ABSTRACTS

R.A. REINERS, Editor. ABSTRACTORS: N.E. Bednarcyk, J.E. Covey, J.G. Endres, Yoshio Hiyano, J. Iavicoli, S. Kawamura, D.A. Leo, F.A. Kummerow, E.G. Perkins, and R.W. Walker

• Fats and Oils

FRACTIONATION OF COCONUT OIL TRIGLYCERIDES BY GAS-LIQUID CHROMATOGRAPHY. M. Bugant and J. Bezard (Lab. de Physiol. Animale et de la Nutr. Faculté des Sciences, 21-Dijon, France). *J. Chromat. Sci.* 8, 380–5 (1970). A system is described for separation by gas-liquid chromatography and collection of milligram quantities of triglycerides. The system includes a stainless steel column (3/16 inch outside diameter by 6 feet) packed with 1% w/w JXR on 100/120 mesh Gas-Chrom Q, which gives satisfactory separation in each run of about 3mg of a mixture of triglycerides; a stream-splitter at the column outlet for collection of each triglyceride peak; and a pre-column placed in the injection block to provide on-column injection. The method was applied to separation and collection of triglyceride peaks from coconut oil, and the purity of collected peaks was monitored. The degree of purity is generally excellent except in the case of late-eluting peaks. There is significant contamination of these peaks, present in low concentration in the mixture, due to tailing of preceding peaks that are present in high concentration.

HEAT AND MASS TRANSFER IN A BATCH DRY RENDERING COOKER. L. S. Herbert and T. E. Norgate (Div. of Chem. Eng., Commonwealth Scientific and Industrial Res. Organization, Clayton, Victoria, Australia 3168). *J. Food Sci.* 36, 294–8 (1971). Heat transfer measurements have been made during batch dry rendering runs using inedible (mainly sheep) offal in a full scale Laabs-type cooker with steam heated shaft. Data were obtained at 6 minute intervals throughout several cycles and heat and mass balances obtained for the complete cycles. It is proposed that changes in heat transfer coefficients occurring during the cycle are caused by the inversion of the tallow/water emulsion initially present as the liquid phase in the cooker, to a water/tallow emulsion. Water droplets are progressively evaporated, until in the last part of the cycle, drying of the solid particles is taking place in an environment of anhydrous tallow.

BASIS OF STABILITY OF AMINE SALTS OF LINOLEIC ACID. 1. GENERALITY OF THE OXIDATION PROTECTION AND EFFECT OF PHYSICAL STATE. S. D. Koch, A. A. Hyatt and D. V. Lopiekes (Monsanto Res. Corp., Boston Lab., Everett, Mass. 02149). *J. Food Sci.* 36, 477–81 (1971). The mechanism and generality of the known stabilization against autoxidation conferred on linoleic acid by certain basic amino acids was investigated. Basic amino acids were the only class of compounds found to confer the effect, but 2, 3-diaminopropionic and 3,6-diaminohexanoic acids were not effective. A large number of physical and chemical observations were made and correlated but it has not been possible to draw detailed conclusions about the mechanism of stabilization, nor can a detailed structure of the stabilized complex be suggested. The cause of the phenomenon appears to be closely associated with the physical arrangement of the ions in the crystal lattice.

2. STRUCTURE-PROPERTY CORRELATIONS ON LYSINIUM LINOLEATE. D. V. Loiekes and S. D. Koch. *Ibid.*, 482–85. The solid compound formed by treating L-lysine with linoleic acid has been examined by chemical stoichiometry, electrical conductivity, infrared and nuclear magnetic resonance spectroscopy. It is a true equimolar salt and not merely a mixture of the two acids. The diene system of the linoleic acid is not changed from that in the free fatty acid. Conductivity measurements show that the salt is a moderately strong electrolyte. Salts of other basic amino acids, ornithine and 2,4-diaminobutyric acid, with linoleic and oleic acids were also examined and showed similar evidence. Interpretation of the data and the significance of the findings to stability of unsaturated fatty acids are discussed.

DETECTION OF ANIMAL FATS IN VEGETABLE FATS AND OILS BY GLC AND TLC. C.W. Thorpe (Div. of Food Chem. and Technol., FDA, Washington, D.C. 20204). *J. Assn. Off. Anal. Chem.* 54, 643–5 (1971). Three methods which employ digitonin precipitation to isolate sterols were tested to determine the extent to which the digitonides were formed at 3 different mole ratios of digitonin to cholesterol. The effect of added aluminum chloride was also studied. Small amounts of added aluminum chloride reduced the amount of non-complexed cholesterol found by each of the methods studied; however, a minimum weight ratio of 10:1 digitonin to cholesterol is necessary for quantitative work. Two types of commercially available precoated thin-layer chromatographic plates were evaluated for use in the present AOAC method for determining animal fats in vegetable fats and oils, 28.018–28.088. Commercial plates were tested with samples identical to those used in the 1969 collaborative study of this method. Results indicate that these commercial plates are acceptable in that they adequately separate sterols from other unsaponifiable components. The official first action method has been revised to permit optional use of these plates.

VOLATILE FLAVOR COMPONENTS OF COCONUT MEAT. F. M. Lin and W. F. Wilkens (Dept. of Food Sci. and Technol., N.Y. State Agr. Exp. Sta., Cornell Univ., Geneva, N. Y. 14456). *J. Food Sci.* 35, 538–39 (1970). Gas-chromatographic and mass-spectral techniques were employed in the isolation and identification of the volatile-flavor components of coconut meat. Fifteen compounds were positively identified. Odors of authentic compounds were described. Both delta-C_8, -C_{10} lactones and *n*-octanol were the major volatile components and responsible for the characteristic aroma of coconut meat. The contributions of other minor components to flavor and their significance were also described.

DETERMINATION OF LOW LEVEL ISOLATED *trans* ISOMERS IN VEGETABLE OILS AND DERIVED METHYL ESTERS BY DIFFERENTIAL INFRARED SPECTROPHOTOMETRY. Anita Huang and D. Firestone (Div. of Food Chem. and Technol., FDA, Washington, D.C. 20204). *J. Assn. Off. Anal. Chem.* 54, 47–51 (1971). A procedure is described for differential infrared spectrophotometric determination of low levels (1–6%) of isolated *trans* isomers in vegetable oils or derived methyl esters. Triglycerides and methyl esters of known isolated *trans* content were analyzed by the procedure and results compared with those obtained with the AOCS tentative method for isolated *trans* isomers. Results obtained by the described method are more accurate than those obtained by the AOCS method.

EFFECTS OF TYPES AND LEVELS OF FAT AND RATES AND TEMPERATURES OF COMMINUTION ON THE PROCESSING AND CHARACTERISTICS OF FRANKFURTERS. W. E. Townsend, S. A. Ackerman, L. P. Witnauer, W. E. Palm and C. E. Swift (USDA, Eastern Utilization R&D Div., ARS, Meat Lab. & Physical Chem. Lab., Philadelphia, Pa. 19118). *J. Food Sci.* 36, 261–65 (1971). Frankfurter emulsions containing either 25% or 35% beef fat, pork fat, or cottonseed oil were prepared by comminuting at 1500, 2500, or 5000 rpm to temperatures ranging from 45-85F. Viscosities of the emulsions were all similar. The frankfurters were stuffed, smoked and cooked, and data were obtained on shrinkage, fat retention, ease of peeling, specific gravity, and texture. Shrinkage was inversely related to content of fat. Fat separation mainly occurred in processing frankfurters containing beef fat. Optimum conditions were time as well as temperature dependent.

EFFECTS OF TYPES OF FAT AND OF RATES AND TEMPERATURES OF COMMINUTION ON DISPERSION OF LIQIDS IN FRANKFURTERS. S. A. Ackerman, C. E. Swift, R. J. Carroll and W. E. Townsend (USDA, Eastern Util. R&D Div., ARS, Meat Lab and Phys. Chem. Lab., Philadelphia, Penn. 19118). *J. Food Sci.* 36, 266–69 (1971). The effect of time, temperature and rpm of comminution of emulsions was determined on the dispersion of approximately 25% of beef fat, pork fat or cottonseed oil in frankfurters. The numbers of lipid particles 5μ or less in diameter increased in frankfurters containing either beef or pork fat as comminution was continued to higher temperatures, with pork fat dispersed more thoroughly. Fat tended to separate from frankfurters containing beef fat in particles 200μ or more in diameter. In contrast, no specific degree of dispersion of particles 5μ or less in diameter consistently indicated emulsion stability, or its lack. Increased rpm during comminution produced an increased dispersion of beef or pork fat. Under given conditions pork fat was more finely dispersed than beef fat. Dispersion of cottonseed oil produced particles smaller and more closely packed than could be studied using light microscopy. Electron microscopy revealed many particles 1μ or less in diameter.

STUDY ON TRANSESTERIFICATION. I. KINETICS AND MECHANISM OF THE REACTION BETWEEN FATTY MONOESTERS CATALYZED BY ALKALINE METALS. M. P. Jordán de Urries and R. Martínez Utrilla (Inst. de Productos Lácteos y Derivados Grasos). *Grasas Aceites (Seville, Spain)* 5, 281–90 (1970). A kinetic study of the transesterification reaction between methyl myristate and sec-butyl palmitate with sodium dispersion and sodium/potassium alloy emulsion as catalysts has been carried

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the label that was used to define Mussolini's brand of economic dictatorship in Italy. Mussolini made the Italian trains run on time, and it is no comfort at all to report that our new quasi-government corporation, Amtrak, is managing just about the same thing.

The most chilling aspect of our leap into wage-price control, however, is that so few have attacked the principle of it. Business spokesmen overnight buried their rhetoric about free enterprise and the market price system. Unions, and many of Nixon's political opponents, have been complaining mainly that the freeze isn't fair because profits and interest rates weren't frozen as well, and because the President has proposed that business receive "undue" tax breaks. At best this is sloppy criticism, at worst blatant demagoguery. The trouble with profits is not their altitude but their depth. Last year's corporate profits, adjusted for inflation, were 30% below their 1966 peak and a bit below their 1963 level. On the same basis, employee pay per hour worked, was up 8% from 1966 and up nearly 18% from '63. Interest rates seem to be heading down, at least temporarily; any freeze would serve to prevent a welcome reduction. As for the investment tax credit, it would surely lead to bigger orders for equipment and more orders for materials to make it. The result: more jobs and more efficient factories. Still, though I regard many of George Meany's ideas as a menance to the republic, I am happy to find him quoted in the papers this week to this effect: "If we go down the road of controls, it will begin to look like fascism." He is, I submit, quite right about that.

We face hard choices, much harder than our political leaders or our press is telling us. If our enterprise system is to survive over the long pull, I believe that we must begin now to think about much more fundamental reforms than either Congress or the Administration so far shows any inclination even to *discuss*. If labor is to be persuaded to give up its piratical appetite for outrageous and inflationary wage increases, some other accommodation will be necessary. One splendid but generally overlooked possibility is genuine profit sharing by business and industry, not the tax-dodge variety that prevails today. Another, so complex that I will only sketch it here, is the ingenious proposal of a San Francisco lawyer named Louis Kelso to give workers what he calls "a guaranteed second income," so they needn't worry so much about the level of their wages. His plan, which the Nixon Administration is studying seriously, would let about 80 million workers buy blue chip stocks with borrowed money, and so ultimately enjoy a substantial return from dividends.

A few companies have already used Kelso's basic idea to set up tax-sheltered trusts that enable their employees to become stockholders on credit. For instance employees used much a fund to buy Peninsula Newspapers Inc., which published dailies in three suburban San Francisco cities. Last week when I had lunch with Kelso, he told me that after a decade many of the printers and pressmen at the company have amassed retirement nest eggs of $80,000–$100,000. Kelso's amazing scheme actually works!

We need radical tax reform of several kinds. (Labor must be stripped of its coercive power, which is the antithesis of rule by law, to compel outrageous settlements. But labor must be offered a better alternative than today's economy wrecking course.) We need a much more sophisticated and finely honed system of land use control than today's clumsy zoning ordinances. Most of all we need to zero in on some fundamental problems about the American enterprise system. Today about 5% of the population owns the capital—money, securities, land and tools—that actually produces about 90% of the wealth. It is an undue concentration of capital. And it means that the rich grow richer while ordinary working men and women, you and me included, have little chance to obtain a worthwhile share of the nation's abundance. As our economy operates now, we ameliorate this problem in Alice in Wonderland fashion; by heavy government outlays for welfare, by a tax system that aims to redistribute wealth, and worst of all by makework activity. Perhaps a third of the U.S. work force is occupied on dubious construction or military projects, or sustained by subsidies that prop up inefficient enterprises.

We have forgotten the lessons of history. Until the close of the western frontier, even the poorest American laborer could acquire "capital" almost free, in the form of homesteaded land. Now that the free land is about gone, we seem to have lost sight of a centuries-old truth: property is the only power that can protect an individual's political freedom and rights. To state it another way, economic freedom and political freedom are indivisible. A century ago, these principles helped to forge a nation to which the suffering peoples of other countries flocked in the hope of a better life. Let us pray that the sins of satiety—expediency, myopia and greed—do not make us lose sight of the political foundation of our economic achievement. Let us pray that we make the hard choices that will sustain freedom.

• *Abstracts . .*

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out using GLC as the analytical technique. Myristic and palmitic acids, methanol, octaeicosan-14, 15-dione and dotriacontan-16, 17-dione have been identified as by-products of the transesterification reaction. On the basis of the kinetic results, the mechanism of the reaction is discussed. It is hypothesized that a close relationship exists between the transesterification reaction mechanism and that of the acyloin condensation.

THE LIPIDS OF OIL PALM POLLEN. M.-T. Richert. *Oleagineux* 26, 261–2 (1971). The total lipids were extracted from a sample of pollen from *Elaeis guineensis* from Dahomey by ethanol followed by ethyl ether. The principal fatty acids were C 12:0, 3.8%; C 14:0, 1.6%; C 16:0, 28.1%; C 16:1, 1%; C 18:0, 4.5%; C 18:1, 5.2%; C 18:2, 32.2%; C 18:3, 15.5%; C 22:0, 1.3%; C 24:0, 3.6%. A sterol-rich fraction was separated from the unsaponifiables. It consisted of 23.5% sitosterol; 38.5% stigmasterol plus fucosterol plus isofucosterol; 21% campesterol; 10.5% methylene-24-cholesterol plus brassicasterol; and 6.5% cholesterol, as determined by mass spectrometry and TLC of the propionates on aluminum oxide/silver nitrate plates.

PACKAGING AS A MEANS OF PROTECTING LARD FROM LIGHT. P. Kalac *et al. Prumysl Potravin* 22 (4), 109–14 (1971). Different films were studied. Cellophane exhibited a certain amount of protective action, especially if red- or yellow-colored. The best results were obtained with aluminum foil. White parchment paper and white paper combined with polyethylene are not recommended. (Rev. Franc. Corps Gras)

INCREASE IN DISTILLATION RATE OF THE SOLVENT FROM OILSEED PRESSCAKE BY USE OF PSEUDOFLUIDIZATION. B. I. Muhamedov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971 (2), 172–3. The authors studied under laboratory conditions the hydrodynamics of a pseudofluidized layer and the kinetics of solvent removal from cottonseed presscake. The solvent content of the presscake was lowered from 30% to 0. The distillation time decreased with increase in temperature of the effective surface. Pseudofluidization was found to increase the distillation rate by 15–20 times and 25–30 times compared to continuous and batch evaporators respectively. (Rev. Franc. Corps Gras)

FATTY ACID COMPOSITION OF HAZELNUTS. N. A. Thagusev *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971 (2), 39–41. Hazelnut oil resembles olive oil in composition. In the immature nuts, linoleic acid is the principal component while in the ripe nuts, oleic acid predominates. Irrigation of the plant retards formation of oleic acid, which results in a lower content of this acid at all stages of development. (Rev. Franc. Corps Gras)

THE RELATION BETWEEN THE DEGREE OF UNSATURATION AND THE

COMPOSITION OF NATURAL OILS. L. S. Golodova *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971 (2), 35–8. A direct relationship exists between the degree of unsaturation and the fatty acid composition of natural vegetable oils. The equations expressing this relation can be used for determining the amounts of the principal unsaturated acids in cottonseed and sunflower oils, which have similar ratios of linoleic to oleic acids. (Rev. Franc. Corps Gras)

THE FATTY ACIDS OF THE BOUND LIPIDS IN OIL-RICH SUNFLOWER SEEDS. V. G. Scerbakov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971 (2), 33–4. The bound lipids contain some short chain fatty acids plus myristic, palmitic, palmitoleic, margaric, stearic, oleic, linoleic and arachidic acids. During maturation of the seeds, there is an interchange of fatty acids between the free and bound states. The capacity for interchanging increases with unsaturation of the acid. (Rev. Franc. Corps Gras)

CHANGES IN THE FATTY ACIDS OF CERTAIN FATTY MATERIALS AFTER HEATING. R. Ondreika *et al. Prumysl Potravin 22* (4), 125–7 (1971). The authors studied changes in the fatty acids and loss of unsaturated acids in olive oil, sunflower oil, lard and butter after heating at 170±5C for 2 hours. Alterations in both physico-chemical properties and percentage composition of fatty acids were found. These results permit an assessment of the deterioration in biological quality of the fats. (Rev. Franc. Corps Gras)

DETERMINATION OF LINOLEIC AND LINOLENIC ACIDS BY GAS CHROMATOGRAPHY. M. Holasova *et al. Prumysl Potravin 22* (4), 127–9 (1971). The standard Czechoslovak method for this analysis is described. A Varian Aerograph 205-1B instrument was used. Statistical treatment of the data from 13 trials served to verify the method. (Rev. Franc. Corps Gras)

APPARATUS FOR RENDERING MATERIALS BY BATCH OR CONTINUOUS PROCESS SELECTIVELY. W.C. Schmidt (Cincinnati Butchers Supply Co.). *U.S. 3,537,824.* The apparatus may be used alternatively, to render a fat or oil-bearing material by either the batch or the continuous process. A pre-press transfer conveyor between the evaporator and the finisher shortens the rendering period and results in the production of end products of superior quality. Automatically operated transfer conveyors advance the renderable material through several stages of treatment when the apparatus is used for continuous processing, and the end products are automatically accumulated and stored while processing of additional material progresses. The same apparatus may be used in batch rendering of materials having differing characteristics, without intermixing of successive batches. Floor space requirements of the apparatus are minimal.

