ABSTRACTS

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

• Fats and Oils

PEA LIPIDS AND THEIR OXIDATION ON CARBOHYDRATE AND PROTEIN MATRICES. M. Haydar and D. Hadziyev (Dept. of Food Sci., Univ. of Alberta, Edmonton, Alberta, Canada T6G 2E2). *J. Food Sci.* 38, 772–8 (1973). The total lipids of pea seeds were isolated and fractionated by column and two dimensional thin-layer chromatography, and their fatty acid composition determined. The polar lipid fraction revealed up to 10 individual components consisting of phospho-, glyco- and sterol-lipids. The neutrol lipid fraction consisted mainly of triglycerides, small amounts of diglycerides, free fatty acids and esterified sterols. Oxidation of lipids coated on pea carbohydrate and protein matrices depended on both the matrix used and the polar or neutral lipid classes being oxidized. The results indicate that lipid polarity rather than degree of unsaturation has the primary influence on lipid oxidation.

EFFECTS OF DIETARY FAT AND *dl*-α-TOCOPHERYL ON STABILITY CHARACTERISTICS OF PRECOOKED FROZEN BROILER PARTS. J.E. Webb, C.C. Brunson and J.D. Yates (Campbell Inst. for Agr. Res., Campbell Soup Co., Fayetteville, AR 72701). *J. Food Sci.* 39, 133–6 (1974). The effects of several fat sources and *dl*-α-tocopheryl acetate supplementation of broiler feeds on iodine numbers of depot fat, taste panel responses and TBA values of precooked, frozen broiler thigh and drumstick (T and D) parts were studied. Variables evaluated were 18 commercial feed-grade fats of various saturation levels (5% of ration) with and without 11.20 I.U. of added vitamin E per kilogram of feed. The birds were processed, depot fat samples removed and parts deep-fat fried and frozen at −40C. Iodine numbers revealed that the saturation level of dietary fat influenced depot fat saturation. When vitamin E supplementation effect was evaluated within each study, TBA numbers were significantly lower for D parts from vitamin E supplemented birds than for D parts from nonsupplemented birds. There was a significant difference between the various fat diets for TBA numbers and off-flavor scores but there was no consistent effect of saturation level of depot fat on stability of broiler parts.

AUTOMATED DETERMINATION OF FAT IN MILK: PRELIMINARY AND COLLABORATIVE STUDIES. R.L. King (Dept. of Dairy Sci., Univ. of Maryland, College Park, Md. 20742). *J. Assn. Off. Anal. Chems.* 56, 1401–10 (1973). The principles and operation of an AutoAnalyzer system are described and the system was compared to the Babcock method. Initial calibration studies verified the manufacturer's claim of linear response between 2 and 6% fat. Homogenization and heat treatment caused slightly higher and lower results by the AutoAnalyzer system and the Milko-tester, respectively, when raw milk was used for calibration. Use of formalin as a preservative resulted in a positive bias of less than 0.04% fat. Mercuric chloride and potassium dichromate caused no effect. Standard deviation of the difference from the Babcock method for the calibration studies was less than 0.05%. Collaborative studies encompassed 15 samples ranging from 3 to 6% fat, including 3 blind duplicates plus calibration standards. Samples were analyzed in triplicate by 6 laboratories, using 2 methods of AutoAnalyzer calibration.

VOLTAMMETRIC DETERMINATION OF TOCOPHEROLS BY USE OF NEWLY DEVELOPED CARBON PASTE ELECTRODE. S.S. Atuma and J. Lindquist (Dept. of Anal. Chem., Univ. of Uppsala, Box 531, S-751 21, Uppsala 1, Sweden). *Analyst* 98, 886–94 (1973). A voltammetric method is described for determining tocopherols in vegetable oils, foods and pharmaceuticals by a newly developed carbon paste electrode. The samples are saponified and the unsaponifiable fraction is extracted and determined voltammetrically. No elaborate purification method is necessary as the substances that interfere with photometric procedures are electrochemically inactive in the potential range of operation. Detailed procedures for the preparation and the working of the electrode, and results for the precision of the method, are presented.

PROTEIN-LIPID INTERACTIONS. M. Karel (Dept. of Nutr. & Food Sci., MIT, Cambridge, MA 02139). *J. Food Sci.* 38, 756–763 (1973). A number of significant processes in food and biological systems involve interactions between proteins and lipids. Mechanisms by which proteins and lipids interact, the nature of the forces involved and factors which affect the interactions are reviewed. Examples of particularly important interactions in food and biosystems are presented, including biological membrane interactions, protein-oxidizing lipid interactions and coalescence and inversion of emulsions.

BATCH DRY RENDERING: AN INVESTIGATION OF HEAT TRANSFER TO BOILING WATER/TALLOW EMULSIONS. L.S. Herbert and H. Mamers (Div. of Chem. Eng., Commonwealth Scientific and Industrial Res. Organization, Clayton, Victoria, Australia, 3168). *J. Food Sci.* 38, 856–9 (1973). Laboratory scale experiments have been performed to determine the changes in heat transfer coefficient which occur when water is evaporated from a boiling water/tallow emulsion. The coefficients for a water-continuous emulsion were found to be higher than for a tallow-continuous emulsion. However, for a stabilized emulsion, the transition in coefficients from a water-continuous state to a tallow-continuous state was not abrupt and was preceded by a period of declining heat transfer rates to the water-continuous emulsion. The results have been used to interpret the heat transfer processes occurring in a batch dry rendering cooker.

QUANTITATIVE DETERMINATION OF FAT, PROTEIN AND CARBOHYDRATES OF SOY PRODUCTS WITH INFRARED ATTENUATED TOTAL REFLECTANCE. J.M. Wilson, A. Kramer and I. Bengera (Dept. of Horticulture Food Sci., Univ. of Maryland, College Park, MD 20742). *J. Food Sci.* 38, 14–17 (1973). Attenuated total reflectance (ATR), offering a possible rapid method for quantitative measurements of major nutritional components in food materials (fat, protein, carbohydrate) was employed to evaluate the composition of a variety of soy products. Using a sample cell developed in this laboratory, different sample particle sizes and forces applied to a mounted sample were investigated to determine if variations of this type would improve the accuracy and precision of the quantitative ATR technique. Correlations of 0.96 for fat and 0.94 for protein were achieved between a chemical analysis and the infrared technique using a baseline absorbance calculation and 120 mesh samples at 40 pounds force. Errors assignable to various aspects of the ATR technique are discussed.

REACTION PRODUCTS OF HISTIDINE WITH AUTOXIDIZED METHYL LINOLEATE. R.B. Roy and M. Karel (Dept. of Nutr. and Food Sci., M.I.T., Cambridge, MA 02139). *J. Food Sci.* 38, 896–7 (1973). Histidine was reacted with autoxidizing methyl linoleate: (a) in stirred anhydrous mixture; (b) dispersed on filter paper; and (c) in aqueous dispersion. Analysis of the reaction products led to the tentative identification of histamine, ethylamine and aspartic acid. An unidentified histidine-derived compound was also observed. Different reaction conditions resulted in different reaction products.

LIPIDS AND FATTY ACIDS OF CHICKEN BONE MARROW. K.E. Moerck and H.R. Ball Jr. (Dept. of Food Sci., North Carolina State Univ., Raleigh, NC 27607). *J. Food Sci.* 38, 978–980 (1973). Lipids and fatty acid compositions of broiler chicken bone marrow were determined. The lipid content of marrow from femur, tibia and ilium-ischium bones was similar. Average lipid content was 46.5%. Triglycerides were approximately 94.5% of the total lipid and contained primarily 16:0, 18:0, 18:1 and 18:2 fatty acids. Approximately 1.7% of the total lipids were phospholipids which had a relatively high percentage of 20:3 to 22:6 unsaturated fatty acids. Trace amounts of glycolipids were also found. Two components of the phospholipid fraction previously reported as 14:2 or 15:0 and 16:2 fatty acids were shown to be hexadecanal and octadecanal.

CARBONYL AND FATTY ACID ANALYSIS OF ANTELOPE AND BEEF FAT. A. Booren, R. A. Field and J.E. Kunsman Jr. (Div. of Animal Sci., Univ. of Wyo., Laramie, WY 82070). *J. Food Sci.* 38, 63–65 (1973). Characterization of kidney fat from twelve antelope and four beef was accomplished by monocarbonyl, ketoglyceride and fatty acid analysis. Antelope lipids are highly saturated, possessing strong odor and flavor characteristics which many people find objectionable. The antelope fat had a stearic acid content of 42% and an oleic acid content of only 20% while beef fat contained 28%

stearic and 34% oleic acid. The lipid was further analyzed by reacting on a 2,4-DNPH Celite impregnated column. The derivatives were separated from unreacted lipid, and monocarbonyls and ketoglycerides fractionated using column chromatography. The ratio of monocarbonyls to ketoglycerides was about 1:3 in beef and 1:1 in antelope.

