmitate and saccharose with dimethylsulfoxide at 70, 80, and 90C was studied. Potassium hydroxide, saccharate, methylate, and carbonate were used as catalysts. Decreasing the reaction temperature gave a lower content of monoester but the quantity of diester increased. Triester content and tetraester content were unchanged. (Rev. Franc. Corps Gras)

PETROLEUM SULFONATES FOR SPECIALTIES. R.K. Rhodes (Witco Chem. Co.). *Soap/Cosmetics/Chemical Specialties* 49(11), 37–9 (1973). The functional properties and applications of both natural and synthetic petroleum sulfonates are briefly reviewed. Tables of data on various types of petroleum sulfonates are presented.

DETERGENT FORMULATIONS. T.H. Pearson and G.E. Nelson (Ethyl Corp.). *U.S. 3,776,850.* Nonphosphorus detergent builders and sequestering agents are provided. These are either (a) a water soluble polymer of a 1-oxyacylopropane-2,3-dicarboxylic acid, (b) a water soluble salt of a poly-1-oxacyclopropane-2,3-dicarboxylic acid or a mixture of (a) and (b).

DETERGENTS. B.-D. Cheng (Colgate-Palmolive Co.). *U.S. 3,776,851.* A nonphosphate and non-NTA containing detergent composition comprises 30–95% of a detergent, especially an anionic or nonionic detergent, and 5–70% of tetrahydroxysuccinic acid and its salts.

WATER-IN-OIL EMULSIONS. P. Lindner (Witco Chem. Co.). *U.S. 3,776,857.* Stable emulsions are readily prepared and comprise an oleaginous continuous phase, a dispersed water phase and, as an emulsifier, fatty acid esters of ethylene oxide adducts of aliphatic polyhydric alcohols. The alcohols contain 3–12 carbon atoms and 3–6 hydroxyl groups and the adducts contain 0.3–1.5 mols of ethylene oxide per hydroxyl group.

DRY POWDER BUBBLEBATH COMPOSITION. M. Mausner and J.A. Rachels, Jr. (Witco Chem. Co.). *U.S. 3,776,861.* The compositions are composed of separately prepared olefin sulfonate in flaked or powdered form blended with a spray dried bead composed of olefin sulfonate, linear alkyl benzene sulfonate, starch hydrolysate, magnesium sulfate and a sodium or potassium sulfate filler.

SOAP FORMULATION FOR POLISHING ALUMINUM SURFACES. E. Antonini (Colgate-Palmolive Co.). *U.S. 3,778,378.* Metallic mat and scouring pads include a soap formulation containing 1–10% of pentahydrate borax. The soap formulation can also contain 8–60% saponified fatty acids, 1–8% anhydrous sodium carbonate and 20–60% water.

CLEANING COMPOSITION. R.L. Abler and G.A. Gardner (Minnesota Mining and Manufacturing Co.). *U.S. 3,779,929.* Cleaning compositions based on higher fatty alcohol detergents such as sodium lauryl sulfate and having particular utility for removing soil and stains from carpet, upholstery, etc., and for imparting stain resistance to the cleaned surface are improved by certain anionic surfactants. Without these additives the compositions could cause respiratory irritation to an unprotected user, especially in unventilated closed areas.

COMPOSITIONS USEFUL IN THE AQUEOUS COLD BLEACHING OF TEXTILES INCLUDING OPTICAL BRIGHTENERS. W. Fries, H. Bloching, H. Rhld and D. Jung (Henkel & Cie). *U.S. 3,779,931.* The compositions comprise a bleaching component consisting of a percompound yielding H_2O_2 in aqueous solution and an activator, an optical brightener and other customary ingredients of bleaching or washing agents.

SOLID WASHING COMPOSITIONS. B.G. Jaggers, K.F. Ufton and H.R. Wagner *U.S. 3,779,932.* The compositions are perfumed by incorporating into them a monomeric titanate or zirconate ester of a perfumery alcohol or phenol. The esters provide slow release of aroma by hydrolysis during use of the washing compositions.

CLEAR RINSE AGENTS FOR MECHANICAL DISHWASHING. T. Altenschopfer, H. Batka, G. Jakobi, P. Krings, and H-J. Lehmann (Henkel & Cie). *U.S. 3,779,934.* The agent is an adduct of 3–30 mols of ethylene oxide to alkanediols with a linear alkane chain of 10–20 carbon atoms and having vicinal, nonterminal hydroxyls.

NONIONIC SURFACTANTS EXHIBITING ANTIMICROBIAL AND RUST-INHIBITING ACTIONS. H. Suzuki and Y. Tsutsui (Agency of Industrial Sci. and Technol., Tokyo). *U.S. 3,781,218.* Hydroxy fatty acid amide polyoxyalkylene ethers are the active ingredients. If metal soap is added to the surfactants, the emulsifying, dispersing, rust-inhibiting and antimicrobial properties are enhanced.

LAUNDRY PRODUCT CONTAINING ENZYME. R.W. McDonnell and M.H. Win (Colgate-Palmolive Co.). *U.S. 3,781,228.* The product contains granules of a binding agent, such as polyvinyl alcohol or carboxyalkyl cellulose, and a detergent builder salt. Bound to and homogeneously distributed on the surface of the granules is an enzyme. ■

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