COCOA BUTTER SUBSTITUTE. G.A. Daniels, J.D. Johnston and G.C. Robinson (Ethyl Corp.). *U.S. 3,537,865.* Mixtures of triglyceride esters which melt slightly above room temperature and have relatively narrow dilatometric melting ranges are described. These mixtures, which can be readily synthesized from available reactants, contain 2-stearolydidecanoin, 1-stearoyldidecanoin, and optionally and preferably, one or more of 2-stearoyldioctanoin, 1-stearoyldioctanoin and tridecanoin. The mixtures are useful in the manufacture of confections and the like.

AERATED SHORTENINGS. A.J. Howard (Procter and Gamble). *U.S. 3,549,387.* A process for preparing aerated plastic shortening which comprises rapidly chilling liquid fat, passing the chilled fat through two crystalline zones and then injecting edible gas into the fat.

STABILIZED OILS AND FATS OF VEGETABLE AND ANIMAL ORIGIN, AND METHOD OF PREPARING THE SAME. H. Enei, S. Okumura, A. Mega and S. Ota (Ajinomoto Co., Inc.). *U.S. 3,585,223.* Small amounts of cystine stabilize animal and vegetable fats against autoxidation, and the stabilizing effect is greatly enhanced if the cystine is briefly heated in the fat or oil above 140C. The heat treated mixture may be diluted with untreated fat or oil to an ultimate concentration of 0.02% or greater. The preferred concentration range is 0.1–1.5%. The stabilizing effect achieved is far superior to that of BHT and of similar synthetic antioxidants used at their highest permissible concentration.

DEVICE FOR PROCESSING RAW FATS. V. V. Annfriev, K. M. Vechanov, and K. F. Zemlyannikov. *U.S. 3,587,695.* A chopping device with moveable and stationary knives adapted for crushing is described.

COCONUT TREATING APPARATUS FOR PROCESS. H. B. Fairchild. *U.S. 3,587,696.* A process and apparatus for separating the oil from fresh coconut meat is described. The process involves comminuting the meat into a flowable slurry, heating the slurry, and pressing it to remove the oil plus aqueous matereial. This liquid is then centrifuged to separate the two phases.

ATOMIZED HYDROCARBON OXYGENATION REACTION PROCESS AND APPARATUS. E. J. LeMaster. *U.S. 3,590,058.* A method is disclosed for the oxygenation of liquid hydrocarbon compounds to fatty acids and other oxygenated compounds by atomizing a preheated and pressurized mixture of the hydrocarbon, steam and air to a vapor-foam. The vapor-foam mixture is then passed through a catalytic bed at high temperature.

PROCESS FOR THE PURIFICATION OF EDIBLE OILS. M. E. Velan (Salador-Huileries, Saint Ouen, France). *U.S. 3,590,059.* The process comprises bleaching with earth and removing the fatty acids in the oil by means of steam under vacuum. The improvement consists of treating the oil prior to bleaching with a small amount of an organic acid at 50-80C and adjusting the moisture level of the oil to 0.1-0.5%. The oil may be alkali refined prior to the acid treatment.

MARGARINE OILS CONTAINING INTERMEDIATE MELTING RANDOMLY ESTERIFIED TRIGLYCERIDES OF HIGH C_{12} CONTENT. *P. Seiden* (Procter and Gamble). *U.S. 3,592,661.* Margarine oils consisting of a soft oil component and an intermediate melting, randomly esterified, triglyceride component of high C_{12} content and low C_{16-18} content exhibit improved solids content properties as shown by a bent and rapidly sloping SCI curve.

PROCESS FOR TREATING COMMINUTED PEANUT SLURRY. C. M. Gooding (CPC International). *U.S. 3,592,662.* This process removes an alkaline malodorous distillate from a comminuted peanut slurry by passing the slurry in a continuously agitated, thin-film over a heated surface under vacuum. Peanut butter subjected to this treatment is characterized by fine flavor, excellent shelf life and absence of any unpleasant odor.

PROCESS FOR THE PREPARATION OF A NEW LYSOLECITHIN MIXTURE. H. Betzing (A. Natterman and Cie, G.m.b.H.). *U.S. 3,592,829.* Lysolecithins are obtained by a mild alcoholysis in which the percentage of the unsaturated fatty acids corresponds at least to the starting material.

SELECTIVE HYDROGENATION OF DIENES. D. R. Fahey (Phillips Petroleum Co.). *U.S. 3,592,862.* The hydrogenation of cyclic and acyclic dienes to monoenes is improved by promoting trihydrocarbylphosphine-modified carbonyl cobalt catalysts with alcohols, esters and amides.

OLEFIN ISOMERIZATION. L. F. Heckelsberg (Phillips Petroleum Co.). *U.S. 3,592,868.* Ruthenium oxide is used as a catalyst for shifting the double bonds of olefins.

CRYSTALLIZATION PROCESS AND APPARATUS. R. Lafay and J. C. Macaire (Inst. Franc. du Petrole, des Lubrifiants et Carburants). *U.S. 3,593,536.* A process is described for selectively crystallizing one of the constituents of a liquid mixture which involves cooling the mixture by direct thermal exchange with an immiscible liquid coolant circulating countercurrently to the mixture. The coolant is introduced at a sufficiently low temperature to permit the crystallization of one of the components. Direct thermal exchange is effected by passing the liquid mixture and the immiscible coolant alternately through many agitated and quiet zones. Crystallization occurs in the agitated zones and separation of the crystals in the quiet zones.

PROTECTION OF FATTY MATERIALS. L. Morris (CPC International). *U.S. 3,594,176.* The product is made by thoroughly mixing lipids with undried gluten obtained from the wet milling of corn or grain sorghum. The mixture is then dried to yield a product of high fat content which does not bleed. The dried product contains 50-95% gluten and 50-5% lipids which may include soapstocks, vegetable oils or fats, starch fat, animal fat, grease or tallow. Additional constituents such as acids or steepwater may be added to enhance the flavor or the nutritive value.

EGG FOOD PRODUCT AND PROCESS. D. Melnick, M. I. Wegner, and D. R. Davis (CPC International). *U.S. 3,594,183.* Egg yolk solids from which most of the fat and cholesterol have been extracted are mixed with vegetable oil, salt, emulsifiers and colors. After this mixture has been emulsified, pasteurized and spray dried, dry particles of egg yolk solids are recovered. This product may then be used in place of regular egg yolk solids. The refatted yolk solids may be mixed with egg white solids, non-fat milk solids, an alkaline material, baking powder, vegetable gum, sugar and spices. Rehydrated and cooked it yields a scrambled egg or omelet.

HARD BUTTER COMPRISING RANDOMLY ESTERIFIED TRIGLYCERIDES OF C-12 AND C-16 TO 18 FATTY ACIDS. P. Seiden (Procter and Gamble). *U.S. 3,595,673.* The hard butter so prepared exhibits a rapid change in solids content as the temperature is lowered from the complete melting point.

METHOD OF PREPARING A LIQUID SHORTENING. J. R. Shaffer and E. R. Hair (Procter and Gamble). *U.S. 3,595,674.* A stable liquid shortening, suitable for use in continuous bread making and donut frying, is produced by forming concentrate and diluent fractions separately, processing each of the fractions, blending the fractions and then processing the blend.

METHOD AND COMPOSITION FOR CONDITIONING BREAD DOUGH. G. D. Neu (Eastman Kodak Co.) *U.S. 3,592,660.* A hydrate of a calcium salt of at least one C_{14}-C_{20} fatty acid, a monoglyceride, and water is incorporated in bread dough for its conditioning effect. Between 0.1 and 10 ounces of the calcium salt per 100 pounds of flour is effective but best results are obtained with 0.5-8 oz/100 lbs flour. The hydrate can be added either to the sponge or the dough in a sponge-dough process, or to the brew in a continuous process.

FLUFFY FROSTING COMPOSITIONS. G. F. Brunner, B. Lawrence, N. B. Howard and P. Seiden (Procter and Gamble). *U.S. 3,592,663.* Fluffy frosting compositions, in the form of a dry mix or finished product, based on certain fatty acid esters of polyglycerol where a specified minimum amount of the fatty acid contains 22 carbon atoms.

CONTROLLING BACTERIA WITH A FATTY TETRAAMINE. W. W. Havers and J. de la Torre (Armour Industrial Chem. Co.). *U.S. 3,592,918.* Fatty tetraamines are used alone or in admixtures with other specified compounds as biocides for various purposes.

POWDERED ICE CREAM MIX. A. R. Mishkin, D. E. Yingst and J. J. Peters (Nestle S.A.). *U.S. 3,594,193.* A powdered nondairy ice cream mix is prepared by forming a premix of fat, sugar, corn syrup, sodium caseinate, and emulsifier; homogenizing and spray drying. The premix is then blended with additional sweetener, fat, emulsifier and flavoring. The emulsifier is a combination of sorbitan tristearate and sorbitan monooleate.

HYDROGENATION OF POLYMERIC FATTY ACIDS. M. V. Kulkarni and R. L. Scheribel (General Mills Inc.). *U.S. 3,595,887.* The process improvement use of a two-step process in which the material is first hydrogenated with a nickel catalyst and then with a palladium catalyst. An optional step between the two hydrogenation processes involves treatment with an acid and an acid-activated clay. The end products are useful in preparing polymers such as polyesters, diisocyanates, ester based urethanes, polyamides, and epoxy resins which find utility in adhesives, coatings, castings, laminates, can sealants, and inks.

PRODUCTION OF GLYCEROL MONOALKANOATES. R. Reiser and A. F. Isbell (Research Corp., New York). *U.S. 3,595,888.* Triglycerides of saturated or unsaturated alkanoic acids are heated with at least two moles of isopropylidene glycerol at 100-200C. The reaction product is then hydrogenated to yield glycerol monoalkanoates. Acids and alkaline substances may serve as catalysts. The isopropylidene glycerol may be preformed or formed in the presence of the triglycerides by condensation of glycerol and acetone by azeotropic distillation of the water of condensation.

CRYSTAL STRUCTURE OF THE *C* FORM OF STEARIC ACID. V. Malta, G. Celotti, R. Zannetti and A.F. Martelli. *J. Chem. Soc. B* 1971, 548–53. The crystal structure of the *C* form of stearic acid has been determined from X-ray powder diffraction patterns. The crystals are monoclinic, space group $P2_1/a$, with unit cell dimensions $a = 9.36$, $b = 4.95$, $c = 50.7$ Å. $\beta = 128°\ 15'$ and $Z = 4$. The crystal structure has been determined by trial and error methods to R 0.086. The structural parameters are compared with those of similar compounds, in particular the same acid in the polymorphous *B* form. (World Surface Coatings Abs. No. 350)

RELATIONSHIP BETWEEN THE NUTRITIVE VALUE AND THE STRUCTURE OF POLYMERIZED OILS. III. ON THE ABSORPTION OF THE TOXIC COMPONENTS IN THE THERMALLY OXIDIZED OILS. T. Ohfuji, S. Iwamoto and T. Kaneda (Dept. of Food Chem., Tohoku Univ., Sendai, Japan). *Yukagaku* 19, 887–90 (1970). Soybean oil was thermally oxidized by dry air bubbling at 185C for 10, 15, 20 or 25 hrs and fed to rats for 4 wks. Increased heating time reduced the nutritive value of oil. Fecal, liver and intestinal lipid analysis showed that more than 55% of toxic fraction (average molecular weight: about 2000, see previous paper) was absorbed, but that only the small amount of it was detected in liver and intestine.

RELATIONSHIP BETWEEN THE NUTRITIVE VALUE AND THE STRUCTURE OF POLYMERIZED OILS. IV. TOXICITY OF FECAL LIPIDS SEPARATED FROM RATS FED THERMALLY OXIDIZED OIL TO MICE. T. Ohfuji and T. Kaneda. *Ibid.*, 1068–71. The toxic fraction of thermally oxidized soybean oil was fed to rats for 2 weeks. Their fecal lipids were extracted, fractionated and analyzed by column chromatography and IR. The toxic fraction, which seemed to be the dimer or trimer of triglyceride, was decomposed in the intestine to molecules as small as diglycerides. More than 80% of it was absorbed. The toxic components of rat fecal lipid were again orally administered to mice. They were more toxic than the original polymerized oil. The chromatographic behavior, molecular weight and toxicity of the fecal lipid seemed to indicate that at least a part of toxic components in the thermally oxidized oil underwent little change in the rat body and was excreted in the feces.

V. ON THE NUTRITIVE VALUE OF HIGHLY POLYMERIZED SUBSTANCES IN THERMALLY OXIDIZED OILS. *Ibid.*, 1071–74. Linseed oil oxidized at 275C until it gelled (I) or, for 12 hours (II), and soybean oil oxidized at 185C (III) and its tetramer fraction (IV) were fed to rats for 12 days. The growth of rats I or IV was better than that of rats II or III, and almost comparable to the growth observed when the fresh oils were fed. However, the anatomical examinations of adipose tissues showed that the rats I or IV were remarkably bad. The fecal lipid analysis suggested the polymers larger than the pentamer of triglyceride were excreted in feces without being absorbed.

DETERMINATION OF SOLID FAT AND WATER CONTENT OF MARGARINE BY HIGH RESOLUTION NMR. T. Suzuki, O. Kamo, H. Toyama, K. Yoshida, T. Maruyama and I. Niiya (Japan Electron Optics Lab. Co., 1418 Nakagami, Akishima, Japan; Asahi Electrochemical Co., 7-1 Higashioku, Arakawa-ku, Tokyo; Jap. Margarine & Shortening Makers Assoc., 30 Nihonbashi, Hamacho, Tokyo). *Yukagaku* 19, 1019–24 (1970). The solid fat concentration of margarines, butters and hardened beef tallow-corn oil mixture was quantitatively determined by a high resolution NMR. The accuracy of NMR method was better than those of dilatometry, especially at higher solid fat concentrations. Water concentration was also measured. The lowest detectability of water was 3.4% with ±2% error.

STUDIES ON THE LIPIDS OF JAPANESE LITTLENECK, TAPES JAPONICA. IV. STEROLS. S. Yasuda (Dept. General Education, Hiroshima Univ., Hiroshima, Japan). *Yukagaku* 19, 1014–19 (1970). Five Δ^5-sterols, cholesterol, 22-dehydrocholesterol, brassicasterol, 24-methylenecholesterol and isofucosterol were isolated from Japanese littleneck by silver nitrate-impregnated silicic acid column chromatography, and identified by m.p., IR, TLC and GLC. The presence of $\Delta^{5,7}$-sterols was also suggested by UV and Liberman-Burchard reaction.

DIFFERENTIAL THERMAL ANALYSIS OF EDIBLE OILS AND FATS. VIII. HARDENED FISH OIL, RAPE SEED OIL AND HARDENED FISH OIL MIXTURE WITH COCONUT OIL. I. Niiya, T. Maruyama, M. Imamura and T. Matsumoto (Jap. Margarine and Shortening Makers Assoc., 3–30 Nihonbashi Hamacho, Chuo-ku, Tokyo). *Yukagaku* 19, 946–50 (1970). Hardened fish oil (IV 52, SV 183.4) (I), hardened rape seed oil (IV 69.9, SV 181.6) (II) and mixtures of I and II were allowed to stand at 10, 20, or 30C for 1, 24, 120 or 720 hours and their differential thermal analysis curves were recorded. The hardened fish oil at 0 and 20C had a large broad endothermic peak at 34C and an indistinct gentle peak in the lower temperature side. At 30C it was different from others. Hardened rapeseed oil at 0C showed a large broad peak at 21–27C and at 20C had a small but gentle peak at the lower temperature side as well. At 30C two peaks were seen. Hardened fish oil

containing 10% coconut oil did not show a different curve from (I), but those containing 20, 40, or 60% coconut oil did have different curves. When the blend with (I) contained 80 or 90% of coconut oil, it had the characteristic DTA curve of coconut oil.

SOME PROBLEMS ON EMULSIFIERS AS FOOD ADDITIVES. Y. Toda (Taiyo Chem. Ind. Co., 62 Akahori, Yokkaichi, Japan). *Yukagaku* 19, 1007–13 (1970). A review with 54 references.

PHYSICAL PROPERTIES OF MARGARINE AND SHORTENING. III. RELATION BETWEEN DTA AND PHYSICAL PROPERTIES OF HOUSEHOLD MARGARINE AND BUTTER. I. Niiya, T. Maruyama, E. Morise, M. Imamura and T. Matsumoto (Jap. Margarine and Shortening Makers Assoc., 30 Nihonbashi Hamacho, 3-chome, Chuo-ku, Tokyo). *Yukagaku* 19, 891–897 (1970). Differential thermal analysis (DTA) was used to compare commercial margarines and butters. DTA curves of domestic hard margarines showed three endothermic peaks, while those of similar foreign products two. DTA curves of separated oils showed a similar tendency. The oils containing linoleic acid showed a peak below 0C. DTA curves of soft margarines were almost same as above. Imitation margarines containing more than 50% water showed entirely different curves from the above. However, separated oils from the imitation margarines were not unique. Good correlation was shown between the DTA curves and the hardness of butters but not in their separated oils.

IDENTIFICATION OF FLAVOR COMPOUNDS IN FAT AND OIL. II. IDENTIFICATION OF HYDROGENATION FLAVOR. Y. Kawase, H. Niizuma, S. Takagi and K. Yasuda (Res. Lab., Nisshin Oil Mills, Chiwakacho, Kanagawa-ku, Yokohama, Japan). *Yukagaku* 19, 883–87 (1970). Hydrogenated cotton seed oil, hydrogenated linseed oil, hydrogenated soybean oil and completely hydrogenated soybean oil were aerated at 130C. Volatile compounds were trapped by dry ice, extracted with ethyl ether and analyzed by GLC and IR. The presence of 6-*trans*-nonenal was confirmed in hydrogenated linseed oil, but not in other oils. 2-*trans*,4-*trans*-Dodecadienal was identified in the three hydrogenated oils except completely hydrogenated soybean oil.