THE NATURE OF FATS AND FATTY COMPONENTS IN NONDAIRY IMITATION MILKS. M. Filsoof, M. Mehran and F.V. Kosikowski (Dept. of Food Sci., Cornell Univ., Ithaca, NY 14850). *J. Food Sci.* **38**, 945–8 (1973). Fourteen nondairy imitation milk powders and concentrates were analyzed for fat and fatty component characteristics. Fats of nondairy imitation milk products showed melting point ranges of <5.0–44.5C; refractive index 1.4482–1.4670; unsaponifiable matter of 0.42–1.44%; and peroxide value 1.04–24.41. Sterols were mostly campesterol, stigmasterol and beta-sitosterol, but one nondairy imitation milk contained relatively high levels of cholesterol or its related compounds, 71.49 milligrams per 100 grams fat. The fatty acid composition was dominated by unsaturated forms, comprising 75–80% of the total sterols. Only one nondairy imitation milk powder contained fat resembling coconut.

SOYBEAN PHOSPHATIDYLCHOLINE DEVELOPS BITTER TASTE ON AUTOXIDATION. D.J. Sessa, K. Warner and D.H. Honig (USDA, Northern Reg. Res. Lab., ARS, Peoria, IL 61604). *J. Food Sci.* **39**, 69–72 (1974). Soybean phosphatidylcholine (SPC) and hydrogenated SPC were isolated by column chromatography from commercial lecithin and hydrogenated lecithin, respectively. Aqueous suspensions of these preparations with added Cu^{++} were stored at 25C. A seven-member taste panel rated dilutions containing 0.1% phospholipid for intensity of bitterness, based on the scoring system: 0 = none to 3 = strong. Both SPC and hydrogenated SPC initially rated a score of 0.8. A score of 1.6 was given when a suspension of SPC exhibited maximum absorbance due to diene conjugation. The score increased to 3.0 after 4 weeks of storage. The development of bitter taste appeared to be associated with extent of oxidation of SPC as determined by thiobarbituric acid assay. Since no changes in taste occurred with hydrogenated SPC treated similarly, bitterness development is attributed to autoxidation of the constituent unsaturated fatty acids.

DECREASE OF LINOLEATE OXIDATION RATE DUE TO WATER AT INTERMEDIATE WATER ACTIVITY. T.P. Labuza and H.E. Chou (Dept. of Food Sci. and Nutr., Univ. of Minn., St. Paul, MN 55101). *J. Food Sci.* **39**, 112–3 (1974). The rate of oxidation of methyl linoleate in intermediate moisture content model systems showed unusual behavior. As had been found during other research at low trace metal content, increasing the A_w of the system, and thus the water content, increased the oxidation rate. Systems at similar A_w but higher moisture content also oxidized faster. This is due to the increased mobility in the dilute aqueous phase. On the other hand, at high trace metal content (around 1000 parts per million), exactly the opposite effect occurred with respect to A_w since in this case, the effect of dilution predominated. It was shown that oxidation is directly dependent on total moisture content, supporting the above conclusions.

FORMATION OF A POTATO CHIP-LIKE FLAVOR FROM METHIONINE UNDER DEEP-FAT FRYING CONDITIONS. S.C. Lee, B.R. Reddy and S.S. Chang (Dept. of Food Sci., Rutgers, The State Univ., New Brunswick, NJ 08903). *J. Food Sci.* **38**, 788–90 (1973). A model system was developed for treating the various components of potatoes under deep-fat frying conditions. The system involved the deep-fat frying of cotton balls moistened with an aqueous solution of either amino acids or sugars or their combinations. When methionine was treated under deep-fat frying conditions, its reaction products imparted an odor and flavor reminiscent of that of potato chips to the oil. By observing the aroma generated by different homologs and analogs of methionine under deep-fat frying conditions, it was observed that a certain chemical structure is necessary for the production of the potato chip-like flavor.

CANDLES MADE OF STEARIN. Ploog (Henkel & Cie. GmbH, Dusseldorf). *Seifen-Öle-Fette-Wachse* **100**(2), 43–8 (1974). Described are the preparation and properties of stearin. Further described is the manufacture of stearin candles such as composite, pure stearin, uncolored and colored stearin candles, immersion colored stearin, crystal and pressed candles.

LIPID OXIDATION AND FATTY ACID CHANGES IN BEEF COMBINED WITH VEGETABLES AND TEXTURED VEGETABLE PROTEIN. M.R. Sangor and D.E. Pratt (Dept. Foods and Nutrition, Purdue Univ.). *J. Am. Dietetic Assoc.* **64**, 268–70 (1974). The antioxidant activity on beef lipids of boiling water extracts of soy textured vegetable protein (t.v.p.), various vegetables alone, vegetables plus t.v.p., and home-made beef-vegetable soup containing t.v.p. was studied by determining the thiobarbituric acid number after differing storage periods. Beef slices were covered with the different extracts and stored at 3C for up to 14 days. Five and 10% extracts of t.v.p. had substantial antioxidant activity, with the higher concentration being more effective with longer storage. The TBA values at the end of 9 days were 2.69 and 1.72 for 5 and 10% extracts respectively as against 7.56 for a distilled water control. The initial TBA value for all three samples was 3.16. Extracts of tomato, onion, carrot, celery, potato or green beans were all considerably less effective than the t.v.p. extract alone. When the vegetable extracts were combined with the t.v.p. extract, the antioxidant effect was intermediate. In vegetable soup, the antioxidant effects of both extracts of t.v.p. were nearly the same. Fatty acid changes in the beef in the soup varied, with myristic and stearic acids remaining more constant than palmitic, oleic, and linoleic acids.

MARGARINE FAT. K. Frommhold (Lever Bros.). *U.S. 3,796,581.* The margarine fat formulation comprises: (a) a liquid fat containing at least 40% polyunsaturated fatty acids; (b) a fat of melting point 41–45C containing or consisting of hydrogenated soybean oil; (c) a fat of a melting point of 25–40C with at least part of the constituents (a) and (b) being interesterified.

METHOD FOR PROCESSING ANIMAL RAW MATERIAL. C.H. Klampenborg (Titan Separator A/S). *U.S. 3,796,737.* For the purpose of reducing the amount of fat in the dry product obtained from raw animal material that is subjected to boiling and is separated, in one or more stages, into pure fat, glue water and sludge, the sludge is returned to the boiler for renewed heat treatment together with unheated raw material.

FLUID SHORTENING MANUFACTURE. M.J. McCarthy (Swift & Co.). *U.S. 3,796,806.* Fluid shortening compositions are prepared from normally plastic shortening agents by first melting and then recooling them in the presence of a suitable crystal inhibitor.

FATTY PARTICULATE CONTAINING HEAT SENSITIVE CONDIMENT. R.E. Cermak (SCM Corp.). *U.S. 3,796,814.* The particulates have a substantially continuous fatty matrix phase at the surface. The composite particles are prepared by contacting a heat sensitive condiment with preformed fatty matrix particles at a temperature not substantially above the Wiley melting point of the matrix particles for a time sufficient for the condiment to be absorbed. Agglomerates of the composite particles can then be formed.

POURABLE EMULSION. H.W. Lincklaen and J.H.M. Rek (Lever Bros.). *U.S. 3,796,815.* There is described a pourable margarine which shows a significant reduction in spattering behavior during frying and also has an improved stability against oil separation at relatively high use temperatures (e.g., 20–35C). The margarine contains 20% of an aqueous phase and 80% of fatty phase, which contains 90–99.5% of a liquid vegetable oil and 10–0.5% of hard fat. The aqueous phase contains a phosphatide from 5–35% of which is a monoacylglycerophosphatide whose acyl group is derived from fatty acids having at least 12 carbon atoms.

HARD BUTTER COMPOSITIONS FROM NONRANDOMIZED TRIGLYCERIDES. J.M. Hasman and R.J. Zielinski (SCM Corp.). *U.S. 3,796,816.* A hard butter having a S.C.I. over a temperature range from 80F to 92F consists of 45–80% glyceryl tricaprin, 20–55% glyceryl trilaurin, and 0–8% partial glycerides whose fatty acid moiety has 8–22 carbon atoms. Confectionary coatings containing this hard butter are also described.

PROCESS FOR INTERESTERIFICATION OF A MIXTURE OF GLYCERIDES. A.M. van Buren, A.B.M. Oloosterman, J.H.M. Rek and H.F. Zock (Lever Bros. Co.). *U.S. 3,798,245.* An improvement is described in the preparation of glyceride fractions by directed interesterification followed by fractionation; after addition of alkali metal to form the interesterification catalyst the mixture is degassed. By use of the improvement, an excellent yield of a polyunsaturated fraction can be obtained from sunflower seed oil.

METHOD FOR EMBOSSMENT PACKAGING OF WARM BUTTER. L. Peters. *U.S. 3,798,335.* Nonwhipped butter or margarine is packaged, after it has been churned, by elevating its tem-

perature until it is flowable under its own weight, and then, while under agitation, flow-filling it into embossing dies or packages.