CONTRIBUTION OF SOLVATION TO ANTIOXIDANT ACTION. G.E. Zaikov, Z.K. Maizus and N.M. Emanuel (Inst. of Physical Chem., Moscow). *Yukagaku* 19, 871–79 (1970). A review with 38 references.

STUDIES ON MONOGLYCERIDES BY THE DIFFERENTIAL SCANNING CALORIMETRY. II. QUANTITATIVE DETERMINATION OF 1-MONOPALMITIN. M. Takasago, K. Horikawa and S. Masuyama (Osaka Municipal Tech. Res. Inst., Kitaku, Osaka, Japan). *Yukagaku* 19, 880–83 (1970). A differential scanning calorimeter was applied for a rapid quantitative determination of 1-monopalmitin in the mixture of 1- and 2-monopalmitin. The exothermic curve of a 5–10 mg sample in an aluminium pan was recorded at the rate of 10C/min. The curve was traced on tracing paper, cut out and weighed. The error was within 2%.

TOXIC CHARACTER OF RANCID OIL. X. FEEDING SOYBEAN OIL AT DIFFERENT STAGES OF THERMAL OXIDATION AND FATTY ACID COMPOSITIONS IN BLOOD, LIVER AND EXCREMENT OF RATS. G. Kajimoto (College of Nutr., Univ. of Kobe Gakuin, Ikawadani, Kobe, Japan). *Yukagaku* 20, 20–25 (1971). Soybean oil was heated at 180C for 20 (I) or 35 hrs (II) and fed to rats at 15% level of diet for 25 days. Reduced body weight gain and reduced triglyceride level in blood, liver and excrement were found with rats fed I and II. C-18:2 fatty acid was the major fatty acid in the liver and blood lipids of the control rats, while C-18:1 was the principal fatty acid in rats fed I or II. No conjugated diene was found in the liver of the control rats or of rats fed I or II. However, conjugated triene, tetraene and pentaene appeared in the liver of all subjects, and were especially rich in the liver of rats given thermally oxidized oils.

THE PRESENCE OF LIPIDS WITH A CARBON-PHOSPHORUS BOND. T. Hori (Dept. Chem., College of Liberal Arts and Education, Shiga Univ., Otsu, Japan). *Yukagaku* 20, 2–6 (1971). A review with 34 references.

INTERACTIONS BETWEEN CHOLESTEROL AND LECITHINS IN MONOLAYERS AT THE AIR-WATER INTERFACE. J. Tinoco and D.J. McIntosh (Dept. Nutr. Sciences, Univ. Calif., Berkeley, Calif. 94720). *Chem. Phys. Lipids* 4, 72–84 (1970). Liver lecithins were isolated from normal or essential fatty acid-deficient rats, and these were separated into fractions containing mainly 1, 2, 3, 4 or 6 double bonds. Pressure-area measurements were made with these fractions at the air-water interface. The linoleoyl-lecithin fraction and the arachidonoyl-lecithin fraction were measured in mixed monolayers with cholesterol, and condensation was observed. Palmitoyl-linoleoyl- and stearoyl-linoleoyl lecithins were chemically synthesized and pressure-area curves of these, with and without cholesterol, were measured. Condensation also occurred with these nearly pure preparations.

DETERMINATION OF RETENTION INDICES OF SATURATED HYDROCARBONS BY GRAPHICAL METHODS. G.D. Mitra and N.C. Saha (Fertilizer Corp. of India Ltd., Sindri, Bihar, India). *J. Chromato. Sci.* 8, 95–102 (1971). Several methods of determining Kovát's retention indices of saturated hydrocarbons have been discussed. A linear relationship has been observed in retention indices of alkyl and cyclic paraffins between two liquid phases belonging to nonpolar or moderately polar groups. Retention index of a compound available in one liquid phase can be determined in a second solvent. When separate straight lines are drawn for properly chosen homologous series and family members, the data can be read accurately within ±1 index unit. The criteria for the classification into homologous series and family members and also for the selection of a suitable pair of liquid phases have been dealt with mathematically. By these methods retention indices of 43 alkyl and 48 cycloparaffins have been computed in SE-30.

HYDROLYSIS OF PHOSPHOGLYCERIDES BY PURIFIED LIPASE PREPARATIONS. II. PREPARATION OF UNSATURATED 2-MONOACYL CHOLINE PHOSPHOGLYCERIDES. A.J. Slotboom, G.H. DeHaas, G.J. Burbach-Westerhauis and L.L.M. VanDeenen (Lab. of Biochem., State Univ. of Utrecht, Utrecht, The Netherlands). *Chem. Phys. Lipids* 4, 30–36 (1970). A number of 3-sn-phosphatidylcholines having an unsaturated fatty acid moiety esterified at the 2-position were 1-specifically hydrolyzed by purified lipase preparations (EC 3.1.1.3). The unsaturated 2-monoacyl choline phosphoglycerides formed, were purified by elution on Sephadex LH-20. The purity of these compounds was confirmed by thin-layer chromatography, while phospholipase A (EC 3.1.1.4) hydrolysis revealed that the unsaturated fatty acid ester was almost exclusively located at the 2-position. Starting from 3-sn-phosphatidylcholines carrying a ^{14}C-labeled unsaturated fatty acid ester at the 2-position this method turned out to be very suitable for the preparation of unsaturated ^{14}C-labeled 2-monoacyl choline phosphoglycerides.

OCCURRENCE OF FATTY ACID METHYL ESTERS IN WALNUT KERNEL AND OTHER OILS. L.B. Rockland and C. De Benedict (Western Utilization Res. and Dev. Div., ARS, USDA, 263 South Chester Ave., Pasadena, Calif. 91106). *J. Agr. Food Chem.* 18, 228–33 (1970). Cold-pressed oil extracted from English (Persian) walnuts, *Juglans regia*, was stripped of volatile constituents by molecular distillation at 150C. The molecular distillate contained free fatty acids, β-sitosterol, other unidentified apparent steroids and a small amount of C_{16} and C_{18} fatty acid methyl esters (FAME). The latter was isolated by micropreparative gas chromatography and identified using infrared, NMR and mass spectrometry. Special care was taken to preclude formation of FAME during sample preparation, isolation and characterization. A sample of rancid kernels contained 30 times as much FAME as fresh kernels. FAME may be formed by deteriorative reactions within the kernel during storage.

COOL TASTING MARGARINE. H.W.L. Westenberg (Lever Bros.) *U.S. 3,607,305.* The hard stock has a slip point of 30–40C and an increased amount of *trans* acids, resulting in a steep dilatation curve. It is mixed with a liquid oil and may or may not be interesterified.

METHOD AND APPARATUS FOR DEODORIZING GLYCERIDE OILS WITHIN A SINGLE VESSEL USING COUNTERCURRENT INDIRECT HEAT EXCHANGE AND DIRECT SUPERHEATED STEAM INJECTION. R.R. King (French Oil Machinery Co.) *U.S. 3,607,670.*

PROCESS FOR THE EXTRACTION OF A FRACTION OF THE UNSAPONIFIABLE OF A VEGETABLE OIL. P. Mastagli (Serdex-Societe d'Etudes . . ., France). *U.S. 3,607,890.* Citrostadienolic and/or cycloarthenolic fractions are extracted with dimethylformamide.

PROCESS FOR THE HYDROGENATION OF AN OLEAGINOUS MATERIAL. P.N. Ross, Jr. and J.B. Edwards (Procter and Gamble)

U.S. 3,608,039. Process uses a suspended catalyst and an alternating current electrical field.

APPARATUS FOR SEPARATING FATTY ACID DISTILLATES FROM VEGETABLE OILS BY SELECTIVE CONDENSATION AND TEMPERATURE CONTROL. R.W. West (Carrier Corp.). *U.S. 3,608,279.* The desired component is condensed by spraying a liquid in contact with the vapor.

• Fatty Acid Derivatives

MASS SPECTROMETRY OF SOME DEUTERATED 1,3-DISTEARINS. A. Morrison, M.D. Barratt and R. Aneja (Unilever Res. Lab. Colworth/Welwyn, The Frythe, Welsyn, Herts., U.K.). *Chem. Phys. Lipids* 4, 47–59 (1970). The mass spectra of 1,3-distearins -d_1, -d_4 and -d_5 with the deuterium incorporated into the glyceryl moiety, have been investigated in order to clarify the electron-impact induced fragmentation of 1,3-distearin itself. High resolution mass spectrometry has been utilized to give accurate masses of fragment ions and consequently molecular formulae. Where applicable, metastable peaks have been correlated with proposed mechanisms. It has been found that the loss of water from the molecular ion is electron-impact induced and that the hydrogen atoms eliminated arise from the hydroxyl group and the stearoyl chains. There is no appreciable scrambling of deuterium between the chains and the glyceryl head. Many of the fragment ions with molecular weights greater than 200 a.m.u. probably have cyclic structures and most retain the glyceryl residue intact.

STUDIES ON ALKALINE OXIDATION OF ALCOHOLS. M. Masuda, M. Ishizaka, H. Maruyama and H. Nishino (Daisan Kasei Co., Goi, Ichihara-shi, Chiba, Japan). *Yukagaku* 19, 1087–90 (1970). Straight chain saturated alcohols (C_6-C_{18}), branched chain alcohols from the oxo-alcohol process, glycols, oleyl alcohol, benzyl alcohol, 2-ethyl-1-hexanal and 2-ethyl hexyl ether were oxidized with alkali metal hydroxides to fatty acids at 210–320C. The yield of fatty acids from primary alcohols was about 90%, from secondary alcohol negligible, from aldehyde 74% and from ether none. The presence of water reduced the yield of fatty acids.

STUDIES ON THE CYCLOADDITION TO UNSATURATED FATTY ACID METHYL ESTER. I. ADDITION OF METHYL ACRYLATE TO CONJUGATED OCTADECADIENOIC ACID METHYL ESTERS. O. Suzuki and T. Hashimoto (Nat. Exp. Station of Ind., Tokyo, 1-chome, Hon-machi, Shibuya-ku, Tokyo). *Yukagaku* 19, 950–6 (1970). Kinetic studies of methyl acrylate addition to conjugated methyl octadecadienoate showed that the reaction was based on the Diels-Alder reaction. *Trans-trans* octadecadienoate had about 100 times higher activity than its *trans-cis* form at 160C. The addition product was proved to have cyclohexene ring by IR, NMR and mass spectroscopy.

II. ADDITION REACTIONS OF METHYL METHACRYLATE AND METHYL CROTONATE TO METHYL TRANS-9, TRANS-11-OCTADECADIENOATE. O. Suzuki. *Ibid.*, 1075–81. Kinetic studies showed that the addition of methyl methacrylate or methyl crotonate to *trans*-9, *trans*-11-octadecadienoate was based on Diels-Alder reaction. Polymerization of methacrylate was involved in the methacrylate addition reaction as a side reaction. Methacrylate had about 3 times more dienophilic activity than the crotonate. The adduct structures containing a cyclohexene ring were determined by IR, NMR and mass spectroscopy.

III. ADDITION REACTION OF METHYL VINYLACETATE TO METHYL TRANS-9, TRANS-11-OCTADECADIENOATE. *Ibid.*, 1081–86. Addition of methyl vinylacetate to octadecadienoate was based on Diels-Alder reaction. Dimerization of octadecadienoate was involved in the reaction. The dienophilic activity of methyl vinylacetate was about 1/6 of crotonate.

STUDIES ON THE SYNTHESIS OF MERCAPTANS. III. THE REACTION OF LAURYL CHLORIDE WITH SODIUM HYDROGENSULFIDE IN ALCOHOLIC SOLVENTS. T. Arai, T. Sonoda, J. Shiraishi, M. Koyama and M. Koike (Res. Lab., Nippon Oil and Fat Co., 1–56 Ohama-cho, Amagasaki, Japan). *Yukagaku* 19, 863–68 (1970). The synthesis of lauryl mercaptan from lauryl chloride and NaSH in alcoholic solvents was studied. No definite relation was found between mercaptan yield and dielectric constants or solvent polarity. Temperature and amount of water affected the yield of mercaptan and of co-reaction products. The mechanism is discussed.

THE REACTION OF ALCOHOL AND AMINE. VII. SOME ASPECTS OF TRANSALKYLATION OF TERTIARY AMINE WITH ALCOHOL. K. Takehara, S. Okajima, T. Agawa and S. Komori (Res. Lab., Dai-ichi Kogyo Seiyaku Co.; Dept. Applied Chem. Osaka Univ., Suita, Japan). *Yukagaku* 19, 957–62 (1970). The effect of various metals and metal oxides on the selectivity of transalkylation between tertiary amines and alcohols was studied. Only Co, Ni, Fe and Rh catalyzed the reaction. Metal oxides did not work without hydrogen, but metal powders were effective under nitrogen. Co or Rh powder and Cu chromite modified with MnO_2 or BaO showed good catalytic activity. Elevation of reaction temperature from 250 to 300C raised the selectivity. Increase of initial hydrogen pressure and the amount of tertiary amine set up the reaction.

THE EFFECT OF AMINE SALTS OF DIALKYLPHOSPHITE ON THE CRITICAL ANTIWEAR LOAD. K. Suga, S. Watanabe and A. Miyashige (Dept. of Applied Chem., Chiba Univ., Yayoicho, Chiba, Japan and Res. Center, Janome Sewing Machine Co., Hachioji, Tokyo). *Yukagaku* 19, 910–4 (1970). Various amine salts of dialkylphosphites were synthesized and their antiwear load effect on gear oil and liquid paraffin was investigated. Aniline, 1,2,3-benzotriazole, diphenylamine and oleylamine salts of dimethylphosphite, diethylphosphite and dibutyl phosphite had excellent antiwear activity.

METAL COMPLEXES OF POLYOXYETHYLENE ALKYLAMINE AS ANTISTATIC AGENTS FOR PVC. I. Maruishi and S. Tsuda (Osaka Prefectural Ind. Res. Inst., Enokojima-Kamino-cho, Nishi-ku, Osaka, Japan). *Yukagaku* 19, 1033–42 (1970). Antistatic complexes of polyoxyethylene alkylamine with metal chloride, sulfate, nitrate, perchlorate, p-toluene sufonate, benzoate, phthalate, maleate, ebacate and fatty carboxylates were synthesized. Their internal antistatic activities were measured by frictional charge generation and decay. All had antistatic activity. The most effective ethylene oxide concentration was 10 to 15 moles per a complex. Fatty acid salts, and Ca or Cu acetates were good, but organic acids were not.

• Biochemistry and Nutrition

FATTY ACIDS IN TISSUE LIPIDS OF RATS FED STERCULIS FOETIDA OIL. E. C. Coleman and L. Friedman (Div. of Toxicol., U.S. Dept. of HEW, Washington, D.C. 20204). *J. Agr. Food Chem.* 19, 224–28 (1971). Increased amounts of fat were found in the liver and in the hardened heart of female rats that ingested 2% dietary *Sterculia foetida* oil for 34 weeks. Adipose tissue contained the highest level of Halphen positive material, followed by liver and heart tissue. Components having a retention time corresponding to a C_{18}-C_{24} fatty acid were found in the tissue lipids of animals that received the 2% dietary *S. foetida* oil. Dietary *S. foetida* oil caused increased levels of saturated fatty acids and decreased levels of unsaturated fatty acids in heart, liver and particularly in the adipose tissue. Higher levels of linoleate and lower levels of arachidonate in both heart and liver suggested that the mechanism of conversion of linoleate to arachidonate was inhibited.

INCORPORATION OF ACETATE AND FATTY ACIDS INTO LIPIDS OF RAT PLATELETS. M. Okuma, M. Steiner and M. G. Baldini (Div. of Hematologic Res., Brown Univ., Providence, and the Memorial Hosp., Pawtucket, R.I. 02860). *Proc. Soc. Exp. Biol. Med.* 136, 842–47 (1971). The incorporation of acetate and fatty acids into rat platelet lipids was studied by incubating washed platelets with acetate-1-^{14}C or albumin-bound fatty acids-1-^{14}C (palmitic, oleic, linoleic, and linolenic acid) in an artificial medium without addition of cofactors. Acetate was incorporated primarily into PC, TG, CEM, FFA and PE which accounted for three-fourths of its total incorporation into lipids. Palmitate incorporation into platelet lipids was twice as high as that of each of the unsaturated fatty acids. A distinctive pattern of distribution of palmitate or of the unsaturated fatty acids among the various lipid classes was observed as well as differences in the relative abundance of the fatty acids incorporated into each PL group. Rat platelets are therefore capable of (i) incorporation of fatty acids from the suspending medium, and (ii) *de novo* synthesis of fatty acids. Pattern of fatty acid incorporation and rate of *de novo* synthesis appear to be different from those in human platelets.

ESTROGENICITY OF *o,p'*-DDT IN RATS. Helene C. Cecil, J. Bitman and Susan J. Harris (Agr. Res. Serv., Animal Sci. Res. Div., USDA, Beltsville, Md. 20705). *J. Agr. Food Chem.* 19, 61–65 (1971). The estrogenicity of *o,p'*-DDT was compared to estradiol by studying changes in uterine H_2O, RNA and glycogen after a single injection, multiple injections or feeding *ad libitum* to immature female rats or ovariectomized rats.

The minimal effective single dose of *o,p'*-DDT was approximately 0.4 mg, while that of estradiol was 0.04 μg, with maximum uterine response occurring with 10 times these levels. The relative estrogenicity of *o,p'*-DDT is 1/10,000 that of estradiol and the uterine effect of *o,p'*-DDT could be blocked by either MER-25 or Actinomycin D. Feeding 0.5 ppm estradiol elicited a maximum increase in uterine weight, while 1000 ppm *o,p'*-DDT did not. The presence of 1000 ppm *o,p'*-DDT in the diet (equivalent to 5000 μg per day) elicited uterine responses comparable to feeding 0.1 ppm estradiol.

CHOLESTEROL IN CIGARETTE SMOKE CONDENSATE. C. Grunwald, D. L. Davis and L. P. Bush (Dept. of Agronomy, Univ. of Kentucky, Lexington, Ky. 40506). *J. Agr. Food Chem.* 19, 138–39 (1971). Cholesterol, the principal animal sterol, was found in cigarette smoke condensate both in free and bound form. The cholesterol identification was based on gas-liquid chromatography and mass spectrometry. This sterol accounted for 8.6% of the total sterol content in cigarette smoke condensate, of which about 52% was in the free form and 48% in the bound form. In cigarette tobacco, cholesterol accounted for 10% of the total sterols, of which 48% was in the free form and 52% in bound form. The transfer of free and bound cholesterol from cigarette tobacco to trapped condensate was about 13% while the total sterol transfer was 15%.

VITAMIN A DEFICIENCY EFFECT ON RETINA: DEPENDENCE ON LIGHT. W. K. Noell, M. C. Delmelle and R. Albrecht (Neurosensory Lab., State Univ. of New York at Buffalo, 2211 Main St., Building C, Buffalo 14214). *Science* 172, 72–76 (1971). The effects of vitamin A deficiency in the rat eye, as measured by the electroretinogram and changes in rhodopsin content, are critically dependent upon the levels of illumination to which the animals are exposed daily. Depleted animals kept in darkness maintained virtually normal electroretinogram function and rhodopsin content for 5 to 6 months while those kept in weak cyclic light lost rhodopsin continuously. A fraction of the retinol released from rhodopsin during illumination disappears presumably from the pigment epithelium into the blood and becomes unavailable for rhodopsin regeneration. A sequence of three first-order reactions was assumed to estimate the rate constant of this disappearance (0.03 per hour). Computer simulation supporting the experimental data illustrates the dependence of the retinal abnormalities on light.

IRREVERSIBLE EFFECTS OF VISIBLE LIGHT ON THE RETINA: ROLE OF VITAMIN A. W. K. Noell and R. Albrecht. *Ibid.*, 76–80. Diffuse retinal irradiation by visible light produces in the rat the death of visual cells and pigment epithelium. Typically, cage illumination of 1500 lux from fluorescent light through a green filter leads to severe damage when continued for 40 hours. Vitamin A deficiency protects against this damage but experiments show that retinol released by light from rhodopsin is probably not the toxic agent. Protection against light damage depends on a long-range state of cell adaptation to light itself. The normal diurnal cycle of light and dark seems to be the essential factor in controlling visual cell viability and susceptibility.

CONDUCTANCE CHANGES PRODUCED BY ACETYLCHOLINE IN LIPIDIC MEMBRANES CONTAINING A PROTEOLIPID FROM ELECTROPHORUS. M. Parisi, Emilio Rivas and E. De Robertis (Inst. de Anatomia General y Embriologia, Facultad de Medicina, Univ. de Buenos Aires, Buenos Aires, Argentina). *Science* 172, 56–57 (1971). Ultrathin lipidic membranes containing one ten-thousandth of a special proteolipid from electric organ of *Electrophorus* reacted to the addition of acetylcholine by a rapid and transient increase in conductance. Such a change was not induced by choline and is greatly reduced by a previous application of *d*-tubocurarine. These properties, resembling those from chemically excitable membranes, were not observed with another proteolipid from the same tissue.

EFFECTS OF EQUALIZING GROSS PROTEIN VALUE UNITS IN ISOCALORIC RATIONS CONTAINING RAPESEED MEALS OF DIFFERENT QUALITY. A. Anwar, D. R. Clandinin and A. R. Robblee (Dept. of Animal Sci., Univ. of Alberta, Edmonton, Alberta, Canada). *Poultry Sci.* 50, 181–83 (1971). Feeding trials were conducted to study the effect of using high and low quality rapeseed meals as complete replacements of the protein supplied by soybean meal in chick rations. Substitution of rapeseed meal for soybean meal in such a manner that the same levels of energy and G.P.V.Us. were provided, gave equivalent rates of growth irrespective of the total protein content of the rations fed.

INFLUENCE OF VITAMIN A DEFICIENCY ON TISSUE GLYCOGEN METABOLISM IN GROWING CHICKENS. C. F. Nockels and R. W. Phillips (Dept. of Avian Sci., Colorado State Univ., Fort Collins, Colo. 80521). *Poultry Sci.* 50, 174–81 (1971). Vitamin A-deficient Single Comb White Leghorn chickens had significantly reduced plasma glucose levels during their first 16 weeks of life. In spite of this decrease there was a significantly increased deposition of glycogen in the liver of 4-week-old chicks and an increased glycogen level in white muscle tissue of 8- and 16-week-old birds. Vitamin A-deficient 16-week-old birds were unable to degrade glycogen to lactic acid as well as controls. A significant increase in liver lactic acid synthesis was noted in the 24-week-old A-deficient chickens. No changes due to vitamin A deficiency were found in plasma catecholamines or tissue levels of adenosine triphosphate. Although there were no changes in phosphorylase levels between treatments, there was a dramatic decrease in liver and red and white muscle phosphorylase with age.

CRAMBE AND RAPESEED OILS AS ENERGY SOURCES FOR RATS AND CHICKS AND SOME ANCILLARY DATA ON ORGAN WEIGHTS AND BODY CAVITY FAT COMPOSITION. A. J. Sheppard, J. C. Fritz, W. H. Hooper, T. Roberts, W. D. Hubbard, A. R. Prosser and J. W. Boehne (Div. of Nutr., Food and Drug Admin., U.S. Dept. of HEW, Washington, D.C. 20204). *Poultry Sci.* 50, 79–83 (1971). Experiments with chicks and rats concerning the acceptability of crambe and rapeseed oils as dietary constituents are reported. There were no significant differences in the growth of rats fed comparable caloric levels of sucrose, crambe oil or rapeseed oil. Crambe oil and rapeseed oil diets produced less growth and poorer feed conversion than a corn oil diet in two chick experiments. Apparent digestibility values with single comb White Leghorn chicks were 91, 75 and 77, respectively, for corn, crambe, and rapeseed oils. GLC analysis of the body cavity fat showed that more oleic acid accumulated in the fat of White Leghorns fed crambe and rapeseed oils as compared to the fat of birds fed corn oil. It is concluded that crambe and rapeseed oils are inferior to corn oil as energy sources for the chick.

THE INFLUENCE OF DIETARY OILS ON CHICK GROWTH RATE. H. Menge (USDA, Beltsville, Md. 20705). *Poultry Sci.* 50, 261–65 (1971). A comparison was made between the chick growth stimulation of the linoleate from safflower oil or coconut oil and the polyunsaturated fatty acids of menhaden oil. Significant growth responses were obtained from 1.65-3.3% linoleate supplied by safflower oil. No significant differences existed between the groups receiving relatively small amounts of linoleate from safflower or coconut oil, although dietary coconut oil at the 11.88% level did exhibit a probable growth depression. The high levels of saturated fatty acids in the coconut oil may, at least, be a contributing factor in this case. Relatively high levels of these fatty acids were found in the plasma lipids of the chicks fed coconut oil. Menhaden oil containing relatively low amounts of linoleate promoted chick growth as effectively as safflower oil that supplied much greater levels of linoleate. The responses obtained from menhaden oil were considered to be due to the polyunsaturated fatty acids of the oil which have been demonstrated to depress the synthesis of eicosatrienoic acid, and also they may have substituted for linoleate or arachidonate, or both, in the essential fatty acid-deficient chick.

MODE OF ACTION OF CHLOROPHENOXYISOBUTYRIC ACID ON CHOLESTEROL METABOLISM IN MAN. L. Horlick, B. J. Kudchodkar and H. S. Sodhi (Dept. of Med., Univ. Hosp. and Univ. of Saskatchewan, Saskatoon, Sask., Canada). *Circulation* 43, 299–309 (1971). In short-term trials chlorophenoxyisobutyric acid (CPIB) (Atromid-S) reduced the plasma cholesterol and triglyceride levels in eight subjects with type II and IV hyperlipidemias to an equal extent. In these subjects, who were maintained on constant solid food diets, CPIB administration resulted in increased excretion of fecal neutral and acidic sterols in the type II subjects only. There was an immediate increase in specific activity of plasma cholesterol in seven of the eight subjects, and a reduced rate of fall of specific ac-

tivity in many of the subjects. It is suggested that CPIB inhibits the synthesis of cholesterol *in vivo*, and that the subsequent fall in plasma cholesterol is responsible for the release of cholesterol with higher specific activity from tissues into the plasma pool.

SEASONAL CHANGES IN THE LIPIDS OF ADIPOSE TISSUE IN A HIBERNATING LIZARD. H. Afroz, M. Ishaq and S. S. Ali (Dept. of Biochem., Univ. of Karachi, Karachi, Pakistan). *Proc. Soc. Exp. Biol. Med.* 136, 894–98 (1971). Studies were made on the changes in the lipid pattern of adipose tissue in a lizard during hibernation, arousal and activity. A relation appears to exist between the fat composition of the adipose tissue and the lizard's seasonal physiological state. Adipose tissue shows a marked increase in size and lipid content during the prehibernation and hibernation periods. Arousal resulted in a two- to threefold reduction in the tissue weight and its fat content, and this remained low during activity. Triglycerides always represented the bulk of the lipid fraction. During arousal and activity the levels of EFA and cholesterol were reduced. Despite the alterations in the fatty acid pattern of triglycerides, especially in the levels of palmitic, palmitoleic, stearic and linolenic acids, there was no change in the total unsaturation during hibernation, arousal and activity. The relative proportions of the lipolytic products (FFA, DG, and MG) were increased during arousal and activity, and were associated with marked variations in their fatty acid composition which may be related to variable metabolic rates for these acids.

EFFECTS OF PROLONGED CONTINUOUS EXPOSURE TO 100% OXYGEN AT 450 MM Hg IN VIVO ON LIPID SYNTHESIS IN RAT LIVER AND ADIPOSE TISSUE SLICES. D. D. Feller, E. D. Neville and K. S. Talarico (Environmental Biol. Div., Ames Res. Cent., NASA, Moffett Field, Cal. 94035). *Proc. Soc. Exp. Biol. Med.* 136, 928–33 (1971). Male rats, fed *ad libitum*, were exposed to 100% oxygen at 450mm Hg for periods of time varying from 1 to 3 weeks. After exposure, blood lipid assays were performed and *in vitro* incorporation of acetate-2-^{14}C into CO_2 and fatty acids by slices of liver and epididymal adipose tissue was measured. The oxygen-exposed rats gained a greater amount of weight over the exposure period than did their isocalorically, pair-fed controls. Plasma lipid values obtained from oxygen-exposed rats were higher than those obtained from the pair-fed group. Fatty acid contents in liver and adipose tissue of the oxygen-exposed rats were higher than those obtained from the pair-fed control rats. Conversion of acetate to fatty acids was found to be significantly higher in adipose tissue of O_2-exposed rats than that of nonexposed controls. A similar difference was not found in the case of slices of liver obtained from the same two groups of rats. The possibility that the oxygen-enriched environment alters the utilization of foodstuffs in a manner which more efficiently conserves energy by the storage of greater amounts of fat and/or greater synthesis of lipids is discussed.

OBLIGATORY ROLE OF THE Δ^5-BOND OF CHOLESTEROL FOR STEROID FORMATION BY ADRENAL PREPARATIONS. E.C. Trout, Jr. and Wilma Arnett (Geriatrics Res. Lab., Veterans Admin. Center, Martinsburg, W.V. 24301). *Proc. Soc. Exp. Biol. Med.* 136, 469–72 (1971). The Δ^5-bond appears to be a very specific requirement for the formation of steroids from cholesterol. Rat and hog adrenal homogenates were incapable of converting tracer amounts of radioactive dihydrocholesterol to labeled steroids to any significant extent. This inability was not due to competitive inhibition by cholesterol since cholesterol-extracted acetone powder preparations of beef adrenal mitochondria or homogenates of adrenals with high levels of dihydrocholesterol were similarly unable to effect a significant conversion. Steroid synthesis from radioactive cholesterol was substantially inhibited in homogenates of adrenals from rats fed dihydrocholesterol while the total amount of cholesterol in these adrenals was increased as compared to that of normal rats.

THE EFFECTS OF HYPOCHOLESTEROLEMIC AGENTS ON CHOLESTEROL ESTERIFICATION IN VITRO. J.S. Schweppe and R.A. Jungman (Dept. of Res., Chicago Wesley Memorial Hosp., Chicago, Ill. 60611). *Proc. Soc. Exp. Biol. Med.* 136, 449–51 (1971). The hypocholesterolemic agents Atromid-S and Choloxin stimulate the *in vitro* synthesis of cholesterol esters from free cholesterol by a rat liver microsomal preparation. Atromid-S enhances, in particular, the formation of cholesteryl oleate and linoleate. Choloxin has its primary effect on cholesteryl oleate. SU-13437 stimulates the formation of all cholesterol esters. SaH-2348 primarily affects the rate of formation of cholesteryl oleate and linoleate.

THE EFFECT OF VITAMIN D DEFICIENCY ON THE LIPIDS OF BONE MATRIX. R.L. Cruess and I. Clark (Orthopaedic Res. Lab., Royal Victoria Hosp. and McGill Univ., Montreal, Quebec, Canada). *Proc. Soc. Exp. Biol. Med.* 136, 415–19 (1971). The bones of control and vitamin D-deficient animals have been analyzed to determine whether the D-deficient state affects the lipids extractable from these bones. A decrease in serum calcium and an increase in serum phosphorus was noted and all D-deficient animals had an increase in the percentage of the organic fraction of the bones. There was an increase in the total lipids extractable from the epiphysis, metaphysis, and diaphysis; and a significant increase was found in the diaphyseal phospholipids and cholesterol. Significant decrease was noted in the metaphyseal fatty acid and an increase in the diaphyseal fatty acid. There was a decrease in the metaphyseal triglyceride and an increase in the diaphyseal triglyceride. It is concluded that perhaps there is an arrest in the conversion of neutral fats to phospholipids but the vitamin D-deficiency does not have a primary effect on phospholipid metabolism.

EFFECT OF VITAMIN B_6 DEFICIENCY ON THE METABOLISM OF ISOLATED FAT CELLS: RESPONSE TO INSULIN, EPINEPHRINE AND THEOPHYLLINE. D.J. Sabo and S.N. Gershoff (Dept. of Nutr., Harvard Schl. of Public Health, Boston, Mass. 02115). *Proc. Soc. Exp. Biol. Med.* 136, 542–46 (1971). When isolated epididymal fat cells from vitamin B_6-deficient rats were incubated with glucose, lipogenesis was greater both in the absence and presence on insulin than when fat cells from fed and fasted control animals were similarly treated. Fat cells from vitamin B_6-deficient rats also appeared more sensitive to lipolysis induced by theophylline and to a lesser extent ephinephrine. This effect appeared to be related at least in part to the inanition accompanying the vitamin deficiency. Insulin was effective in partially inhibiting the epinephrine effect on fat cells from *ad libitum* controls but not on fat cells from deficient rats or pair fed controls. Conversely, insulin appeared less effective in inhibiting the theophylline effect on fat cells from *ad libitum* controls than the other groups. Ratios of triglyceride to DNA were similar in fat cells obtained from control and deficient rats indicating that in rat vitamin B_6-deficiency experiments the amount of fat cells used can be quantified by the amount of triglyceride present.

CARCINOMA OF THE GALLBLADDER INDUCED IN HAMSTERS BY INSERTION OF CHOLESTEROL PELLETS AND FEEDING DIMETHYLNITROSAMINE. K. Kowalewski and E.F. Todd (Surgical-Medical Res. Inst. and Dept. of Pathol., Univ. of Alberta, Edmonton, Alberta, Canada). *Proc. Soc. Exp. Biol. Med.* 136, 482–86 (1971). Hamsters having or not surgically implanted intracholecystic cholesterol pellets were given carcinogen diethylnitrosamine (DEN) or dimethylnitrosamine (DMN), dissolved in drinking water. Exposure to these carcinogens lasted from 8 to 22 weeks. No gallbladder tumors were found in DEN-treated hamsters, having or not intracholecystic "experimental stones." In 68% of hamsters exposed to DMN and having gallbladder pellets, adenocarcinomas were found. Only one gallbladder tumor was detected in DMN-treated animals which had no gallbladder pellet. It was concluded that "experimental gallbladder stone" enhanced the malignant transformation of gallbladder mucosa in DMN-treated hamsters. It was considered probable that dysplasia of bile duct and gallbladder epithelium observed only in DMN-treated animals represents a premalignant lesion. Presence of this premalignant lesion associated with nonspecific irritation of gallbladder mucosa by a "stone" may be considered an important etiological factor contributing to gallbladder malignancy in hamsters.

COMPARISON OF ACTIVITY OF 25-HYDROXYCHOLECALCIFEROL AND DIHYDROTACHYSTEROL IN THE THYROPARATHYROIDECTOMIZED RAT. Helen C. Harrison and H.E. Harrison (Depts. of Pediatrics, Johns Hopkins Univ. Schl. of Med. and Baltimore City Hosp., Baltimore, Md. 21205). *Proc. Soc. Exp. Biol. Med.* 136, 411–14 (1971). Assays of the activity of synthetic 25-hydroxycholecalciferol in the thyroparathyroidectomized rat indicate that it is no more potent than ergocalciferol. These and other data (1) indicate that both 25-hydroxycholecalciferol and ergocalciferol are only ⅕ as active as dihydrotachysterols in this assay. These results suggest that the pharmacologic action of vitamin D as a substitute for parathyroid hormone operates through a mechanism different from the physiologic action of this sterol derivative.