METHOD OF ANALYZING FOR CHOLESTEROL. C.D. Warburton (Eastman Kodak Co.). *U.S. 3,799,739.* Quantitative determination of cholesterol in body fluids such as blood serum is accomplished by contacting a sample of the fluid with bromine to form brominated derivatives of the cholesterol and cholesterol esters. The brominated derivatives are converted to the corresponding iodinated derivatives, and the amount of iodine liberated upon decomposition of the iodinated derivatives is measured.

ICE MILK OR LOW FAT IMITATION ICE CREAM. J.L. Gabby, D.D. Corbin and J.B. Lowe (The Drackett Co.). *U.S. 3,800,036.* Frozen desserts including ice milk and imitation ice cream having no triglyceride fat ingredient or optionally up to 7% of fat can be prepared by employing as texturizing ingredient 0.5–1.5% of polyglycerol ester. From 0.05 to 0.5% of hydrophilic colloid stabilizer is optionally employed.

• Biochemistry and Nutrition

THE EFFECT OF HEMORRHAGIC SHOCK ON THE PHOSPHOLIPID COMPOSITION OF BLOOD PLASMA OF ANESTHETIZED DOGS. H.P. Schwarz, L. Dreisbach and J.J. Spitzer (Dept. of Clin. Pathol., Philadelphia General Hosp., Philadelphia, PA 19104). *Proc. Soc. Exp. Biol. Med.* 145, 57–60 (1974). The phospholipid composition of arterial, sagittal sinus and hepatic venous blood plasma was investigated in dogs under pentobarbital both before and shortly after a severe hemorrhage. The total lipid P concentration in the artery decreased following hemorrhage, but the phosphatidyl-glycerol concentration increased. Only small and variable differences were observed across the splanchnic region either before or after the bleeding. A significant release of total lipid P, phosphatidyl ethanolamine, choline plasmalogen and phosphatidylglycerol was noted across the brain under control conditions. The individual phospholipids were continued to be released even following hemorrhage. The physiological significance of these changes will have to await further study.

THE EFFECT OF TWO SUBSTITUTED VALERIC ACID DERIVATIVES ON CHOLESTEROL METABOLISM IN RATS. D. Kritchevsky, S.A. Tepper and J.A. Story (Wistar Inst. of Anat. and Biol., Philadelphia, PA 19104). *Proc. Soc. Exp. Biol. Med.* 145, 12–17 (1974). Two valeric acid derivatives (4-[2-carboxyethyl]-7-methyl-5-oxoindan-1β-yl valeric acid [compound X] and 4-(decahydro-6-methyl-3-oxo-cyclopenta[f] quinolin-7β-yl) valeric acid [compound Y]) and clofibrate (ethyl p-chlorophenoxyisobutyrate) have been studied for their effects on cholesterol absorption, 7α-hydroxylation and oxidation, hepatic lipogenesis and serum and liver levels in rats. All three test compounds were fed (0.3% of diet) for 2 wk. Compound Y was similar to clofibrate in its effects. Compound Y administration resulted in decreased hepatic synthesis of cholesterol and fatty acids, increased oxidation of [26-^{14}C]cholesterol to $^{14}CO_2$ and increased 7α-hydroxylation of cholesterol. Compound X had no significant effect on any of these parameters. Clofibrate exhibited a hypocholesteremic effect and clofibrate and compound Y were hepatomegalic. Cholesterol absorption was decreased by clofibrate but not by the two valeric acid derivatives.

LIVER MICROSOMAL HYDROXYLATION OF STEROID HORMONES AFTER ESTABLISHING AN INDIGENOUS MICROFLORA IN GERMFREE RATS. K. Einarsson, J-A. Gustafsson and B.E. Gustafsson (Dept. of Med., Serafimerlasarettet, Depts. of Chem. and Germfree Res., Karolinska Inst., Stockholm, Sweden). *Proc. Soc. Exp. Biol. Med.* 145, 48–52 (1974). The liver microsomal metabolism of 4-[4-^{14}C]androstene-3,17-dione and 5α-[4-^{14}C]androstane-3α,17β-diol was studied in germfree, conventional and exgermfree rats with a normal indigenous microflora. Germfree rats were significantly more active than conventional rats in hydroxylating 4-androstene-3,17-dione in position 6β ($P < 0.02$) and 5α-androstane-3α,17β-diol in positions 2β ($P < 0.05$), 7α ($P < 0.02$) and 18 ($P < 0.02$). In addition 7α-, 16α- and 16β-hydroxylation of 4-androstene-3,17-dione and 2α- and 7β-hydroxylation of 5α-androstane-3α,17β-diol tended to be greater in germfree rats than in conventional rats. In most cases the exgermfree rats, which had been reared outside the germfree isolators for 4 wk, showed similar activities of the microsomal hydroxylase systems as their conventional counterparts. Thus, exgermfree rats showed significantly less efficient 16β-hydroxylation of 4-androstene-3,17-dione ($P < 0.02$) and 2β- ($P < 0.02$) and 7α- ($P < 0.05$) hydroxylation of 5α-androstane-3α,17β-diol than germfree rats. The results show that the induced state of certain microsomal hydroxylase systems in germfree rats is reversible and dependent on the metabolic changes in the germfree rat consecutive to the absence of the normal indigenous microflora.

THE EFFECT OF COLD ON THE COMPOSITION OF THE PHOSPHOLIPIDS OF THE BLOOD PLASMA OF HEALTHY ATHLETES. B.D. Polis, E. Polis, H.P. Schwarz and L. Dreisbach (Biochem. Lab., U.S. Naval Air Development Center, Warminister, PA 18974). *Proc. Soc. Exp. Biol. Med.* 145, 70–73 (1974). The phospholipid composition of the blood plasma of nine healthy athletes was examined before and after the subjects were placed in a tank filled with water at 2C. It was found that the phosphatidylglycerol (GPG) content of the plasma was very significantly elevated immediately after and 7 min following the exposure to the cold. Only one other phospholipid, phosphatidic acid, showed much lesser elevation of GPG after the subjects left the cold-water tank. All the remaining individual phospholipids and total lipid phosphorus were not affected by the experiment. The possible significance of these changes of GPG in stress are discussed.

CHANGES IN NEUTRAL LIPID CONSTITUENTS DURING DIFFERENTIATION OF THE CELLULAR SLIME MOLD, DICTYOSTELIUM DISCOIDEUM. B.H. Long and E.L. Coe (Biochem. Dept., Northwestern Univ. Med. and Dental Schls., Chicago, IL 60611). *J. Biol. Chem.* 249, 521–9 (1974). The total lipid content of differentiating *Dictyostelium discoideum* was 100 to 125 mg per g dry weight; of this, about 95 mg per g was polar lipid (mainly phospholipid) and 25 mg per g was neutral lipid in the early stages. During culmination and maturation of the sorocarp, polar lipid declined to 75 mg per g, while neutral lipid increased to 40 mg per g. Per 10^{10} cells, polar lipid declined from 135 to 75 mg and neutral lipid increased from 33 to 45 mg. The neutral lipid fraction was resolved into its major components and the level of each in milligrams per g

dry weight was determined at 10 different stages of slime mold differentiation. Approximate balances among the different lipid components were calculated from the changes in quantities. During the period prior to early aggregation, a net synthesis of lipid (phospholipid, sterol and sterol ester) occurred from unidentified precursors. During aggregation metabolism shifted toward a net degradation, characterized by a rapid conversion of free fatty acids to unidentified products. This net degradation continued during the migration-preculmination period, although phospholipid replaced the nearly exhausted triglyceride and free fatty acid reserves as the major source of lipid. During the latter periods net sterol synthesis ceased, but sterol ester synthesis continued at the expense of preformed free sterol.

LIPID ACCEPTOR IN UDPGLUCURONIC ACID METABOLISM IN RAT LIVER MICROSOMES. E. Puhakainen and O. Hanninen (Dept. of Physiol., Univ. of Kuopio, SF-70101 Kuopio 10, Finland). *FEBS Letters* 39, 144–8 (1974). Recent studies have provided evidence that several monosaccharides in glycoprotein synthesis are bound to endogenous lipid acceptors. In the case of glucose the microsomal enzymes of the liver catalyze the transfer of the monosaccharide from UDPglucose to dolichol monophosphate. It has been suggested that DUPglucuronsyltransferase route associated with an endogenous glucuronide formation might play a role in the production of free GlcNA. This kind of endogenous GlcUA acceptor has not been isolated. UDPGlcUA can also be converted to free GlcUA in mammalian liver via stepwise hydrolysis by a pyrophosphatase and a phosphatase, or via biosynthesis and hydrolysis of mucopolydsaccharides. In this work we have found an endogenous lipid GlcUA acceptor and preliminarily studied its role in glucuronide biosynthesis and the formation of free GlcUA in rat liver microsomes.

ENDOTOXIN-INDUCED ALTERATIONS IN ISOLATED FAT CELLS: EFFECT ON NOREPINEPHRINE-STIMULATED LIPOLYSIS AND CYCLIC 3,5-ADENOSINE MONOPHOSPHATE ACCUMULATION. J.A. Spitzer (Dept. of Physiol. and Biophys., Hahnemann Med. Coll., Philadelphia, PA 19102). *Proc. Soc. Exp. Biol. Med.* 145, 186–91 (1974). This study was designed to investigate the mechanism of interaction between endotoxin and isolated canine fat cells. Exposure to endotoxin in vitro elicited a higher NE-stimulated lipolytic response than that obtained from normal cells. The release of G and FFA in both normal and endotoxin-treated cells was linear for 2 hr. NE dose-response studies revealed increased G and FFA release at each dose level including saturation, after endotoxin treatment, without consistent changes in the dose at which half-maximal response occurred. The NE dose-response curves were compatible with the Clark-Stetton model of hormone action. Thus the data are consistent with the interpretation of a greater number of receptor-hormone complexes being involved after exposure to endotoxin. Endotoxin-treated fat cells of both SC and O origin had a significantly higher cAMP level, which was further elevated by subsequent NE stimulation, manyfold above the level of normal cells. The results suggest that exposure of isolated fat cells to endotoxin in vitro causes alterations in the lipoprotein components as well as in the ionic distribution within the fat cell membrane.

CHARACTERIZATION OF THE SERUM HIGH DENSITY LIPOPROTEINS AND APOLIPOPROTEINS OF PINK SALMON. G.J. Nelson and V.G. Shore (Bio-Med. Div., Lawrence Livermore Lab., Univ. of Cal., Livermore, CA 94550). *J. Biol. Chem.* 249, 536–42 (1974). High density lipoproteins (HDL) were isolated by centrifugation from the serum of salmon *(Oncorhynchus gorbuscha)* captured just before spawning. There were no detectable low density lipoproteins in their serum. Disc electrophoresis in polyacrylamide gels (in 8 M urea at pH 8.6) produced a pattern with two major and several minor bands for both the intact lipoproteins and the lipid-free protein moiety. The over-all pattern was very similar to that of human HDL. These data suggest that general physical properties of the HDL are not specifically dependent on the total amino acid composition of the molecule but rather on its general secondary or tertiary structure and these same features must govern the binding of lipids to proteins in soluble lipoproteins.

TRANSFER OF CARBON ATOMS FROM MEVALONATE TO N-FATTY ACIDS. J. Edmond and G. Popjak (Depts. of Biol. Chem. and Psychiatry, UCLA Schl. of Med., Los Angeles, CA 90024). *J. Biol. Chem.* 249, 66–71 (1974). The distribution of ^{14}C in the unsaponifiable (neutral) and saponifiable (acidic) components of tissue lipids was examined 4, 24 and 72 hours after the subcutaneous injection of [2-^{14}C]mevalonate into 9-day-old rats. Of the total radioactivity contained in the unsaponifiable plus saponifiable material, 7 to 33% was in the acidic fraction obtained from the brain, spinal cord and the skin, most of it (90% in the brain and spinal cord) being associated with palmitate and stearate in the ratio of 8:2 or 7:3, 4 hours after the injections. Seventy-two hours after the injections the stearate became slightly more heavily labeled than palmitate in these three organs. The palmitate and stearate from the kidney and lung lipids became labeled also, but not as extensively as in the three organs of ectodermal origin. In contrast the n-fatty acids from liver did not contain detectable isotopic label. The incorporation of label into the two fatty acids in the brain and skin increased linearly with increasing doses of mevalonate. It is postulated that label from [2-^{14}C] mevalonate is diverted through a shunt to 3-hydroxy-3-methylglutaryl-CoA and free acetoacetate which is utilized preferentially for fatty acid synthesis in the brain, spinal cord and the skin. Mechanisms which could account for the recycling of carbon atoms from intermediates of sterol biosynthesis are presented.

CROTONYL COENZYME A REDUCTASE ACTIVITY OF BOVINE MAMMARY FATTY ACID SYNTHETASE. S.K. Maitra and S. Kumar (Dept. of Chem., Georgetown Univ., Washington, D.C. 20007). *J. Biol. Chem.* 249, 111–7 (1974). Lactating bovine mammary fatty acid synthetase, the enzyme complex that synthesizes fatty acids from a primer, malonyl-CoA and TPNH, is shown to have a relatively high crotonyl-CoA reductase activity. Throughout purification to homogeneity the ratio of the reductase to the synthetase activities remains constant and the two activities emerge super-imposed on gel filtration. Although the investigation showed that the reductase activity of the enzyme is an inherent property of the enzyme, the pH profiles and the rates of recovery of the two activities of the enzyme by preincubation were not the same. Synthetase gave a bell-shaped pH profile with an optimum at pH 6.8 while the reductase reaction showed maximum activity in the range of pH 7 to 8 5. The reductase activity was influenced by preincubation while the synthetase was not. The crotonyl-CoA reductase reaction requires TPNH as electron donor, but at a 20-fold higher concentration DPNH will substitute for TPNH with 50% V_{max}. As a result of the presence of the reductase activity crotonyl-CoA substitutes as a primer in fatty acid synthesis as effectively as butyryl-CoA, a primer decidedly better than acetyl-CoA.

APPARENT MONOMER ACTIVITY OF SATURATED FATTY ACIDS IN MICELLAR BILE SALT SOLUTIONS MEASURED BY A POLYETHYLENE PARTITIONING SYSTEM. V.L. Sallee (Dept. of Physiology, Univ. of Texas Southwestern Med. Schl., Dallas, TX 75235). *J. Lipid Res.* 15, 56–64 (1974). Partitioning of saturated fatty acids between discs of polyethylene film and aqueous buffer has been characterized and subsequently used to measure monomer activities of fatty acids in micellar solutions of bile salt. Partitioning of fatty acids between polyethylene and buffer achieved equilibrium in about 24–48 hr. Partition coefficients for fatty acids 10:0 and 16:0 were essentially independent of concentration, as expected for true partitioning. Experiments with various pH buffers showed that only the protonated form of fatty acids 12:0 and 16:0 participated in partitioning,

and the midpoints of the partition coefficients vs. pH curves were 4.5–5.0 and 6.5–7.0, respectively. Experimentally determined partition coefficients at pH 7.4 ranged from 2.03 ± 0.09 for 9:0 to 56,100 ± 13,850 for 17:0. The addition of each methylene group increased the partition coefficient by a factor of about 3.75, corresponding to an incremental free energy change for each methylene group of -3433 J · mole^{-1} (-820 cal · mole^{-1}). Monomer activities of solutions of 14:0 and 16:0 dissolved in 20 mM taurodeoxycholate were linearly dependent on the total fatty acid concentration. 1 mM 14:0 and 16:0 in 20 mM taurodeoxycholate had monomer activities of 1.3×10^{-5} M and 5.6×10^{-7} M, respectively. Solutions prepared with a constant concentration ratio of fatty acid to taurodeoxycholate had essentially constant monomer activities between 8 and 20 mM taurodeoxycholate.

PREPARATIVE FRACTIONATION OF TRIGLYCERIDE MIXTURES ACCORDING TO ACYL CARBON NUMBER, USING HYDROXYALKOXYPROPYL SEPHADEX. B. Lindqvist, I. Sjogren and R. Nordin (Mjolkcentralen, Fack, S-101 10 Stockholm, Sweden). *J. Lipid Res.* 15, 65–73 (1974). The present paper describes the use of hydroxyalkoxypropyl Sephadex in a liquid chromatography system. When the column is held at 40C, and when elution is made with a linear gradient of two solvents, an excellent separation of saturated triglycerides in the region C_9–C_{56} is obtained in 24 hr, even with sample loads as high as 0.5 g/cm^2 of column. Triglycerides containing unsaturated fatty acids are eluted more rapidly than their saturated homologs, one C–C double bond being equivalent to -1.42 fatty acid carbon atoms.

ULTRASTRUCTURAL AND PHYSIOLOGICAL EVIDENCE FOR CORTICOSTEROID-INDUCED ALTERATIONS IN HEPATIC PRODUCTION OF VERY LOW DENSITY LIPOPROTEIN PARTICLES. E P. Reaven, O.G. Kolterman and G.M. Reaven (Dept. of Med., Stanford Univ. Schl. of Med. and Veterans Admin. Hosp., Palo Alto, Calif. 94304). *J. Lipid Res.* 15, 74–83 (1974). The cause of corticosteroid-induced hyperlipoproteinemia was studied in rats and mice. An ultrastructural morphometric method was utilized to demonstrate alterations in hepatocyte very low density lipoprotein content, and Triton WR 1339-treated rats were used to identify changes in the removal of very low density lipoproteins from plasma. The results show that corticosteroid treatment results in (1) an increase in both plasma triglyceride and cholesterol levels, (2) an increase in rate of accumulation of triglyceride after inhibition of very low density lipoprotein removal by Triton, and (3) an increase in the number and size of Golgi-associated very low density lipoprotein particles in hepatocytes. These combined results suggest that corticosteroids induce hyperlipoproteinemia through increased hepatic production of very low density lipoproteins.