INFLUENCE OF THE SOURCE OF DIETARY FAT ON SOME METABOLIC RESPONSE OF MEAL-FED RATS. R. C. Theuer (Dept. of Nutritional Res., Mead Johnson Res. Cent., Evansville, Ind.). *Proc. Soc. Exp. Biol. Med.* 136, 765–68 (1971). Male rats were

accustomed to a two-meal-a-day feeding pattern on diets containing either medium-chain triglycerides (MCT) or long-chain triglycerides (LCT). Fat comprised 40% of calories in these diets. Before the morning meal, rats fed the MCT diet had higher blood ketone and plasma nonesterified fatty acid levels and lower blood glucose and plasma triglyceride levels than the LCT-fed rats, suggesting that the MCT-fed rats may have been in the postabsorptive state for a longer time. After the rats received the morning feeding, the MCT-fed rats showed a rapid decline in plasma NEFA levels and a greater rise in blood glucose levels than LCT-fed rats. The high fasting blood ketone levels decreased in both groups, but the MCT-fed rats maintained a higher level than the LCT-fed rats even after the meals. Postprandial hypertriglyceridemia was observed in both groups. However, in the MCT-fed rats the triglyceride level returned to the fasting level by 2 hr after the meal; whereas the hypertriglyceridemia was sustained for at least 5 hr after the meal in the LCT-fed rats. This finding probably relates to the more rapid and complete digestion of MCT compared to LCT.

ALTERATIONS IN TISSUE AND SERUM ALDOLASE IN RABBITS DUE TO VITAMIN E DEFICIENCY. R. J. Helmsen and A. A. White (Lab. of Vision Res., Nat'l Eye Inst., Nat'l Insts. of Health, U.S. Dept. HEW, Bethesda, Md. 20014). *Proc. Soc. Exp. Biol. Med.* 136, 785–89 (1971). Dystrophic rabbit muscle showed a decrease in total nitrogen, noncollagen nitrogen (NCN), dry weight and dry fat-free weight (DFF wt). Collagen nitrogen and the fat content of the tissue were found to be increased over that seen in the controls. Livers of E-deficient animals displayed a 40% rise in total nitrogen and NCN versus normals. Aldolase activity was markedly decreased in dystrophic muscle, but liver revealed an elevation in its enzyme concentration compared to controls. The elevation of serum aldolase in E-deficient rabbits preceded and paralleled the creatinuria associated with the development of dystrophy by a period of 1 to 2.5 weeks. These conclusions were compared to those observed in other forms of muscle wasting.

THE INCORPORATION OF ACETATE-2-^{14}C AND MEVALONATE-2-^{14}C INTO CHOLESTEROL DURING VITAMIN B_{12} DEFICIENCY. E. E. Armstead, J. M. Hsu and B. F. Chow (Dept. of Biochem., Johns Hopkins Univ., and the Biochemistry Res. Lab., Veterans Admin. Hosp., Baltimore, Md. 21218). *Proc. Soc. Exp. Biol. Med.* 136, 911–15 (1971). Cholesterol biosynthesis was studied in male rats from mothers fed a vitamin B_{12} deficient diet during pregnancy and lactation. Deficient males had significantly lower plasma cholesterol levels, the ester fraction being diminished. Adrenal cholesterol was appreciably higher, relative to levels observed in the B_{12} fed rats, while cholesterol content of testes and brain was not significantly different between the two groups. Vitamin B_{12} deficiency enhanced the rate of acetate incorporation into liver cholesterol while mevalonate incorporation remained unchanged after 30 min and 2 hr but was markedly lower in the deficient group after 4 hr. Mevalonate incorporation into adrenal and testicular cholesterol was also reduced at 4 hr but incorporation into brain cholesterol was unchanged.

EFFECT OF (-)-HYDROXYCITRATE ON FATTY ACID SYNTHESIS BY RAT LIVER IN VIVO. J. M. Lowenstein (Grad. Dept. of Biochem., Brandeis Univ., Waltham, Mass. 02154). *J. Biol. Chem.* 246, 629–32 (1971). Incorporation of ^3H from ^3H_2O was used to measure the rate of fatty acid synthesis in rat liver. (-)-Hydroxycitrate strongly inhibits fatty acid synthesis *in vivo*.

STUDIES ON THE MEMBRANES OF BACILLI. I. PHOSPHOLIPID BIOSYNTHESIS. P. H. Patterson and W. J. Lennarz (Dept. of Physiol. Chem., Johns Hopkins Univ. Schl of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 246, 1062–72 (1971). Ghosts of a *Bacillus* sp. isolated from a culture of *Bacillus megaterium* KM were prepared by the lysozyme technique and found to be free of several typical cytoplasmic and cell wall components. All of the enzymes responsible for the synthesis of phosphatidylethanolamine and phosphatidylglycerol from phosphatidic acid were found to be present in the ghosts. The biosynthesis of phosphatidylethanolamine and phosphatidylglycerol was shown to proceed via CDP-diglyceride as a common intermediate. When synthesized *in vitro* this intermediate, as well as the end products, were found to be associated with the ghosts. In studies of the properties of the individual enzymes, it was found that all of the enzymatic activities were stimulated by addition of Mg^{++} and a nonionic detergent, and had similar pH optima.

FATTY ACIDS OF ADRENAL LIPIDS FROM RATS FED PARTIALLY HYDROGENATED SOYBEAN FAT. P. O. Egwim and D. S. Sgoutas (Burnsides Res. Lab., Univ. of Illinois, Urbana, Ill. 61801). *J. Nutr.* 101, 315–22 (1971). The effect of partially hydrogenated soybean fat on the lipid composition of rat adrenals has been determined. The experimental fat contained 48% *trans* fatty acids and traces of linoleic acid. When fed at levels of 10 and 20% by weight of the diet for 5 months, an increase in the concentration of cholesterol esters was observed and elaidic acid incorporated in amounts of 22% of total fatty acids in cholesterol esters, 17% in triglycerides and 7% in phospholipids. In addition, an acid identified as 9,13-docosadienoic acid occurred in the cholesterol ester and the phospholipid fractions. In particular, when the experimental fat was fed at 20% level, the acid amounted to 24 and 16% concentration in adrenal cholesterol esters and phospholipids, respectively. On supplementing the experimental diet with 2% corn oil, the 9,13-docosadienoic acid diminished whereas the concentration of *trans* fatty acids remained practically unchanged.

EFFECT OF VITAMIN B_6 DEPLETION IN ADULT MAN ON THE PLASMA CONCENTRATION AND THE URINARY EXCRETION OF FREE AMINO ACIDS. Y. K. Park and Hellen Linkswiler (Dept. Nutr. Sci., Univ. of Wisconsin, Madison, Wis. 53706). *J. Nutr.* 101, 185–91 (1971). The effect of vitamin B_6 depletion on the plasma concentration and urinary excretion of free amino acids before and following a 3.00-g L-methionine loading dose was studied in six male college students fed an experimental diet which supplied 150 g protein and 0.16 mg vitamin B_6 daily. Vitamin B_6 depletion caused a substantial increase in both the fasting and 2-hour postprandial plasma concentration of glycine, serine and threonine, a marked increase in the pre- and postmethionine urinary excretion of serine and threonine and a slight increase in the postmethionine urinary excretion of glycine. During vitamin B_6 deprivation there also was a slight but significant decrease in the fasting plasma concentration of alanine, isoleucine, leucine and valine. Supplements of 2.00 mg pyridoxine daily to the subjects for 1 or 2 weeks caused the values to return to or approach predepletion levels.

EFFECT OF CIBA 13,437-SU ON SERUM CHOLESTEROL AND TRIGLYCERIDES, PLASMA FIBRINOGEN, FIBRINOLYSIS AND PLATELET ADHESIVENESS IN PATIENTS WITH ISCHEMIC HEART DISEASE. P. M. Mannucci, F. Pareti, C. A. Maggi and M. Diaguardi (2nd Inst. of Med. Pathol., Univ. of Milan, Milan, Italy). *J. Atheroscler. Res.* 13, 1–8 (1971). The effects of the phenolic ether Ciba 13,437-Su (300mg daily) on serum chloesterol, triglycerides, plasma fibrinogen, fibrinolysis and platelet adhesiveness were assessed in 10 patients with ischemic heart disease treated for 6 months and observed thereafter for 2 months with a placebo. The administration of the drug was free of appreciable side-effects and no evidence of toxicity was seen. Serum transaminases did not show any significant change. Mean serum cholesterol was reduced by about 20% and serum triglycerides by about 50% after the 1st month of treatment. The decrease was sustained and the levels returned to the high initial values when the placebo was started. A progressive fall of plasma fibrinogen was also observed, attaining the lowest values after 5 months of treatment and reverting to the initial values when the active drug was withdrawn. Fibrinolysis was not favourably influenced by the drug, as seen by the prolongation of the euglobulin lysis time and the increase of plasma plasminogen. Platelet adhesiveness was not significantly changed. Hence Ciba 13,437-Su is an effective and well-tolerated agent with a sustained hypolipidemic action. However, a decrease of fibrinolytic activity during the treatment was observed.

CELL PROLIFERATION IN THE ATHEROSCLEROTIC PLAQUES OF CHOLESTOROL-FED RABBITS. PART I. COLCHICINE AND (^3H)THYMIDINE STUDIES. C. Cavallero, E. Turolla and G. Ricevuti (Inst. of Pathol. Anatomy II, Univ. of Rome, Rome). *J. Atheroscler. Res.* 13, 9–20 (1971). The cell proliferation in the atherosclerotic plaques of cholesterol-fed rabbits has been morphologically studied by using colchicine and (^3H)thymidine. Colchicine blocked mitoses and tritium labeled nuclei were particularly numerous in early plaques as well as in the smooth muscle cells of the underlying media; they were mainly located in the most superficial parts of the intimal thickenings beneath the endothelial layer. Less numerous tritium labeled nuclei and colchicine metaphases were found in more advanced, fibro-fatty and fibrous plaques. After withdrawal of cholesterol feeding, proliferative changes were still present, but far less evident. From these findings it appears that the initiation and the evolution of the atherosclerotic plaque are closely associated to a proliferative reaction of the arterial wall involving both the medial smooth muscle cells and the cellular constituents of the intimal lesion.

CHOLESTEROL ESTERIFICATION IN VITRO WITH DL-N-(α-METHYLBENZYL)-(1-^{14}C)LINOLEAMINE. Y. H. Abdulla and C. W. M. Adams (Dept. of Pathol., Guy's Hosp. Med. Schl., London, SE1). *J. Atheroscler. Res.*, 13, 61–65 (1971). Incubation of rat aorta and intestine *in vitro* with DL-α-methylbenzyl-(1-^{14}C)-linoleamide (MBLA) results in the fairly selective formation of radioactive cholesterol esters and a radioactive complex between MBLA and free cholesterol. A much wider range of lipids is labelled after incubating liver *in vitro* with this drug. It is suggested that when MBLA is presented to the aorta and intestine *in vitro* as an intact molecule, these tissues can esterify cholesterol by a transamidation reaction between the drug and the sterol through an enzyme route that remains to be characterized. After administering the drug orally a wide range of lipids are labelled in plasma, liver and aorta. Cholesterol esterification is not prominent.

ACID MUCOPOLYSACCHARIDES OF FATTY STREAKS IN YOUNG, HUMAN MALE AORTAS. E. R. Dalferes, Jr., H. Ruiz, V. Kumar, B. Radhakrishnamurthy and G. S. Berenson (Dept. of Med. and Biochem., Louisiana State Univ. Schl. of Med., New Orleans, La.). *J. Atheroscler. Res.* 13, 121–31 (1971). The mucopolysaccharide (MPS) content and composition of fatty streaks (posterior thoracic and abdominal aorta) were compared to carefully selected uninvolved aortic intima (anterior thoracic). An altered composition of MPS in the very earliest lesions occurring in adolescent males was observed. An increase of MPS, chondroitin sulfate C in particular, was found in the fatty streak associated with spindle cell and extracellular lipid in 12 to 25 year age group. The area of the aorta more susceptible to atherosclerosis showed the most striking changes. These studies are a further indication that MPS contribute to the development of fatty streaks, likely through their interaction with lipids.

INHIBITION OF ATHEROSCLEROSIS IN CHOLESTEROL-FED RABBITS BY A HEPARITIN SULFATE; PRELIMINARY COMMUNICATION. B. J. Grossman, J. A. Cifonelli and A. K. Ozoa (La Rabida-Univ. of Chicago Inst. and Dept. of Pediatrics, Pritzker Schl. of Med., Univ. of Chicago, Chicago, Ill.). *J. Atheroscler. Res.*, 13, 103–9 (1971). An apparently non-toxic naturally occurring acid mucopolysaccharide from a mammalian source has been isolated and purified, which has good lipoprotein lipase activating effects, with little anticoagulant activity and is absorbed through the alkaline portion of the bowel. The polysaccharide has been shown to produce a reduction in serum cholesterol levels in rabbits fed a 2% cholesterol diet. It has been shown to reduce the formation of dietary induced atheroma in the wall of the aorta of rabbits treated with the compound on a 2% cholesterol diet when compared to rabbits on the diet, but not treated with the polysaccharide. The possible application to the prevention and treatment of atherosclerosis in man is discussed.

THE METABOLISM OF INTRAVENOUS (7α-^{3}H)CHOLESTEROL (1-^{14}C) PALMITATE IN MAN. R. S. Rosenfeld, B. Zumoff and L. Hellman (Inst. for Steroid Res., and Dept. of Oncol., Montefiore Hosp. and Med. Cent., New York, N.Y. 10467). *J. Atheroscler. Res.*, 13, 77–83 (1971). Synthetic (7α-^{3}H)cholesterol (1-^{14}C)palmitate was administered intravenously to two subjects in order to study the fate of cholesterol ester injected into the peripheral circulation. By 3 min over 80% of the injected cholesterol palmitate had disappeared from the plasma and by 10 h, the specific activity (^{3}H) of free cholesterol was 3 to 5 times greater than the specific activity of cholesterol from the ester fraction. During this interval, the ^{14}C:^{3}H ratio rapidly declined and then leveled off at about 6% of the initial ratio in the injected cholesterol palmitate. These observations demonstrate the rapid removal of the injected ester followed by hydrolysis and reappearance of the cholesterol moiety in plasma both in free and esterified form. The efficiency of removal and hydrolysis of newly absorbed dietary sterol which enters the circulation largely as cholesterol ester may be of pertinence to the process of atherogenesis.

FATTY ACID COMPOSITION OF LIPIDS FROM BROILERS FED SATURATED AND UNSATURATED FATS. G. A. Schuler and E. O. Essary (Dept. of Food Sci. and Technol., Virginia Polytech. Inst. and State Univ., Blacksburg, Va. 24061). *J. Food Sci.* 36, 431–34 (1971). The fatty acid composition of lipids from broiler-type chicks fed a corn-soybean type of diet from 1 day to 10 wk of age was determined by gas chromatography and compared with that from broilers fed the same diet with either 8% saturated fat (tallow) or 8% unsaturated fat (safflower oil) substituted for an equal weight of corn. Fat was extracted from the raw skin, breast, thigh and abdominal fat at bi-weekly intervals from 4–10 wk of age and from the cooked tissue and the water in which the broilers were cooked at 8 and 10 wk. The fatty acid composition of fatty acids in these tissues was influenced by the degree of unsaturated fatty acids in the diet. Fatty acids from cooked tissues and cooking water contained a large amount of 18-carbon unsaturated fatty acids. Presence of 13- and 25-carbon saturated fatty acids was noted in the skin of 4-wk-old broilers. Further research is needed to substantiate this finding.

DEBITTERING OF SOYBEAN MEAL BY ALCOHOL VAPOR. I. EVALUATION OF THE DEBITTERING EFFECT IN TERMS OF DETERMINING THE ACTIVITIES OF CERTAIN ENZYMES AND IN TERMS OF FROLICH'S TEST. G. Janicek *et al. Sb. Vys. Sk. Chem.-Technol. Praze, Potraviny* **E** 28, 21–7 (1970). Debittering of soybean meal with a mixture of alcohol and water vapors was more rapid than with either alone. The degree of debittering was evaluated both by the urease test of Janicek and by the cresol red test of Frolich. The organoleptic properties of soybean meal debittered by dilute alcohol were equal to those of samples debittered by water. Isopropanol was less active than ethanol, methanol and propanol. For human food, ethanol is required with an optimum concentration of 10% by volume. (Rev. Franc. Corps Gras)

CHANGES OCCURRING DURING WET AND DRY HEAT TREATMENTS. XIV. CHANGES IN THE NUTRITIVE VALUE OF SOYBEAN PROTEIN WITH ADDITION OF CERTAIN SUGARS. G. Janicek *et al. Sb. Vys. Sk. Chem.-Technol. Praze, Potraviny* **E** 28, 47–71 (1970). Various sugars were added at levels of 1–50% by weight of the protein. Samples were heated at temperatures of 140–160C for 30–120 minutes. The most significant decrease in nutritive value of the protein occurred with glucose. Maltose, sucrose and starch were less effective. (Rev. Franc. Corps Gras)

[α-(C_5–C_{17}) ALKYL] BENZYL FATTY ACID AMIDES AS CHOLESTEROL LOWERING AGENTS. Y. Suzuki, Y. Nakamura, T. Fukumaru, N. Hamma, M. Kimura, S. Aono and H. Fukushima (Sumitomo Chem. Co., Ltd., Osaka) *U.S. 3,590,057.* The compounds are composed of an α-alkylbenzylamine containing in the α-position an alkyl group of 5–17 carbon atoms and a monocarboxylic acid, either saturated or unsaturated, having 15–19 carbon atoms. The fatty acid amide is prepared by reacting the acid, a reactive derivative of it, or natural fat with the α-alkylbenzylamine.

PROCESS FOR THE REDUCTION OF AFLATOXIN CONTENT OF OILSEED MEALS BY OZONIZATION. E. T. Rayner, C. T. Dwarakanath, G. E. Mann and F. G. Dollear (U. S. Sec'y of Agr.). *U. S. 3,592,641.* Contaminated cottonseed and peanut meals hydrated to levels of 22% and 30% respectively were contacted with ozone gas in a covered vessel at atmospheric pressure. Substantial lowering of the aflatoxin content was achieved by heating the meal in the vessel to 75–100C for 1–2 hours.

TREATING HULL-ENCLOSED COTYLEDON SEEDS. R. L. Hawley and J. T. Duren (Ralston Purina). *U.S. 3,594,184.* Soybeans are treated to remove objectionable flavors, to remove or alter physiologically objectionable carbohydrates, to change density, to produce a more desirable texture and to produce a full-fat edible product. The process involves controlled dry heating of the whole bean followed by controlled water treatment. Fnally, the beans may be roasted to obtain edible nut-like products or roasted and ground to produce a spread.