IN VIVO SAMPLING OF CARDIAC TRIGLYCERIDE FROM DOGS DURING ETHANOL INFUSION. M. Wong (Med. Section, Wadsworth Hosp. Center, Veterans Admin., Los Angeles, CA 90073). *J. Lipid Res.* 15, 50–55 (1974). The feasibility of procuring and analyzing cardiac tissue for triglyceride in vivo was tested in anesthetized dogs. Measurements of triglycerides in samples obtained in vitro confirmed: reproducibility of triplicate analyses of the glyceride-glycerol moiety of tissue triglyceride (SEM ± 2.1%), homogeneity in and between ventricles (SEM ± 1.8%), and agreement between right endocardial triglyceride and left myocardial triglyceride (difference not significant). Seven dogs received ethanol, 15–30 mg/kg/min, and five dogs received glucose or 0.85% NaCl for 2 hr. Cardiac output and filling pressure were measured from the left ventricle and tissue was taken from the right ventricle with a biopsy catheter before and during infusions. Three to four samples were obtained from each dog; the average weight was 14.4 mg and two to three biopsies were required for each sample. In the ethanol group, triglyceride increased after 15 min and continued to rise; the final triglyceride concentration correlated with the infusion rate. In the glucose-saline group, in vivo triglyceride concentration did not change and did not differ from postmortem triglyceride. Cardiac function declined in the ethanol group and was unaffected in the controls. Thus, multiple in vivo measurements of cardiac lipid are practical and safe and show that ethanol infusions cause early and progressive accumulation of triglyceride in heart muscle.

STUDIES OF GLUCAGON RESISTANCE IN LARGE RAT ADIPOCYTES: ^{125}I-LABELED GLUCAGON BINDING AND LIPOLYTIC CAPACITY. J.N. Livingston, P. Cuatrecasas and D.H. Lockwood (Depts. of Med. and Pharmacol. and Exptl. Therapeutics, Johns Hopkins Univ. Schl. of Med., Baltimore, MD 21205). *J. Lipid Res.* 15, 26–32 (1974). This study is concerned with potential modifications of large fat cells from adult rats (400–450 g) that make them resistant to stimulation by glucagon. The lipolytic capacity and ^{125}I-labeled glucagon-binding capability of these cells were compared with these properties of small glucagon-sensitive cells from young rats (130–160 g). As determined by maximal stimulation with theophylline, dibutyryl cAMP or epinephrine, the lipolytic capacity of large cells was not markedly different from small cells, which suggests that an alteration contributing to glucagon insensitivity is not present in the enzymes involved with hormone-mediated lipolysis. Glucagon-binding studies did indicate a difference between the two cell types. Both large cells and particulate fractions from large cells bound less ^{125}I-labeled glucagon than small cells or small-cell particles. That diminished binding is not a consequence of glucagon degradation is indicated by the similar amounts of ^{125}I-labeled glucagon degraded by both cell types. The decrease in ^{125}I-labeled glucagon binding was not as marked as the decrease in lipolytic response to glucagon stimulation. This lack of correlation and the relationship between elevated phosphodiesterase levels and glucagon insensitivity described in the accompanying report suggest that diminished binding explains only in part the marked resistance to glucagon found in large cells.

ROLE OF PHOSPHODIESTERASE IN GLUCAGON RESISTANCE OF LARGE ADIPOCYTES. R.A. De Santis, T. Gorenstein, J.N. Livingston and D.H. Lockwood. *Ibid.*, 33–38. The role of phosphodiesterase in glucagon resistance of large adipocytes was investigated. A comparison was made of phosphodiesterase activities of homogenates prepared from isolated small (mean diameter $\simeq$ 45 μm) and large (mean diameter $\simeq$ 78 μm) adipocytes, using various concentrations (5×10^{-4} to 1×10^{-7} M) of 3′,5′-cAMP. Kinetic analyses revealed two distinct catalytic activities (high and low affinities) in both cell types; however, the activities of both high- and low-affinity enzymes were significantly elevated in large adipocytes. Lipolysis was measured in isolated adipocytes in the presence of different concentrations (0.1–0.6 mM) of the phosphodiesterase inhibitor aminophylline. Large adipocytes were less responsive to low levels of methylxanthine, suggesting that greater amounts of phosphodiesterase must be inhibited before lipolysis can be stimulated. To evaluate the influence of phosphodiesterase during glucagon-stimulated lipolysis, small and large adipocytes were incubated with a maximally effective concentration of glucagon (1.5×10^{-6} M) in combination with various concentrations (0.1–0.6 mM) of aminophylline. Although the glucagon effect was potentiated in both cell types, the maximum lipolytic response of large adipocytes (at 0.4 mM aminophylline) was approximately 36% lower than that observed in small adipocytes (at 0.2 mM aminophylline).

INCORPORATION OF [2-^{3}H]GLYCEROL INTO RAT BRAIN 1,2-DIACYL-SN-GLYCERO-3-PHOSPHORYLCHOLINE AND 1,2-DIACYL-SN-GLYCEROL MOLECULAR SPECIES IN VIVO. J.F. O'Brien and R.L. Geison (Waisman Center on Mental Retardation and Human Dev., Univ. of Wisc., Madison, WI 53706). *J. Lipid Res.* 15, 44–49 (1974). Rat brain 1,2-diacyl-*sn*-glycerols (diglycerides) and 1,2-diacyl-*sn*-glycerols obtained from 1,2-diacyl-*sn*-glycero-3-phosphorylcholine after treatment with phospholipase C differ

markedly in carbon number distribution. 70% of the 1,2-diacyl-*sn*-glycerols had a total of 38 fatty acid carbon atoms, and there was no detectable change in the 1,2-diacyl-*sn*-glycerol mass pattern between 7 and 23 days of age. In contrast, 1,2-diacyl-*sn*-glycero-3-phosphorylcholine contained at most 10% of this molecular species in the brains of rats of comparable age. A small increase in the C_{36} species of 1,2-diacyl-*sn*-glycero-3-phosphorylcholine, which is associated with myelination, was noted between 10 and 17 days. The incorporation of intracranially injected [2-^{3}H]glycerol into 1,2-diacyl-*sn*-glycero-3-phosphorylcholine species with polyunsaturated fatty acids containing 20 or 22 carbon atoms was greater than into the species containing only saturated and/or monoenoic fatty acids between 30 min and 24 hr. The 1,2-diacyl-*sn*-glycerol fractions containing polyunsaturated fatty acids had the lowest specific activity at 30 min. The specific activity of the particular 1,2-diacyl-*sn*-glycerol fraction containing the stearate-arachidonate pair is the lowest for 4 hr after intracranial injection of the isotope.

ORIGIN OF ESTERIFIED CHOLESTEROL TRANSPORTED IN THE VERY LOW DENSITY LIPOPROTEINS OF HUMAN PLASMA. P.J. Barter (Dept. of Clinical Sci., John Curtin Schl. of Med. Res., The Australian Natl. Univ., Canberra, A.C.T., Australia). *J. Lipid Res.* 15, 11–19 (1974). In two subjects the specific activity of esterified cholesterol in plasma lipoprotein subfractions was measured for up to 9 hr after an intravenous injection of [^{3}H]mevalonic acid. It was found to be consistently higher in larger ($S_f > 100$) than in smaller (S_f 20–100) very low density lipoproteins (VLDL). Four subjects were given an intravenous injection of heparin so that the VLDL could be studied as its concentration fell and subsequently rose again. During the first hour the relative reduction was greatest for triglyceride, intermediate for free cholesterol, and least for esterified cholesterol. Between 1 and 7 hr postheparin, the VLDL pool was restored, but the pattern of increase of individual lipids was not parallel. The triglyceride increment was much greater during the 1–4-hr period than during the 4–7-hr period; in three of the subjects the free cholesterol increment was also greater during the earlier period. The increase in esterified cholesterol, however, was consistently greater during the 4–7-hr period. In six other subjects the specific activity of VLDL esterified cholesterol was related to that of its possible plasma precursors in samples collected at 1-hr intervals for 8 hr after the injection of [^{3}H]mevalonic acid. Free cholesterol emerged as the most likely immediate precursor with the possibility of a hepatic as well as an intraplasma origin.

METABOLISM OF SULFOQUINOVOSYL DIGLYCERIDE IN CHLORELLA PYRENOIDOSA BY SULFOQUINOVOSYL MONOGLYCERIDE:FATTY ACYL CoA ACYLTRANSFERASE AND SULFOQUINOVOSYL GLYCERIDE:FATTY ACYL ESTER HYDROLASE PATHWAYS. M.G. Wolfersberger and R.A. Pieringer (Dept. of Biochem., Temple Univ. Schl. of Med., Philadelphia, PA 19140). *J. Lipid Res.* 15, 1–10 (1974). Cell-free preparations of *Chlorella pyrenoidosa* catalyze the transfer of the fatty acyl moiety of fatty acyl CoA derivatives to sulfoquinovosyl monoglyceride to form sulfoquinovosyl diglyceride. This reaction is stimulated by Triton X-100 concentrations of up to 0.6 mg/ml and has a pH optimum of 7.7. Similar *Chlorella* preparations catalyze the stepwise removal of both fatty acyl groups from sulfoquinovosyl diglyceride to form sulfoquinovosyl monoglyceride and then sulfoquinovosyl glycerol. This reaction is inhibited by both calcium and magnesium. The nonionic surfactant Triton X-100 inhibits the enzymatic deacylation at concentrations of less than 0.5 mg/ml but stimulates it at higher concentrations. The pH optimum for the deacylation of sulfoquinovosyl glycerides is 8.2, with little activity observed below pH 8. The enzymatic activities for both the transacylation and deacylation reactions are associated with a 30,000 *g* particulate fraction of *Chlorella*. Sulfoquinovosyl glycerol was found not to be an acceptor of the fatty acyl moiety of fatty acyl CoA derivatives. Methods are described for the preparation of sulfoquinovosyl monoglyceride, sulfoquinovose and 3-sulfo-1,2-propanediol.

CHANGES OF GANGLIOSIDES AND OTHER LIPIDS IN SKELETAL MUSCLE FROM RABBITS WITH EXPERIMENTAL DYSTROPHY. I. Albarracin, F.E. Lassaga and R. Caputto (Dept. de Quimica Biologica, Facultad de Ciencias Quimicas, Univ. Nacional de Cordoba, Ciudad Univ., Cordoba, Argentina). *J. Lipid Res.* 15, 89–93 (1974). Comparison of the skeletal muscles from vitamin E-deficient and control rabbits showed that the muscles from the deficient animals had lower contents of protein and glycogen but more water and lipid. Increases of individual lipids per unit weight of muscle from deficient animals compared with those from control animals were 2.2-fold for gangliosides, 2.18-fold for cholesterol, 1.74-fold for sulfatides, and 1.45-fold for neutral glycosylceramides. Total phospholipids did not change; this was the result of an increase in sphingomyelin (1.47-fold) and a decrease of phosphatidylcholine to 83% of the control, while the other fractions remained unchanged. When the measurements were referred to total muscle, the contents of cholesterol, gangliosides, sulfatides, neutral glycosylceramides and sphingomyelin in muscle from vitamin E-deficient rabbits were also above those of the control rabbits, and only the phosphatidylcholine content was decreased. It was not possible to determine whether the alteration of lipid content preceded or followed the onset of signs of muscular dystrophy.

ACCELERATION OF HEPATIC STEROL SYNTHESIS AFTER A SINGLE DOSE OF THE PORPHYROGENIC CHEMICAL ALLYLISOPROPYLACETAMIDE. L. Taddeini, I. Frantz, Jr. and A. Sanghvi (Depts. of Med., St. Paul Ramsey Hosp. and Univ. of Minn. Hosps., Univ. of Minn. Med. Schl., Minneapolis, MN 55455). *J. Lipid Res.* 15, 84–88 (1974). Hepatic sterol synthesis is accelerated in animals after a single dose of allylisopropylacetamide, a chemical known to be porphyrogenic. Evidence is provided to show that enhanced sterol biosynthesis is due to an increased formation of mevalonic acid, indicating that the primary site of action of the chemical is on one or more steps in the pathway from acetate to mevalonate.

SYMPOSIUM: DEVELOPING FOODS FOR THE CARDIAC CONCERNED. A.M. Altschul (Prof., Dept. of Community Medicine and International Health, Georgetown Univ., School of Med., Washington, DC 20007), R.E. Bown, G. Christakis, S.R. Hoover, P.F. Hopper, O.C. Johnson, G.E. Liningston, W.H. Meyer, R.H. Moshy, E.J. Reid, C.J. Robertson and F.J. Stare. *Food Technol.* 28(1), 16–32 (1974). A summary is given of the papers presented at the symposium on Developing Foods for the Cardiac Concerned at the 1973 IFT Annual Meeting. Discussed are: decreasing the saturated fatty acid content of animal products, vegetable proteins in prudent diet foods, etc.

CALCIUM ACTIVATION OF SOYBEAN LIPOXYGENASE. F. Restrepo, H.E. Snyder and G.L. Zimmerman (Food Technol. Dept., Iowa State Univ., Ames, IA 50010). *J. Food Sci.* 38, 779–82 (1973). Lipoxygenase is known to be activated by calcium (Ca^{2+}) but only under special circumstances. This study confirms that calcium activation depends on the addition of calcium to the reaction mixture before or concurrently with enzyme. We have found that two isozymes of lipoxygenase differ in their response to added calcium. Lipoxygenase 1 is inhibited while lipoxygenase 2 is activated. Also, calcium activation of soybean extracts is eliminated by a procedure for phytate removal, but addition of phytate does not restore the activation. A study of the calcium, lipoxygenase and linoleic acid concentrations on lipoxygenase activity showed that maximum calcium activation varies with linoleic acid concentration but not with lipoxygenase concentration. The mechanism by which calcium activates lipoxygenase is still obscure.

SENSITIVE CELLULOSE COLUMN FOR THE RAPID DETECTION OF AFLATOXINS IN AGRICULTURAL PRODUCTS. M. Jemmail (Service Mycotoxines de l'INRA, 16 rue Nicolas Fortin, 75013 Paris, France). *J. Assn. Off. Anal. Chems.* 56, 1512–13 (1973). A simple and rapid screening method has been developed for the detection of less than 5 parts per billion aflatoxin B_1 in corn. Cellulose tubing is layered with acidic alumina, anhydrous sodium sulfate, and silica gel. The sample is applied to the column, which is developed in chloroform-acetonitrile-2-propanol. A sharp blue fluorescent band is an indication of the presence of aflatoxin. Sulfuric acid treatment, which will yield a yellow color in the presence of aflatoxin, may be used as a further confirmatory test.

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF ALPHA-, BETA-, GAMMA- AND DELTA-BHC LEVELS IN HUMAN BLOOD, DEPOT FAT AND VARIOUS ORGANS WITH THE USE OF 2,2-DIMETHYLPROPANE-1,3-DIOL SUCCINATE AS THE STATIONARY LIQUID PHASE. G. Czegledi-Janko (Inst. for Chem. and Food Analysis, H-1022 Hermann Otto u. 15, Budapest, Hungary). *Analyst* 98, 863–72 (1973). The presence of various BHC isomers in the human organism has received relatively little attention, and studies were often restricted to only one BHC isomer. A previously described one-step extraction and clean-up procedure before GLC determination of organochlorine pesticide residues in human blood has now been applied to various organs and depot

fat. The identification of the BHC isomers was performed by GLC with several stationary phases. 2,2-Dimethylpropane-1,3-diol succinate was found to be the most satisfactory. It gave distinctly separated peaks and characteristic relative retention times.

DISTRIBUTION OF DIELDRIN IN MILK FRACTIONS. C.Y.W. Ang and L.R. Dugan Jr. (Dept. of Food Sci. and Human Nutr., Michigan State Univ., East Lansing, MI 48823). *J. Food Sci.* 38, 791–5 (1973). Dieldrin was found to be distributed in a similar pattern in milk containing added pesticide and milk containing physiologically incorporated pesticide. The relative amounts of dieldrin in various fractions closely resemble the relative amounts of total lipids in these fractions. Comparable levels of residue, on a fat basis, were found in whole milk, skim milk, cream, washed cream, butter and butter-oil. Lower levels were observed in buttermilk and butter serum, and lowest values were found in refined buttermilk, refined butter serum and fat globule membrane pellets. An inverse relationship between the dieldrin concentration and the level of phospholipid and/or high-melting glyceride content apparently exists. The slightly higher concentrations of dieldrin, on a fat basis, observed in refined skim milk might be due to slight solubility of this pesticide in the milk serum. This study suggests that dieldrin has a tendency to be distributed more favorably with the neutral or free lipids in milk regardless of whether it is the original deposition or is in an altered orientation as a consequence of separation.

EFFECT OF FEEDING A PROTECTED SAFFLOWER OIL SUPPLEMENT ON THE COMPOSITION AND PROPERTIES OF THE SARCOPLASMIC RETICULUM AND ON POSTMORTEM CHANGES IN BOVINE SKELETAL MUSCLE. R.P. Newbold, R.K. Tume and D.J. Horgan (CSIRO Div. of Food Res., Meat Res. Lab., Cannon Hill, Queensland, Australia 4170). *J. Food Sci.* 38, 821–3 (1973). Supplementing the diet of steers with safflower oil which had been protected from ruminal hydrogenation by formaldehyde-treated protein led to substantial changes in the fatty acid composition of the phospholipids of the sarcoplasmic reticulum. However, it did not affect the rate or extent of Ca^{2+} uptake, the rate or extent of Ca^{2+} release on cooling, or the basal or extra ATPase activities of the sarcoplasmic reticulum. Nor did it affect the rate and extent of pre-rigor changes such as cold shortening, thaw shortening and fall in pH. In addition the postmortem rates and patterns of change in the concentrations of adenine nucleotides, glycolytic products and intermediates were unaffected. Thus the meat from animals fed a protected polyunsaturated oil supplement does not appear to need different pre-rigor handling to that from unsupplemented animals.