TREATING FULL-FAT, HULL-ENCLOSED SOYBEANS. R. L. Hawley and J. T. Duren (Ralston Purina). *U.S. 3,594,185.* The beans treated according to U.S. 3,594,184 may be treated with flavor material, sugars, or oils to obtain different edible nut-like products.

PRODUCING A FULL-FAT FLOUR PRODUCT FROM COTYLEDON SEED MATERIALS. R. L. Hawley and J. T. Duren (Ralston Purina). *U.S. 3,594,186.* The dehulled beans are treated according to *U.S. 3,594,184* and then either dried and ground to a powder or ground, slurried with water and flash dried to a powder.

PREPARATION OF CAROTENOID COMPOUNDS. J. Morel (Rhone-Poulenc S.A.). *U.S. 3,594,432.* Retrodehydro-β-carotene is produced in improved yield by brominating β-carotene with N-bromosuccinimide and then dehydrobrominating the resulting 4-bromo-β-carotene in the presence of an alkali metal iodide.

A COMPARISON OF IN VIVO AND IN VITRO UPTAKE OF ESTRADIOL BY HUMAN BREAST TUMORS AND THE RELATIONSHIP TO STEROID EXCRETION. F. James, V.H.T. James, A.E. Carter and W.T. Irvine (Dept. of Surgery and Chem. Pathol., St. Mary's Hosp. Med. School, London, W.2). *Cancer Res.* 31, 1268–72 (1971).

The uptake of estradiol-^{3}H by human breast tumor tissue has been studied by an in vivo technique in a group of patients with breast cancer. In each patient, both methods were used. A good correlation between the results of the two methods was found, suggesting that both are measures of the same binding phenomenon which is exhibited for estradiol by some but not all breast tumors. No correlation between the uptake of estradiol-^{3}H and the excretion of androsterone and etiocholanolone could be detected.

A REQUIREMENT FOR DIETARY LIPIDS FOR INDUCTION OF CYTOCHROME P-450 BY PHENOBARBITONE IN RAT LIVER MICROSOMAL FRACTION. W.J. Marshall and A.E.M. McLean (Dept. of Ex. Pathol., Univ. College Hosp. Med. School, Univ. St., London WCIE 6JJ, U.K.). *Biochem. J.* 122, 569–73 (1971). Rats fed on purified synthetic diets have a markedly lower cytochrome P-450 concentration and hydroxylating enzyme activity in liver microsomal fraction than rats fed on stock pellets. When both groups are treaded with phenobarbitone the difference is even greater, the purified diet allowing only 50% of the cytochrome P-450 concentrations of controls. Addition of herring oil, linoleic acid or 0.1% oxidized sitosterol to the diets allows induction of cytochrome P-450 to take place. The interactions between dietary protein and the lipid substances are explored. The mechanism of induction of microsomal hydroxylation enzymes by drugs is discussed in the light of these requirements.

A ROLE FOR PHOSPHOLIPIDS IN THE BINDING AND METABOLISM OF DRUGS BY HEPATIC MICROSOMES. T.E. Eling and R.P. DiAugustine (Dept. of Pharmacol., Univ. of Iowa, College of Med., Iowa City, Iowa 52240). *Biochem J.* 123, 539–49 (1971). The pretreatment of rat liver microsomes with phospholipase C or D decreased the N-demethylation of (+)-benzphetamine. The hydroxylation of aniline was essentially unchanged by pretreatment of microsomes with phospholipase C. Some components of the microsomal mixed-function oxidase system were impaired by phospholipases. The fluorescence of 1-anilinonaphthalene-8-sulphonate (ANS) was greatly enhanced by microsomes. Phospholipase C or D markedly decreased ANS-microsome fluorescence. Quantum yield of ANS-microsome fluorescence appeared to be related directly to phospholipid content of microsomes. Most of the drugs studied enhanced ANS-microsome fluorescence Warfarin, however, displaced ANS fluorescence competitively from microsomes. The latter effect was postulated as being due to warfarin competing with ANS for the cationic site on microsomal phosphatidycholine. ANS fluorescence was also increased by the presence of phospholipid micelles. The fluorescence of ANS-phosphatidylcholine micelles was modified by warfarin and (+)-benzphetamine in a manner similar to that observed with microsomes. Warfarin decrease of fluorescence was absent when ANS was bound to phosphatidic acid, which lacks a cationic site. Trypsin pretreatment of microsomes did not modify ANS-microsome fluorescence, including drug-induced changes. It was postulated that phospholipids have a permissive role in the metabolism of most drugs by hepatic microsomes and that the ANS probe might reflect interactions of compounds with microsomal membrane phospholipids.

A SIMPLE METHOD FOR CALCULATING ABSORPTION OF DIETARY CHOLESTEROL IN MAN. H.S. Sodhi, L. Horlick, D.J. Nazir and B.J. Kudchodkar (Dept. of Med., Univ. of Saskatchewan, Saskatoon, Canada). *Proc. Soc. Exp. Biol. Med.* 137, 277–79 (1971). The currently available methods for estimating the absorption of dietary cholestrol are so difficult that only a few studies under rather restricted experimental conditions have been conducted. A very simple approach circumventing these difficulties is based on the determination of two isotopes (^{3}H and ^{14}C) in a single unmeasured "test" sample of feces after feeding a mixture of cholesterol-1-2-^{3}H (5 μCi), β-sitosterol-4-^{14}C (1 μCi) and carmine red (300 mg). The two sterols undergo similar conversions and degradations in the gastrointestinal tract, except for the differences in their absorption. Thus, the fraction of dietary cholesterol which is absorbed in excess of the absorption of β-sitosterol can be calculated merely from the difference in the ^{3}H/^{14}C ratios between the mixture given by mouth and that obtained from the feces. It is important to examine the first sample of feces containing the red color of the carmine red since this "test" sample contains the unabsorbed sterols uncontaminated by radioactivity from the biliary cholesterol and bile acids.

ACTIVATION OF LIPOPROTEIN LIPASE. EVALUATION OF CALCIUM, MAGNESIUM AND AMMONIUM AS COFACTORS. T.F. Whayne and H.M. Felts (Banting & Best Dept. of Med. Res., Univ. of Toronto, Toronto 5, Ontario, Canada). *Circulation Res.* 28, 649–54 (1971). Lipoprotein lipase (LPL) from rat heart acetone powders has been reported to depend on the presence of NH_4^+, calcium, or other divalent cations for optimal activity. In addition, the enzyme will not hydrolyze an artificial triglyceride emulsion unless it is converted to an active substrate by the addition of very low density lipoproteins, high density lipoproteins (HDL) or certain peptides contained in these complexes.

ANALYSIS OF LONG-CHAIN FREE FATTY ACID BINDING TO BOVINE SERUM ALBUMIN BY DETERMINATION OF STEP-WISE EQUILIBRIUM CONSTANTS. A.A. Spector, J.E. Fletcher and J.D. Ashbrook (Dept. of Int. Med and Biochem., Univ. of Iowa, Iowa City, Iowa 52240). *Biochemistry* 10, 3229–33 (1971). The stepwise equilibrium method was employed to analyze the binding of long-chain free fatty acids to bovine albumin. Equilibrium partition incubations were done at 37C in a calcium-free Krebs-Ringer phosphate buffer (pH 7.4). Charcoal-extracted crystalline bovine serum albumin and ^{14}C-labelled fatty acids were used. In general, the 16-carbon atom acids were bound more tightly than either the 14- or the 18-carbon atom acids. With all of the acids, we noted the presence of one very strong albumin binding site having an equilibrium constant in the range of $10^7 M^{-1}$ and two sites with constants in the range of $10^6 M^{-1}$. Five additional sites having constants ranging from 10^5 to $10^4 M^{-1}$ also were detected. In every case the equilibrium constants for binding of the first 4 moles of fatty acid occurred in descending order: K_1 K_2 K_3 K_4. This suggests that appreciable cooperative binding effects were not evident over the range of fatty acid: albumin molar ratios that are usually employed in metabolic studies. From partition data with a protein-free aqueous phase, the extent of aqueous dimerization was estimated for palmitic, stearic and oleic acids. Anion dimerization corrections then were calculated for the corresponding binding data, assuming that only the fatty acid anion monomer interacts with albumin. A reanalysis of these corrected data revealed that little or no change was produced in the magnitude of the first four equilibrium constants. This indicated that anion dimerization has little effect upon the binding parameters when the fatty acid: albumin molar ratio is within the usual physiological range.

BIOHYDROGENATION OF UNSATURATED FATTY ACIDS. VI. SOURCE OF HYDROGEN AND STEREOSPECIFICITY OF REDUCTION. I.S. Rosenfeld and S.B. Tove (Dept. of Biochem., N.C. State Univ., Raleigh, N.C. 27607). *J. Biol. Chem.* 246, 5025–31 (1971). The biohydrogenation of either linoleic acid or *cis*-9,*trans*-11, *cis*-13-octadecatrienoic acid (punicic acid) by *Butyrivibrio fibrisolvens* results in the formation of *trans*-11-octadecenoic acid. Incubation of whole cells with tritiated formate, tritiated succinate, and glucose labeled with tritium in various positions failed to result in the labeling of the monoenoic acid product. In contrast, experiments performed in D_2O indicated that deuterium was incorporated at the *cis* double bond(s) reduced by the microorganism. This reduction, which takes place stereospecifically, was found to occur by *cis* addition to the D side of *cis*-9,*trans*-11-octadecadienoic acid, an intermediate in the biohydrogenation of linoleic acid. The distribution of deuterium at the reduced carbon atoms shows an isotope effect and leads to the speculation that reduction occurs by addition of a proton and hydride ion mediated by an unknown carrier.

CHANGES IN TISSUE GLYCOSAMINOGLYCANS IN RATS FED A HYPERCHOLESTEROLAEMIC DIET. P. Seethanathan and P.A. Kurup (Dept. of Biochem, Univ. of Derala, Trivandrum-1, India). *Atherosclerosis* 14, 65–77 (1971). The changes in tissue glycosaminoglycans and lipids in rats fed a hypercholesterolaemic diet have been studied. Maximum lipid accumulation occurred in the liver, aorta and serum; the lungs and kidney showed moderate increases, while no appreciable increase occurred in other tissues. Glycosaminoglycan concentration is highest in the aorta, cornea and pancreas; is moderate in the retina, serum, brain, kidney, skin and testis, while the other tissues contain only low concentrations. Glycosaminoglycans probably have only a minor role in lipid metabolism in the last group of tissues. However, the ratio of sulphated glycosaminoglycans to hyaluronic acid is normally high in tissues like the aorta, where maximum lipid accumulation occurs, but considerably decreases in hypercholesterolaemic animals. In tissues like the pancreas, brain, etc., where lipid deposition is only minimal, this ratio is normally considerably lower and shows no appreciable change in hypercholesterolaemic animals. It is suggested that the role of glycosaminoglycans in the pathogenesis of atherosclerosis is both to control the

transport of lipoproteins across the arterial wall (by complex formation) and also to stimulate the production of lipoprotein lipase.

CHOLESTEROL ESTERS IN MYELIN ISOLATED FROM CEREBRAL WHITE MATTER OF PATIENTS WITH MULTIPLE SCLEROSIS. Mona E. Fewster, J.F. Mead, F.J. Wolfgram and W.W. Tourtellotte (UCLA School of Med, Los Angeles, Calif. 90024). *Proc. Soc. Exp. Biol. Med.* 133, 795–800 (1970). Cholesterol esters were detected in myelin isolated from normal human white matter, histologically normal multiple sclerosis (ME) white matter and plaques. No differences from normal samples were found for the amount of cholesterol esters in myelin from MS tissue. The distribution patterns of fatty acids in the cholesterol esters were similar for all the samples analyzed.

CORRELATION BETWEEN PLASMA LEVELS OF VITAMIN A AND PROTEINS IN CHILDREN. L.K. Kothari, D.K. Srivastava and R. Sharma (Ravindranath Tagore Med. College, Udaipur, India). *Am. J. Clin. Nutr.* 24, 510–11 (1971). Statistical analysis of the plasma levels of proteins and vitamin A in 40 healthy school children has shown a highly significant positive correlation between vitamin A and albumin. This is in conformity with the role of albumin in the transport of vitamin A and suggests the importance of ensuring an adequate intake of both in malnourished children.

CRYSTALLINE PYRUVATE OXIDASE FROM ESCHERICHIA COLI. II. ACTIVATION BY PHOSPHOLIPIDS. C.C. Cunningham and L.P. Hager (Dept. of Biochem., Univ. of Ill., Urbana, Ill. 61801). *J. Biol. Chem.* 246, 1575–83 (1971). The activity of pyruvate oxidase from *Escherichia coli* increases 15- to 20-fold in the presence of phospholipids extracted from cell membranes. Fractionation and analysis of the phosphatides from *E. coli* cell envelope preparations revealed that lysophosphatidylethanolamine exhibited highest specific activity for stimulating the flavoprotein if the phospholipids were added directly to the assay mixtures. The hydrophobic moieties of lecithin activate pyruvate oxidase whereas the hydrophilic portions of the molecule have no stimulatory effect. The enzyme can also be activated by fatty acids at concentrations only slightly higher than those required for maximal stimulation by micellar phospholipid preparations. Of the fatty acids tested, palmitoleic and oleic appear to be most efficient in stimulating pyruvate oxidase activity.

III. PHOSPHOLIPID AS AN ALLOSTERIC EFFECTOR FOR THE ENZYME. *Ibid.*, 1583–90. Crystalline pyruvate oxidase, a soluble tetrameric flavoprotein from *Escherichia coli*, which binds both thiamine pyrophosphate (TPP) and FAD is activated 15- to 100-fold by phospholipids and long chain fatty acids. Maximal activation of the oxidase requires incubation of the enzyme for at least 6 min with the lipid activator in the presence of substrate and cofactors (pyruvate, TPP and $MgCl_2$). Very little activation occurs if any of these components are omitted from the mixture. Furthermore, activation is markedly reduced if the enzyme is incubated with phospholipid before pyruvate, TPP and $MgCl_2$ are added. Stopped-flow experiments measuring the rate of reduction of enzyme-bound FAD clearly indicate that the presence of lipid activator affects a rate-controlling step leading to the formation of enzyme-$FADH_2$. The rate of reduction of enzyme-bound RAD is increased at least 100-fold in the presence of phospholipid.

DDT ADMINISTERED TO NEONATAL RATS INDUCES PERSISTENT ESTRUS SYNDROME. W.L. Heinrichs and R.J. Gellert (Univ. Washington, School Med., Seattle, Wash. 98195). *Science* 173, 642–43 (1971). The o,p'-isomer of the insecticide DDT when injected into neonatal female rats significantly advanced puberty, induced persistent vaginal estrus after a period of normal extrous cycles, and caused the ovaries to develop follicular cysts and a reduced number of corpora lutea. The uterotropic response to administered estradiol was reduced, and the female pattern of mating behavior was slightly disturbed. Residues of DDT in ovarian, brain, and adipose tissues of the adult animals were the same in both treated and control groups.

EFFECT OF CARNITINE ON FATTY ACID SYNTHESIS IN PERFUSED RAT HEART. S.L. Rodis, P.H. D'Amato, E. Koch and G.V. Vahouney (Dept. Biochem., School Med., George Washington Univ., Washington, D.C. 20005). *Proc. Soc. Exp. Biol. Med.* 133. 1070–75 (1970). The effect of carnitine on fatty acid synthesis in myocardium has been studied with isolated perfused rat hearts. Circulating carnitine (0.5 mM or 5 mM) depressed acetate (5 mM) incorporation into heart lipids in perfused heart preparations, and this effect was due primarily to reduced incorporation into tissue fatty acids and triglycerides. There was also stimulation of acetate oxidation to $^{14}CO_2$ by the higher level of perfusing carnitine. Carnitine significantly depressed pyruvate (5 mM) uptake by perfused rat heart but had no effect on oxidation of pyruvate to $^{14}CO_2$, nor on incorporation of pyruvate into heart lipids. With 105,000 *g* supernatant fraction of heart, fatty acid synthesis from acetate was markedly depressed in the presence of carnitine, while with liver supernatant fraction there was a 40% stimulation of fatty acid synthesis by carnitine. These changes were again reflected primarily in the unesterified fatty acid fraction in each tissue.

EFFECT OF CHLOROPHENOXYISOBUTYRATE ON FREE FATTY ACID UTILIZATION BY MAMMALIAN CELLS. A.A. Spector and Janice M. Soboroff (Dept. of Internal Med. Biochem., Clin. Res. Center, Univ. of Iowa, Iowa City, Iowa 52240). *Proc. Soc. Exp. Biol. Med.* 137, 945–47 (1971). The Ehrlich ascites cell system was employed as an experimental model to investigate the effects of CPIB on FFA utilization. Addition of CPIB to the incubation medium increased FFA uptake by the cells. Incorporation of FFA into cell lipid esters also was greater when CPIB was present. We suggest that the CPIB-induced enhancement in FFA utilization may result from displacement of some FFA to weaker albumin binding sites, thereby making the FFA more available to the cells.

EFFECT OF IRON ON LIPID METABOLISM OF TETRAHYMENA PYRIFORMIS. Y.M. Peng and C.E. Elson (Dept. of Nutr. Sci., Univ. of Wis., Madison, Wis. 53706). *J. Nutr.* 101, 1177–84 (1971). Increased synthesis of phosphonic analogues of phospholipids was observed in *T. pyriformis* grown in media supplemented with iron. These compounds imparted resistance to phospholipase C hydrolysis. Iron supplementation also increased microsomal Δ-6-desaturase activity resulting in synthesis of a Δ-6,9 isomer of linoleic acid. These findings are discussed in relation to the increased glyconeogenic capacity of iron-grown *Tetrahymena*.

EFFECT OF LIPIDS ON GROWTH HORMONE SYNTHESIS BY ISOLATED PITUITARIES (35720). L.M. Taylor and W.G. Blackard (Dept. of Biochem., and Med., La. State Univ. School of Med., 1542 Tulane Ave., New Orleans, La. 70112). *Proc. Soc. Exp. Biol. Med.* 137, 1026–28 (1971). The effect of octanoate and palmitate on growth hormone synthesis by isolated rat pituitaries was studied. Octanoate had an impressive inhibitory effect on the incorporation of leucine-^{14}C into pituitary growth hormone. The more physiological fatty acid, palmitate, had no effect on incorporation of leucine-^{14}C into pituitary growth hormone. This latter finding suggests that the in vivo inhibitory effect of lipids on growth hormone secretion can not be explained by a direct inhibitory effect on pituitary growth hormone synthesis.

EFFECT ON MAN'S SERUM LIPIDS OF TWO PROTEINS WITH DIFFERENT AMINO ACID COMPOSITION. J.T. Anderson, F. Grande, and A. Keys (Lab. of Physiological Hygiene, Univ. of Minn., Minneapolis, Minn. 55455). *Am. J. Clin. Nutr.* 24, 524–30 (1971). After a period on a controlled customary American diet, 11 students were fed, in reversal design, two diets differing only in the nature of 60 g daily of protein (half the total protein intake). The two proteins used were wheat gluten and egg white. As compared with egg white, gluten is lower in aspartic acid, lysine, methionine and alanine but much higher in glutamic acid and proline. Fasting serum lipid levels were measured in the last 4 days of each 28-day dietary period. Neither the cholesterol nor the triglyceride difference between the two dietary situations was significant. Serum phospholipids were higher by 7 mg/dl ($P = 0.012$) when the men were eating the gluten diet. As the gluten diet contained about 20 g more glutamic acid daily, these results are at variance with reports describing a hypocholesteremic effect of glutamic acid when added to a diet containing a mixture of essential amino acids in place of natural proteins. The evidence at hand indicates that changes in the protein of the diet are of no particular value in designing diets for the reduction of serum cholesterol.

EVIDENCE FOR THE PRESENCE OF A POOL OF GLYCERIDES WITH A RAPID RATE OF TURNOVER IN BROWN FAT FROM NEWBORN RABBITS. B.L. Knight (Med. Res. Council Lipid Metabolism Unit, Hammersmith Hosp., London W12 OHS, U.K.). *Biochem. J.* 123, 485–91 (1971). The specific radioactivity of (^{14}C)

glycerol released during the incubation of brown fat with (^{14}C) glucose is much greater than that of the tissue lipid glycerol. From a study of the release of (^{14}C) glycerol from pre-labelled brown fat, it is concluded that the tissue contains a pool of glycerides with a higher rate of turnover than those in the main lipid store. This pool contains newly synthesized glycerides, has a half-life of 25–30 min and supplies about 25% of the glycerol liberated by brown fat. Thus, a significant fraction of the total ^{14}C incorporated from glucose into brown-fat lipids is released as (^{14}C) glycerol during an incubation.

EXCHANGE OF STEROLS BETWEEN MYELIN AND OTHER MEMBRANES OF DEVELOPING RAT BRAIN. N.L. Banik and A.N. Davison (Dept. of Biochem., Charing Cross Hosp. Med. School, London WC2N 4HH, U.K.). *Biochem. J.* 122, 751–58 (1971). The effect of inhibition of cholesterol synthesis by a hypocholesterolaemic drug (AY-9944) was studied in rat brain during development. At 2 weeks after administration of AY-9944 to young rats 7-dehydrocholesterol accounted for half the total sterol of myelin and other subcellular components. At 4 weeks after injection of the drug 7-dehydrocholesterol had disappeared whereas the cholesterol content of myelin had increased by an equivalent amount. Our studies show that purified myelin has low 7-dehydrocholesterol reductase activity and suggest that 7-dehydrocholesterol is largely converted into cholesterol outside the myelin sheath. Resultant cholesterol may be re-incorporated into myelin by an exchange process. The metabolism of sterols in developing brain is discussed.

FATTY ACID PROFILES OF VARIOUS LIPIDS IN THE CEREBROSPINAL FLUID. M. Goto and J.J. Spitzer (Dept. of Phys. and Biophys., Hahnemenn Med. College and Hosp., Phil., Pa. 19102). *Proc. Soc. Exp. Biol. Med.* 136, 1294–96 (1971). Fatty acid concentration and composition of various lipids were studied in the CSF and in the plasma of control dogs. The average concentration of FFA, TGFA and PLFA and CEFA in the CSF were 5.5%, 1.3%, 0.5% and 0.6% of the respective fatty acid fractions of the plasma. The concentration of FFA in the CSF was higher than that of other lipids. CSF lipids contained a higher percentage of saturated fatty acids than did plasma lipids, mostly due to a higher fraction of palmitic and a lower fraction of oleic and linoleic acids.

GLUCOSE TRANSPORT IN FAT CELL MEMBRANES. G. Illiano and P. Cuatrecasas (Lab. Chem. Biology, Natl. Inst. of Arthritis and Metabolic Diseases, Natl. Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 246, 2472–80 (1971). The properties of D-glucose transport by isolated fat cell membrane preparations have been studied by measuring directly the rates of sugar accumulation and efflux. The rate of D-glucose accummulation is a temperature-dependent process. In contrast to L-glucose accumulation, D-glucose transport rapidly reaches a steady state, displays saturation kinetics with respect to substrate, is inhibited by 3-O-methyl glucose but not by L-glucose, is markedly suppressed by low concentrations of phloretin, and is enhanced by insulin. The transport process is not coupled to energy-producing metabolic processes, and no accumulation occurs against a chemical gradient.

HYPOCHOLESTEROLEMIC EFFECT OF RIFAMPIN IN THE MONKEY (M. FASICULARIA). S.D. Warner and M.F. Stephenson (Dept. of Pathol. and Toxicol., Human Health Res., and Dev. Lab, Dow Chem. Co., Zionsville, Ind. 46077). *Proc. Soc. Exp. Biol. Med.* 137, 194–5 (1971). The oral administration of rifampin to cynomolgus monkeys at dosage levels of 40, 80 and 110–120 mg/kg for 180 consecutive days resulted in marked lowering of serum cholesterol levels. Choleretic activity or complexing with bile acids by rifampin may be a mechanism for the observed hypocholesterolemic effect.

IDENTIFICATION OF CHOLESTEROL DIGITONIDE IN THE AORTIC MEDIA OF EXPERIMENTAL RABBITS. A. Trillo (National Inst. of Cardiology, Mexico City, Mexico). *Atherosclerosis* 14, 13–16 (1971). Aortic tissues from cholesterol-fed rabbits were fixed in glutaraldehyde fixative containing digitonin resulting in the formation of a cholesterol digitonide compound. Osmiophilic spicules 600 to 800 Å in diameter identified as cholesterol digitonide were found in the inner half of the aortae, in the intercellular spaces and within smooth muscle cells.

INCORPORATION OF INTRAVENOUSLY INJECTED ACETATE-2-^{14}C INTO TISSUE LIPIDS OF HYPOTHERMIC HAMSTERS. C. Entenman, P. Ackerman and X.J. Musacchia (Inst. Lipid Res., Berkeley, Calif. 94702). *Proc. Soc. Exp. Biol. Med.* 136, 47–51 (1971). The in vivo synthesis of lipids from acetate-2-^{14}C is drastically reduced in hamster tissue at 7C vs. 37C body temperature. The most active tissues at the 7C temperature are the brain, liver, kidney and small intestine, on the basis of amount of ^{14}C activity found in those tissues per gram of tissue. In these tissues, a gradual increase in lipid-^{14}C occurs at a body temperature of 7C following acetate-2-^{14}C injection. At a 7C body temperature a smaller percentage of small intestine phospholipids were synthesized from acetate-2-^{14}C, with a corresponding increase in the percentage of total ^{14}C activity found as neutral lipid-^{14}C. Of the neutral lipids in the small intestines, the greatest percentages of ^{14}C activity appeared in the free fatty acids and diglycerides. There was no discernible change in percentage of carcass fat either between the hypothermic and normothermic hamsters, or among the hypothermic hamsters over the 18 hr. time period studied.

IN VIVO CHOLESTEROL AND FATTY ACID SNYTHESIS IN THE PIG INTESTINE. D.R. Romos, G.L. Allee and G.A. Leveille (Dept. Animal Sci., Lab Nutr. Biochem., Univ. Ill. at Urbana-Champ., Urbana, Ill. 61801). *Proc. Soc. Exp. Biol. Med.* 137, 570–73 (1971). The results of these studies show that in the pig the intestine contributes only about 4% to cholesterol synthesis from acetate-1-^{14}C while liver and adipose tissue contribute 67 and 29%, respectively. Each of the proximal three segments of the intestine contributed more to cholesterol synthesis than did the distal segment. Fatty acids were synthesized primarily in the adipose tissue of the pig when pyruvate-3-^{14}C was the substrate while the intestine and liver together contributed only about 9% to overall fatty acid synthesis. Fatty acid synthesis from acetate-1-^{14}C in pig intestine was of minor importance when compared with liver or adipose tissue fatty acid synthesis.

INFLUENCE OF 4,4-(ISOPROPYLIDENEDITHIO) BIS (2,6-DI-T-BUTYLPHENOL) (DH-581) ON EXPERIMENTAL ATHEROSCLEROSIS IN RABBITS. D. Kritchevsky, H.K. Kim and Shirley A. Tepper (Wistar Inst. of Anat. and Biol., Phil., Pa. 19104). *Proc. Soc. Exp. Biol. Med.* 136, 1216–21 (1971). The influence of orally administered 4,4-(isopropylidenedithio) bis (2,6-di-t-butylphenol) (DH581) on the development of cholesterol-induced atherosclerosis in rabbits has been investigated. When fed at a level of 0.3% to rabbits who are also being given a diet augmented with 2% cholesterol and 6% corn oil, DH-581 does not affect the course of the cholesterol-induced atherosclerosis. At this dietary level, however, DH-581 did cause reductions in liver triglycerides. When administered at a level of 1% of the atherogenic diet, DH-581 significantly lowers the severity of atheromata in the arch ($p = 0.05$) and thoracic aortha ($p = 0.01$) of rabbits. These rabbits also showed consistently lower serum cholesterol and liver cholesterol and triglyceride levels. Serum triglyceride levels were variable.

LOCATION OF LINDANE, DIELDRIN AND DDT COMPOUNDS IN EGGS. Mary E. Zabik and L. Dugan, Jr. (Dept. of Food Sci and Human Nutr., Michigan State Univ., East Lansing, Mich. 48823). *J. Agr. Food Chem.* 19, 904–9 (1971). Three groups of eggs from successive 1-week time intervals were collected from hens fed rations contaminated with 25-ppm lindane, dieldrin and DDT; the albumen was separated and the yolk fractionated into lipovitellin, lipovitellenin, livetin and phosvitin fractions. Lipovitellenin with 80–89% total lipid contained 80–85% of the lindane, dieldrin and DDT compounds, while lipovitellin (25% lipid) contained approximately 10%. When the amount of lipid in each fraction was compensated for, no significant differences occurred among pesticide residue levels of the egg yolk fractions, even though lipovitellin possessed the highest level of contamination on this basis.

PH AND IONIC STRENGTH DEPENDENT AGGREGATION OF SERUM LOW-DENSITY LIPOPROTEINS. J. Mauldin and W.R. Fisher (Depts. of Med. and Biochem., Univ. of Florida, Gainesville, Fla. 32601). *Biochemistry* 9, 2015–20 (1971). Normal serum low-density lipoproteins, density 1.02–1.06 g/cm^3, undergo a reversible ionic strength pH-dependent aggregation as visualized in the analytical ultracentrifuge. Monodisperse low-density lipoprotein preparations of high salt concentration undergo a transition yielding multiple discrete components when the solution pH is decreased from neutrality to the range of 4.5-5.5. Below pH 4.5 visible precipitation of low-density lipoproteins occurs except in very dilute salt solutions. In the pH range of 4.5-5.5 the transition from a single to a multicomponent state is promoted by increasing ionic strength and occurs in solutions of KBr, NaCl and NaBr, and this aggregation is further enhanced by increasing low-density

lipoprotein concentration. These observations emphasize the need for control of pH and ionic strength in studying solutions of low-density lipoproteins.

PHOSPHATIDYLSERINE: SELECTIVE ENHANCER OF HISTAMINE RELEASE. A. Goth, H.R. Adams and Mary Knoohuizen (Dept. of Pharmacol., Univ. of Texas, Southwestern Med. School at Dallas, Dallas 75235). *Science* 173, 1034–5 (1971). Phosphatidylserine, in contrast with other phospholipids, markedly enhanced histamine release from rat peritoneal mast cells induced by dextran or protein antigens. This enhancing effect was selective for dextran and protein antigens and did not extend to the action of compound 48/80 or chymotrypsin. These findings suggest a role for phosphatidylserine in the response of mast cells to antigens.

PLASMA PRE-BETA LIPOPROTEIN IN HEALTHY ADULTS. M. Horder, H. Toft, N.C. Christensen and E.E. Simonsen (Odense Hosp, Univ. of Odense, Odense (Denmark)). *Atherosclerosis* 14, 31–37 (1971). Lipoprotein electrophoresis on paper was performed on plasma from 132 fasting healthy individuals in order to determine the frequency of pre-beta lipoprotein. In 31% a pre-beta lipoprotein zone was seen on the electrophoresis strips. By far the highest frequency was found in males aged between 40 and 70, and the frequency was as high as 60% in males aged 50 to 59. There was a positive correlation between serum triglyceride values and the occurrence of pre-beta lipoprotein. A pre-beta lipoprotein zone with a higher rate of mobility than that normally found was seen in a few cases.

PRECIPITATION OF ^{125}I-LABELED LIPOPROTEINS WITH SPECIFIC POLYPEPTIDE ANTISERA. J.J. Albers and F. Aladjem (Dept. Microbiol., Univ. Southern Cal., School of Med., Los Angeles, Cal. 90033). *Biochemistry* 10, 3436–42 (1971). R-Thr and R-Gln polypeptides in high density lipoproteins HDL2 and HDL3, very high density lipoproteins (VHDL) and very high density lipoproteins generated from HDL2 and HDL3 (GVHDL) were quantitatively precipitated by polypeptide specific anti-R-Thr and anti-R-Gln antisera. The results of quantitative precipitation of labeled HDL2 and HDL3 were as follows: 93–97% of the radioactivity was precipitated by (a) anti-HDL2 or anti-HDL3 followed by anti-γ-globulin, (b) anti-R-Thr followed by anti-γ-globulin, or (c) anti-R-Gln followed by anti-R-Thr followed by anti-γ-globulin; only 84–90% of the radioactivity was precipitated by anti-R-Gln followed by anti-γ-globulin. Anti-R-Thr precipitated 95 97% of the radioactivity of ^{125}I-labeled GVHDL, whereas anti-R-Gln precipitated less than 3%. Upon immunoelectrophoresis, HDL2 gave a single zone of precipitation with both anti-R-Thr and anti-R-Gln. HDL3 gave two zones of precipitation with anti-R-Thr but gave only one zone with anti-R-Gln. VHDL and GVHDL gave only a single zone of precipitation with anti-R-Thr and no reaction with anti-R-Gln. We conclude: (1) HDL2 and HDL3 are composed of two populations: one, approximately 90%, which contains both R-Gln and R-Thr and the other, approximately 10%, which does not contain R-Gln but does contain R-Thr, and (2) VHDL and GVHDL contain R-Thr but do not contain R-Gln.

PURIFICATION AND PROPERTIES OF A BOVINE MILK LIPASE. R.L. Richter and H.E. Randolph (Dept. of Animal Sci, Texas A&M Univ., College Station, Texas 77843). *J. Dairy Sci.* 54, 1275 82 (1971). A low molecular weight lipase was isolated from clarifier slime. It was precipitated from a water extract of an acetone powder prepared from clarifier slime at 20 to 45% of saturation with $(NH_4)_2SO_4$ and was purified by ultrafiltration. Final isolation was with Sephadex G-75. Estimated molecular weight was 8,500 for the enzyme which contained 7.6% carbohydrate. The enzyme exhibited maximum activity at pH 9 2 and 37C. It hydrolyzed a simple short-chain fatty acid triglyceride faster than long-chain fatty acid triglycerides, but had little specificity for natural oil emulsions. Enzymes activity rapidly decreased at 37C and only 16% of the original activity existed after 5 hr. Storage for 48 hours at 23 and at 4C decreased lipase activity 75 and 23% with complete inactivation after 1 hour at 45C.

STUDIES ON PHOSPHATIDYLCHOLINE VESICLES. DETERMINATION OF PARTIAL SPECIFIC VOLUMES BY SEDIMENTATION VELOCITY METHOD. C. Huang and J P. Charlton (Dept. of Biochem, Univ. of Va. School of Med., Charlottesville, Va. 22901). *J. Biol. Chem.* 246, 2555–61 (1971). The partial specific volume of phospholipid vesicles was determined by the sedimentation velocity method in various concentrations of hydrogen and deuterium oxide mixture. Since the density of D_2O is very much greater than the reciprocal of the specific volume of phospholipids, the density of D_2O-H_2O medium corresponding to zero redistribution of phospholipids during sedimentation can be obtained with high precision by interpolation of the data. This method is therefore direct and accurate for phospholipids. Similar measurements on phospholipid vesicles in various concentrations of potassium chloride and sodium chloride solutions have also been made. The apparent isodensity point in the KCl solution was found to be approximately equal to that obtained in NaCl solution but smaller than that obtained in D_2-H_2O medium. This difference can be attributed to the influence of preferential interaction of the vesicle with water. The partial specific volume and effective specific volumes of phosphatidylcholine vesicles are $\bar{v} = 0.9814 \pm 0.0004$ ml per g, ϕ'KCl $= 0.9883 \pm 0.0002$, and ϕ'NaCl $= 0.9886 \pm 0.0006$ ml per g.