CARBONYL PRODUCTION FROM LIPOLYZED MILK FAT BY THE CONTINUOUS MYCELIAL CULTURE OF PENICILLIUM ROQUEFORTI. D.K. Dwivedi and J.E. Kinsella (Dept. of Food Sci., Cornell Univ., Ithaca, NY 14850). *J. Food Sci.* 39, 83–7 (1974). Continuous cultures of *Penicillium roqueforti* mycelium metabolized free fatty acids from milk fat into CO_2 and carbonyl compounds. Methyl ketones, 2-pentanone, 2-heptanone, 2-nonanone and 2-undecanone, were the major carbonyl compounds produced. Octanoic and decanoic acids seemed to be preferentially utilized. Free fatty acid level, initial pH of growth medium, age of mycelium and salt concentration influenced the length of initial lag phase before fatty acid utilization and carbonyl production occurred. The relative proportion of the major methyl ketones may be altered by varying the free fatty acid level in culture medium.

• Edible Proteins

UTILIZATION OF COTTONSEED WHEY PROTEIN CONCENTRATES PRODUCED BY ULTRAFILTRATION. J.T. Lawhon, S.H.C. Lin, L.W. Rooney, C.M. Cater and K.F. Mattil (Food Protein R&D Ctr., Texas A&M Univ., College Station, TX 77843). *J. Food Sci.* 39, 183–87 (1974). Whey-type liquid by-products from the manufacture of protein isolates from glandless cottonseed flour were processed with semipermeable ultrafiltration (UF) membranes to fractionate and concentrate whey constituents before spray drying. Three different cottonseed wheys resulting from two isolation procedures were processed. The three spray-dried protein products obtained were evaluated for potential use in protein fortification of breads or non-carbonated beverages, and also as whipping products. Separation of carbohydrates and salts (though incomplete) from protein by the UF membrane yielded light cream colored protein-rich products greatly enhanced in whippability and in their utility for beverage fortification over that of unfractionated whey solids. Membrane fractionation significantly increased most of the essential amino acids. Available lysine in the products was increased by more than 50% of the available lysine of the original flour.

VISCOSITY AND WATER ABSORPTION CHARACTERISTICS OF SLURRIES OF SUNFLOWER AND SOYBEAN FLOURS, CONCENTRATES AND ISOLATES. S.E. Fleming, F.W. Sosulski, A. Kilara and E.S. Humbert (Depts. of Crop Sci. and Dairy and Food Sci., Univ. of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N OWO). *J. Food Sci.* 39, 188–91 (1974). The viscosity and water absorption characteristics of slurries of sunflower flours, concentrates and isolates were compared with soy flour, concentrates and isolates. The commercial soy isolate showed higher water absorptions and higher viscosities at each concentration that the soy flour and concentrate while the sunflower concentrates were much more viscous and generally had higher water absorptions than the other sunflower products. The soy flour slurries were more viscous than sunflower flour, whereas the sunflower concentrates were substantially more viscous than the corresponding soy product. The soy isolates showed viscosities much higher than the sunflower isolates. By varying the temperature, mixing regime, slurry medium and slurry concentration, and by pH-activation a product can be altered to produce a wide variety of water absorption and viscosity characteristics.

A COMPARISON OF THE EMULSIFICATION CAPACITIES OF SOME PROTEIN CONCENTRATES. D.D. Crenwelge, C.W. Dill, P.T. Tybor and W.A. Landmann (Depts. of Animal Sci. and Biochem., Texas A&M Univ., College Station, TX 77843). *J. Food Sci.* 39, 175–77 (1974). The emulsification capacities of four proteins were compared under experimental conditions optimized for blendor speed, pH, rate of oil addition and protein concentration. The emulsification capacity (oil phase volume at inversion) for the four proteins indicated that all were good emulsifiers. The amounts of protein required to obtain maximum oil phase volume differed between samples. The amounts of each protein required for this maximum effect were approximately 0.40 for globin. 0.88% for cottonseed protein, 0.98% for soy protein and 1.19% for milk proteins, all expressed as a percentage of the aqueous phase. The emulsification capacity for each protein related closely to the concentration of soluble protein in the sample.

COMPOSITION AND CHARACTERISTICS OF GLANDLESS AND LIQUID CYCLONE PROCESS DEGLANDED COTTONSEED WHEYS. S.H.C. Lin, J.T. Lawhon, C.M. Cater and K.F. Mattil (Food Protein R&D Ctr., Texas A&M Univ., College Station, TX 77843). *J. Food Sci.* 39, 178–82 (1974). Cottonseed wheys are liquid by-products from cottonseed protein isolation processes. These wheys when prepared in the laboratory contained 22–36% of the original flour solids or 12–33% of the flour nitrogen. Differences among various wheys from different processes were clearly indicated by their chemical compositions and gel filtration chromatograms. Whey proteins were water soluble, heat stable and contained up to 7% lysine and 5% cystine. Whey carbohydrates were mainly raffinose and sucrose. Minerals and vitamins in cottonseed wheys were also shown for comparison. Recovery of the utilizable whey constituents to minimize disposal problem was emphasized.

NUTRITIONAL AND CHEMICAL STUDIES OF THREE PROCESSED SOYBEAN FOODS. M. Shemer, L.S. Wei and E.G. Perkins (Dept. of Food Sci., Univ. of Ill., Urbana, IL 61801). *J. Food Sci.* 38, 112–5 (1973). Three different processing methods were used to prepare foods based on whole soybean. Product A was prepared by soaking the beans overnight, blanching at 210F for 20 minutes, blending and drum drying at 40 psig steam. Product B was water-packed canned soybeans, blanched at 210F for 20 minutes and thermally processed in cans at 250F for 60 minutes, then blended, frozen and freeze dried. Product C, a mixture of soy and banana, was prepared by the same method as Product A. The amino acid composition of the three products determined by gas chromatography was compared. The thermally processed product (B) showed a considerable decrease in methionine compared to Product A. Product A showed superior quality, but as a result of methionine supplementation the PER of the thermally processed product (B) was increased. The effect of the different processing procedures on the quality of the end products, such as browning, nitrogen solubility index (NSI) and amino acid partition between the soluble and the nonsoluble fractions was compared. Cost analysis of

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• Abstracts . . .

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the three products shows their economic advantage compared to casein as a protein source.

PROTEIN STRUCTURE AND STABILITY: CONVENTIONAL WISDOM AND NEW PERSPECTIVES. D.B. Wetlaufer (Dept. of Biochem., 227 Millard Hall, Univ. of Minn. Medical School, Minneapolis, MN 55455). *J. Food Sci.* 38, 740–3 (1973). The conventional wisdom on protein structure and stability is reviewed. With occasional exceptions, the conventional wisdom works quite well. However, the thermodynamic basis of the conventional wisdom fails to qualify it for addressing time-related questions such as: "How rapidly can three dimensional structures form, and how long can specific native structure persist in vivo, and under practical in vitro conditions?" A more inclusive, kinetic perspective is required for addressing such questions. Experimental approaches and some practical consequences of the broader kinetic perspective are outlined.

SOME RECENT IDEAS ABOUT THE NATURE OF THE INTERACTIONS BETWEEN PROTEINS AND LIQUID WATER. R. Lumry (Lab. for Biophys. Chem., Dept. of Chem., Univ. of Minn., Minneapolis, MN 55455). *J. Food Sci.* 38, 744–55 (1973). The phenomenological pattern of thermodynamic behavior called "linear enthalpy-entropy compensation" which has been found to characterize many small-solute processes in water solution has been found with protein reactions and provides an experimental pathway for studying the role of water in determining the chemical, physical and specific functional properties of proteins and other biological macromolecules. The pattern is closely related to the source of inhibitor, pH and species specificity in protein reactions. Attempts to determine whether the source is water, the protein or some combination using experimental values for structural parameters of protein suggest that proteins have unique and remarkable properties which must be understood before direct questions about water participation can be studied with any promise of success.

DEEP-FRIED SNACK FOOD PREPARED FROM SOYBEANS AND ONIONS. J.L. Collins and G.G. Sanders (Dept. of Food Technol. and Sci., Univ. of Tenn., Knoxville, TN 37901). *Food Technol.* 27(5), 46–54 (1973). This article details the preparation, sensory evaluation, and analytical testing of a soybean-onion deep-fried snack food.

DIGESTIVE ACCEPTABILITY OF PROTEINS AS MEASURED BY THE INITIAL RATE OF IN VITRO PROTEOLYSIS. J.A. Maga, K. Lorenz and O. Onayemi (Dept. of Food Sci. & Nutr., Colorado State Univ., Fort Collins, CO 80521). *J. Food Sci.* 38, 173–4 (1973). A study was undertaken to measure the initial rate of proteolysis with trypsin of some commonly used protein sources (sodium caseinate, defatted peanut flour, defatted cottonseed flour, FPC and isolated soy proteinate) as a simple in vitro means of measuring gastronomic acceptability. Although differences among proteolysis rates were found, in all products proteolysis occurred in the first few minutes and then remained constant. Sodium caseinate was by far the most easily digestible protein source evaluated: isolated soy proteinate was the least digestible followed by FPC, defatted cottonseed flour and peanut flour. Steaming resulted in faster hydrolysis rates. It was concluded that although certain vegetable proteins may have high nutritional and biochemical values, their digestive acceptability may be quite poor since they are not rapidly hydrolyzed in the digestive system.