TEMPORAL SYNERGISM OF PROLACTIN AND ADRENAL STEROIDS IN THE REGULATION OF FAT STORES. A.H. Meier, T.N. Trobed, M.M. Joseph and T.M. John (Dept. of Zoo. and Physiol., La. State Univ., Baton Rouge, La. 70803). *Proc. Soc. Exp. Biol. Med.* 137, 408–15 (1971). Daily variations in fattening responses to prolactin may be phased or driven by injections of adrenal steroids in a fish (*Fundulus grandis*), a lizard (*Anolis carolinensis*), and a pigeon (*Columba livia*). Daily injections of prolactin about 24 hr. after injections of adrenocortical hormones favor the accumulation of fat stores; whereas daily injections of prolactin 6 hr. after the adrenal steroids cause losses in fat. An experiment on the fish indicated that the rhythm of fat responsiveness to prolactin is capable of self-sustaining circadian oscillations on continuous light following initial synchronization by exogenous hydrocortisone. An experiment on the pigeon indicated that a daily rhythm of cropsac sensitivity to prolactin may also be driven by daily injections of corticosterone, but the temporal pattern of the adrenal steroid and prolactin that favors cropsac proliferation is not in the same phase relations with those that favor accumulation of body fat, liver fat and increases in intestinal weight. It is concluded that a temporal synergism of prolactin and the adrenal steroids is an important organizational unit in the vertebrate system.

THE DIGLYCERIDE KINASE OF RAT CEREBRAL CORTEX. E.G. Lapetina and J.N. Hawthorne (Dept. of Biochem., Univ. of Birmingham, Birmingham B15 2TT, U.K.). *Biochem. J.* 122, 171–79 (1971). Formation of phosphatidic acid by diglyceride kinase (EC 2.7.1-) in the presence of ATP and Mg^{2+} was shown in a homogenate and subcellular fractions of rat cerebral cortex. The kinase was activated by Mg^{2+}. Ca^{2+} activated to a smaller extent but was inhibitory in the presence of optimum concentration of Mg^{2+}. Activity was greatly increased in the presence of added 1,2-diglyceride. Sodium deoxycholate markedly stimulated the reaction, but other detergents (Cutscum and Triton X-100) did not. Diglyceride kinase was concentrated in the supernatant and microsomal fractions from rat cerebral cortex. The distribution of the kinase in the particulate fractions resembled that of acetylcholinesterase and 5′-nucleotidase. The rate of phosphatidic acid synthesis by the diglyceride kinase route was much greater than reported rates for acylation of 3-glycerophosphate and was also very rapid in comparison with the rates of other steps in the synthesis of phosphoinositides. Acetylcholine had no stimulatory effect on diglyceride kinase of isolated intact nerve-ending particles or of nerve-ending membranes obtained after osmotic shock.

THE EFFECT OF ESTRADIOL-17B AND VEGETABLE OIL ON THE HYDROXYLATION OF PROTOCOLLAGEN. T. Liu, Helen G. Oien and E.L R. Stokstad (Dept. Nutr. Sci., Univ. Calif., Berkeley, Calif. 94720). *Proc. Soc. Exp. Biol. Med.* 137, 207–10 (1971). Estradiol-17B dissolved in sesame oil increased the activity of proline hydroxylase as measured by the release of tritium from protocollagen containing tritiated proline. Sesame seed oil alone was responsible for the major part of this effect. The increases produced by the addition of estradiol to sesame seed oil were marginally significant. Studies with constituents of sesame seed oil showed that unsaturated fatty acids, such as oleic, palmitoleic and linoleic acids, were active. Myristic acid was inactive.

THE PHOSPHOLIPID-DEPENDENCE OF URIDINE DIPHOSPHATE GLUCURONYLTRANSFERASE. D. Attwood, A.B. Graham and G.C. Wood (Dept. of Pharmaceutical Chem., Strathclyde U., Glasgow C 1, U.K.). *Biochem. J.* 123, 875–82 (1971). Specific degradation of the phospholipid membrane of guinea pig liver

microsomal fraction with phospholipase A inactivated glucuronyltransferase. The inactivation was reversed by phosphatidylcholine and mixed microsomal phospholipid micelles at concentrations similar to those present in intact microsomal preparations. The other commonly occurring phospholipids did not reactivate phospholipase A-treated enzyme. Since the mixed microsomal phospholipids consisted mainly of phosphatidylcholine, it is concluded that the reactivation by phospholipids is phosphatidylcholine-specific. Reactivation was also achieved by low concentrations of the cationic detergents cetylpyridinium chloride and cetyltrimethylammonium bromide. Higher concentrations of these detergents inactivated the glucuronyltransferase activity of intact and phospholipase A-treated microsomal fractions, whereas non-ionic detergents had little effect on the activity of either preparation. Measurements of the zeta-potentials of the micellar species used in this study showed that no obvious relationship existed between the zeta-potentials and the ability to reactivate glucuronyltransferase. However, high positive or negative zeta-potentials were correlated with the ability of the amphipathic compound to inactivate glucuronyltransferase.

THE ROLE OF THE PLASMA MEMBRANE IN FATTY ACID UPTAKE BY RAT LIVER PARENCHYMAL CELLS. J.D. Wright and C. Green (Dept. of Biochem., Univ. of Liverpool, PO Box 147, Liverpool L69 3BX, U.K.). *Biochem. J.* 123, 837–44 (1971). Suspensions of isolated rat liver parenchymal cells incorporate (^{14}C)palmitic acid into glycerides at about 40% of the rate obtained with liver slices. At short time intervals most of the incorporation is into phosphatidylcholine and this is recovered mainly in the plasma-membrane fraction. At later times (5 min to 2 hr) the (^{14}C)palmitic acid is mainly found in triglyceride, but this is not recovered in the plasma-membrane fraction. Addition of lysophosphatidylcholine increases incorporation of palmitic acid into both phosphatidylcholine and triglyceride, with maximum effect at about 0.1 mM. In vivo, 1 min after injection of (^{14}C)palmitic acid, radioactive phosphatidylcholine is concentrated in the plasma-membrane fraction, but this proportion present in the fraction declines rapidly. The phosphatidylcholine of the plasma-membrane fraction has, at 1 min after injection, a specific radioactivity 30-fold greater than that of the whole tissue. This phosphatidylcholine reaches its maximum specific radioactivity before the tissue phosphatidic acid or diglyceride. The phosphatidylcholine of the plasma-membrane fraction has a very rapid turnover. It is proposed that the rapid formation of phospholipids in the plasma membrane is by acylation of their lysoderivatives and the role of this process in fatty acid uptake is discussed.

THE TURNOVER OF MYELIN PHOSPHOLIPIDS IN THE ADULT AND DEVELOPING RAT BRAIN. F.B. Jungwala and R.M.C. Dawson (Dept. of Biochem., Agr. Res. Council Inst. Animal Physiol, Cambridge, U.K.). *Biochem. J.* 123, 683–93 (1971). Inorganic (^{32}P)phosphate, (U-^{14}C)glycerol and (2-^{14}C)ethanolamine were injected into the lateral ventricles in the brains of adult rats, and the labelling of individual phospholipids was followed over 2–4 months in both a microsomal and a highly purified myelin fraction. All the phospholipids in myelin became appreciably labelled, although initially the specific radioactivities of the microsomal phospholipids were somewhat higher. Eventually the specific radioactivities in microsomal and myelin phospholipids fell rapidly at a rate corresponding to the decline of radioactivity in the acid-soluble pools. Equivalent experiments carried out in developing rats with (^{32}P)phosphate administered at the start of myelination showed some persistence of phospholipid labelling in the myelin, but this could partly be attributed to the greater retention of ^{32}P in the acid-soluble phosphorus pool and recycling. It is concluded that a substantial part of the phospholipid molecules in adult myelin membranes is readily exchangeable, although a small pool of slowly exchangeable material also exists. A slow incorporation into or loss of labelled precursor from myelin phospholipids does not necessarily give a good indication of the rate of renewal of the molecules in the membrane. As presumably such labelled molecules originate by exchange with those in another membrane site (not necessarily where synthesis occurs) it is only possible to calculate the turnover rate in the myelin membrane if the behavior of the specific radioactivity with time of the phospholipid molecules in the immediate precursor pool is known.

VARIATION OF FAT DISTRIBUTION IN PECTORAL MUSCLES OF CHICKENS WITH HEREDITARY MUSCULAR DYSTROPHY. D.J. Mitchell and L.M. Julian (Dept. of Anat., School of Vet. Med., Univ. of Calif., Davis, Calif. 95616). *Proc. Soc. Exp. Biol. Med.* 137, 68–70 (1971). The accumulation of lipids in pectoral muscles of New Hampshire chickens with muscular dystrophy occurred in a centralized zone through the long axis of the muscle. The concentration of fat decreased toward the periphery of the muscle. The fat distribution pattern remained constant in birds 16 to 60 weeks of age, and did not conform to vascular or neurologic patterns in the pectoralis. Fat infiltration appears to be an index of muscle fiber destruction.

ISOLATION AND CHARACTERIZATION OF C-4 METHYL INTERMEDIATES IN CHOLESTEROL BIOSYNTHESIS AFTER TREATMENT OF RAT LIVER IN VITRO WITH CHOLESTAN-3β,5α,6β-TRIOL. T.J. Scallen, A.K. Dhar and E.D. Loughran (Dept. of Biochem. School of Med., Univ. of New Mex., Albuquerque, New Mex. 87106). *J. Biol. Chem.* 246, 3168–3174 (1971). We have studied the effect in vitro of cholestan-3β,5α,6β-triol upon the conversion of tritium-labeled mavalonic acid to cholesterol. An in vitro system is described which is capable of net sterol synthesis in milligram quantities. Thus it is possible to characterize accumulating intermediates by modern physical techniques such as infrared, ultraviolet, nuclear magnetic resonance and mass spectrometry. By using these techniques two sterols were isolated and characterized for the first time: 4,e-dimethyl-$\Delta^{8(9)}$-cholesten-3β-ol and 4β-methyl-$\Delta^{8(9)}$-cholesten-3-one. Our results are consistent with the hypothesis that the polar substituents of cholestanotriol at C-5 and C-6 are responsible for the ability of this compound to interfere with the enzymatic demethylation of C-4 methyl precursors in cholesterol biosynthesis.

• Drying Oils and Paints

CHEMICAL STUDY OF RUBBER LINSEED OIL VEHICLE. S. N. Behere and D. Dosi (Laxminarayan Inst. of Technol., Nagpur Univ., Nagpur). *Paintindia* 21(3), 12–16 (1971). In this study, rubber, both raw and prevulcanized, in various combinations with linseed oil and containing adequate amounts of dryers was analyzed in order to elucidate the chemical reaction occurring between rubber and fatty acid molecules. It was concluded that a certain percentage of the rubber, particularly the smaller units, chemically combined with the unsaturated fatty acids.

TRIGLYCERIDE COMPOSITION CONTAINING TITANIUM DIOXIDE. C. Quesada (SCM Corp.). *U.S. 3,592,940.* Fatty compositions containing (1) a lipid suitable for application to tissues of homeothermal animals, (2) at least one partial ester of a polyol, and (3) finely divided TiO_2 are described. These compositions can be used to increase the opacity of products into which they are incorporated. They have the further advantage of forming stable aqueous emulsions.

SELECTIVE ADSORPTION OF N-FATTY ACIDS AT THE SILICA/BENZENE AND SILICA/N-HEXANE INTERFACE. I—ADSORPTION ISOTHERMS. II—HEATS OF ADSORPTION. C.G. Armistead, A.J. Tyler and J.A. Hockey. *Trans. Far. Soc.* 67, No. 578 Pt 2, 493–505 (1971). Selective adsorption isotherms for *n*-C_6, C_8, C_{12}, C_{14} and C_{16} fatty acids on silica were determined. With the exception of the C_6 and C_8 acids the adsorption isotherms from benzene solutions were independent of chain length. From *n*-hexane, increasing the length of the chain decreased the surface coverage at a fixed solution concentration. Calorimetric measurements showed that the molar heats of adsorption were independent of the surface coverage and the hydrocarbon chain length. (World Surface Coatings Abs. No. 349)

DEHYDRATION OF CASTOR OIL BY TRIMELLITIC ANHYDRIDE. N.A. Ghanem and F.F. Abd El-Mohsen. *Farbe u. Lack* 77, No. 2, 117–25 (1971). The dehydration of castor oil was studied at 270C using various concentrations of trimellitic anhydride (TMA). Samples were examined at the beginning, during and at the end of the dehydration process before and after further heating under vacuum. Esterification takes place as soon as the oil and TMA are mixed at the above temperature; the acidity of the mixture decreases further and then increases as the reaction proceeds. Part of the catalyst combines with the oil while the rest is only partially removed on application of vacuum. The chemical and physical constants of the product correspond quite well with the standard specifications of D.C.O, notwithstanding the presence of TMA which is not objectionable as the material is intended for incorporation in water-soluble oil-modified alkyds. I.R. spectroscopy revealed the disappearance and then the re-establishment of the anhydride group. The combined data provided sufficient

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• *Abstracts* . . .

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grounds for proposing a reaction mechanism. (World Surface Coatings Abs. No. 349)

THERMOSETTING ACRYLIC COPOLYMERS OF MALAWI TUNG OIL. H.W. Chatfield. *Paint, Oil Col. J.* 159, No. 3768, 144 (1971). Copolymers of Malawi tung oil with, respectively, methacrylic acid, methacrylic acid/methyl acrylate and hydroxylated acrylates, and their applications in thermosetting coatings, are briefly described. (World Surface Coatings Abs. No. 348)

IDENTIFICATION OF PAINT RESINS AND OTHER POLYMERIC MATERIALS FROM THE INFRARED SPECTRA OF THEIR PYROLYSIS PRODUCTS. K.W. Smalldon. *J. Forens. Sci. Soc.* 9, No. 3/4, 135–40 (1969). In the method proposed, 1–5 mg. of the substance is pyrolysed in a glass ignition tube and the condensate is transferred to a halide disc for I.R. examination. Bands suitable for identification purposes are given for drying oil, alkyd, acrylic, vinyl, cellulose, epoxy, thermosetting and nylon resins, as well as for rubber compounds and for hydrocarbon and fluorocarbon polymers. Some examples are discussed. (World Surface Coatings Abs. No. 348)

• Detergents

INFLUENCE OF EMULSIFIER TYPE AND SOLUBILITY ON THE STABILITY OF MILK FAT-WATER EMULSIONS. J.B. Mickle, W. Smith, J. M. Tietz, T. C. Titus and M. Johnston (Dept. of Animal Sciences and Ind., Okla. State Univ., Stillwater, Okla.). *J. Food Sci.* 36, 423–25 (1971). The purpose was to measure the change in emulsion stability caused by different chemical types of emulsifiers in relation to the change caused by emulsifier HLB. Seven emulsifiers used as 12 different binary mixtures were evaluated in model systems containing 10, 25 and 40% fat in water. Each emulsifier mixture was used at HLB numbers of 7, 10 and 13. The effect of chemical type on emulsion stability was minor in relation to the large changes caused by the fat percentage in the model system and the HLB of the emulsifier. A method was developed, using gas-liqud chromatography, to measure the HLB numbers of the emulsifiers used in this work. With these measurements it was learned that any differences in emulsion stability which could be traced to the chemical type of emulsifier were probably caused by errors in the original measurement of HLB numbers.

SOLUBILIZATION OF AQUEOUS SOLUTIONS IN NONPOLAR LIQUIDS. L. D. Morse, P. A. Hammes and C. W. Everson (Fine Chemicals, Prod. Dev. and Service Labs., Merck & Co., Inc., Rahway, N.J. 07065). *J. Food Sci.* 36, 248–50 (1971). Solubilization has occurred when surfactant micelles in water solution enclose molecules of a water insoluble substance to form a single phase. The technology deals mostly with hydrophobic matter in water. Water was solubilized at from 1%–11% in orange oil, soybean oil, benzyl alcohol, *n*-heptane, *n*-hexane and cottonseed oil, and aqueous solutions could be enclosed by appropriate micelles and solubilized. Using dioctyl sodium sulfosuccinate, the following quantities of ascorbic acid, as 20% aqueous solution, were solubilized: 22.0 mg/g orange oil; 10.4 mg/g soybean oil; 40.0 mg/g benzyl alcohol; 15.1 mg/ml *n*-heptane; and 14.5 mg/ml *n*-hexane. Triglycerol monooleate and decaglycerol dioleate solubilized ascorbic acid in cottonseed oil at 4.8 mg/ml; caprylic acid and ethoxylated stearic acid in cottonseed oil solubilized 1.5 mg/ml. Water soluble materials can be added to liquids with which they are otherwise incompatible, and unpleasant tasting materials can be taste-masked by solubilization in bland lipophilic liquids.

SOME METHODS FOR DETERMINING ALKALINE SOAPS IN DETERGENTS. M. Bares. *Sb. Vys. Sk. Chem.-Technol. Praze, Potraviny* **E** 29, 131–64 (1970). Various titrimetric methods were studied. Newer methods based on titrating the soap with a cationic surface active agent in a two phase system, and on the selective titration of the fatty acids in a non-aqueous medium by tetraalkyl ammonium hydroxide are described and compared with the methods of Milwidsky and Holtzman. (Rev. Franc. Corps Gras)

SILICA DETERGENT BUILDER. L. McDonald. *Soap and Chemical Specialties.* 47(6), 42–8, 56 (1971). The substitution of the phosphates of a detergent composition with a colloidal silica formed *in situ* provides a detergent composition which shows adequate cleaning ability and a satisfactory redeposition index without contributing nutrients for the growth of algae after disposal. The mechanics of soil removal and redeposition are examined by emission spectrographic analyses and scanning electron microscope probes.

METHOD OF PREPARING AGGLOMERATED DETERGENT COMPOSITION. C.A. Sumner (Stauffer Chemical). *U.S. 3,609,088.*

BUILT DETERGENT COMPOSITIONS CONTAINING HYDROXY ETHER SULFONATES. B. Sundy and H.E. Wixon (Colgate-Palmolive). *U.S. 3,609,090.* These compounds provide both detergency and fabric softening characteristics.

FABRIC-TREATING COMPOSITION AND METHOD. W.J. Parks (Purex Corp.) *U.S. 3,609,989.* A brightener consisting of a synthetic organic polymer is suspendable in a dilute aqueous solution of sodium hypochlorite.