NUTRITIONAL STUDIES ON SOYBEAN CURD PRODUCED BY CALCIUM SULFATE PRECIPITATION OF SOYBEAN MILK. D.J. Schroder, J.I. Elliot and H. Jackson (Depts. of Food Sci. and Animal Sci., Univ. of Alberta, Edmonton, Alberta, Canada). *J. Food Sci.* 38, 1091–92 (1973). In view of the considerable variation in nutritive value that can result from processing, an evaluation was made of the soybean curd produced by calcium sulfate precipitation of heated soybean milk. Rats were fed a control diet containing casein as the sole source of protein and a test diet containing soybean curd as the sole source of protein. With either diet males consumed more feed, gained weight faster and were more efficient than females. All differences attributable to sex were significant. The test diet meets all amino acid requirements for rats except methionine; however, the cost of supplementation with methionine would be very small.

EFFECT OF TEMPERATURE ON LIPID EXTRACTION AND FUNCTIONAL PROPERTIES OF FISH PROTEIN CONCENTRATE (FPC). D.L. Dubrow, A. Kramer and A.D. McPhee (College Park Fishery Prod. Tech. Lab., National Marine Fisheries Service, USDC National Oceanic and Atmospheric Admin., College Park, MD 20740). *J. Food Sci.* 38, 1012–15 (1973). Whole fish, red hake *(Urophycis chuss)* was five-stage countercurrent extracted with isopropyl alcohol (IPA) at temperatures of 20, 40 or 50C to determine the effect on lipid extractability and functional properties of the FPC's produced. Analyses were performed to determine residual lipid, lipid composition, protein solubility, suspendable solids, emulsifying capacity-stability, wettability, pH and reflectance. Results showed that five stages of extraction at 20C reduced the residual fish lipids to about 10%. At 40 or 50C, extractability of lipids required four or three stages, respectively, to produce an FPC with 0.5% residual lipid or less. FPC's processed at 20C had better functional properties than those processed at 40–50C. All FPC's showed a decrease in protein solubility and suspended solids and an increase in pH with increased temperature of extraction. Wettability was poor in all samples regardless of extraction temperature.

SOYA ADDITIVES IN BEEF PATTIES. M.D. Judge, C.G. Haugh, G.L. Zachariah, C.E. Parmelee and R.L. Pyle (Depts. of Animal Sci. and Agr. Eng., Purdue Agr. Expt. Sta., West Lafayette, IN 47907). *J. Food Sci.* 39, 137–9 (1974). Research was conducted to evaluate the effects of two soya products (soya flour and soya protein concentrate) on several measures of quality in ground beef patties. The results indicated that the initial levels of fresh meat spoilage organisms were increased slightly by the soya flour. However, neither the flour nor the soya protein concentrate resulted in increased bacterial numbers at the end of a 7-day storage period. The soya products had a measurable effect on color and decreased cooking shrinkage. The ease of removal of interleaving paper from frozen patties was highly dependent on the fat content of the meat. Whereas, the soya additives had no effect on paper release force in patties containing 20% fat, the additives increased the force required for paper removal from those containing 30% fat.

INFLUENCE OF INGREDIENTS UPON EDIBLE PROTEIN-LIPID FILM CHARACTERISTICS. L.C. Wu and R.P. Bates (Food Sci. Dept., Univ. of Fla., Gainesville, FL 32601). *J. Food Sci.* 38, 783–7 (1973). Pure and mixed systems of aqueous slurries from soybean, peanut, cottonseed and milk have been used as substrates for protein-lipid film formation. Film strength, yield, formation rate and protein incorporation efficiency indicated that soymilk, soy protein isolate or cow's milk formed ideal films. Full fat peanut and cottonseed milks required upward adjustment of the protein-lipid ratios for optimal film strength and quality. Whey protein concentrate demonstrated excellent film-forming ability whereas cottage cheese whey did not. Protein-lipid film formation represents a practical technique for both partially concentrating and texturizing protein from dilute solutions while controlling lipid composition and nutritive value.

PREPARATION OF PROTEIN MONOFILAMENTS. D.A. Lange (General Mills Inc.). *U.S. 3,800,053.* Protein monofilaments are prepared from oilseed protein materials and water through the formation of an extrudable plastic mass and its extrusion into a gaseous medium. The products find use as food supplements and as texturizing bases for foods such as meat analogs.

• Drying Oils and Paints

A STUDY OF $CaCrO_4/Fe_2O_3$ PRIMERS IN DIFFERENT MEDIA. S. Guruviah, V. Chandrasekaran, M. Sundaram and K.S. Rajagopalan (Central Electrochemical Res. Inst., Karaikudi, India). *Paintindia* 23(11), 27–9 (1973). A study of the performance of 1:1 and 1:2 $CaCrO_4/Fe_2O_3$ primers in epoxy ester, phenolic tung oil, and linseed stand oil in comparison with zinc chromate in epoxy ester primer. It was concluded from accelerated test and field exposure tests that best performance was obtained with the $CaCrO_4$ 1:1 primer in epoxy ester medium which is slightly better than epoxy ester-zinc chromate primer.

THE IMPROVEMENT OF ADHESIVITY OF OIL BITUMINOUS GLUING VARNISHES. N.D. Gupta (Bharat Heavy Electricals Ltd., Hardwar, India). *Paintindia* 23(11), 23–6 (1973). Bituminous varnishes lose their tackiness after curing. However specifications demand that they have residual tackiness. Hence investigations were taken to solve this difficulty. Based on considerations of the properties of the various components likely to be suitable, it was finally decided to try addition of polymerized linseed oil. Experimental observations have shown that addition of 20% of polymerized linseed oil brings about the desired result without deterioration of the electrical properties.

POLYBASIC ACIDS FROM SAFFLOWER OIL. B.G.K. Murthy and G.S R. Sastry. *J. Col. Soc.* 12 No 1, 1–4 (1974). Conjugated safflower oil fatty acids (64.2% conjugated linoleic acid) have been prepared by the alkali isomerisation of safflower oil using caustic soda in presence of rectified spirit (95%). Polybasic acids have been prepared in good yields by Diels-Alder synthesis using isomerised safflower oil fatty acids (dienes) and maleic and itaconic anhydrides, acids, acrylic, methacrylic, crotonic and cinnamic acids (dienophils). The utilisation of some of these polybasic acids as alkyd resin modifiers has been studied by replacement of 25–50% of oil and phthalic anhydride by Diels-Alder adducts in the preparation of 60% oil length alkyd resins. The alkyl esters of these polybasic acids and their epoxy derivatives are being investigated as plasticisers for polyvinyl chloride or polyvinyl alcohol resins. (World Surface Coatings Abs. No. 378)

• Fatty Acid Derivatives

THE IMPORTANCE OF INTRAMOLECULAR ASSOCIATIONS IN THE CHEMICAL IONIZATION MASS SPECTRA OF MONOENOIC AND MONOEPOXY FATTY ACID METHYL ESTERS. R.J. Weinkam (Dept. of Pharmaceutical Chem., Schl. of Pharmacy, Univ. of Cal., San Francisco, Cal. 94143). *J. Amer. Chem. Soc.* 96, 1032–7 (1974). The isobutane chemical ionization mass spectra are reported for some monoenoic fatty acids, methyl esters and monoepoxy methyl esters. The enhanced fragmentation observed in the epoxy methyl esters is explained in terms of exothermic intramolecular hydrogen bond formation in the *protonated molecular ions*. The presence of intramolecular hydrogen bonding in bifunctional ions is supported by the observed efficient gas phase hydrolysis and transesterification reactions of the epoxy methyl esters when water and deuteriomethanol are used as reagent gases. The spectra of the epoxide derivative indicate the position, but not the stereochemistry, of the double bond in the olefinic side chain.

EPOXY ACIDS AND EPOXIDIZED OILS. M.M. Hassan El-Mallah and S M. El-Shami (Cairo, Egypt). *Seifen-Öle-Fette-Wachse* 100(2), 29 31 (1974). The course of in-situ epoxidation of butyl oleate was studied with the help of thin-layer as well as column chromatography. The preparative thin-layer chromatography assisted in the determination of the residual unsaturation from which the corresponding iodine value could be calculated. By the application of column chromatography, it was possible to isolate the non-reacted unsaturates, two epoxy isomers and two secondary products. The isolated fractions were subjected to infra-red analysis for their characterization.

STABLE LIQUID EMULSIFIER COMPOSITIONS. R.K. Langhans and G.A. Sunshine (ICI America, Inc.). *U.S. 3,795,627.* Temperature-stable, clear liquid emulsifier baking compositions consist of an ethoxylated fatty acid ester of a glycerol, hexitol, hexitan, or an isohexide as a conditioner and a monoglyceride as a softener in combination with a small amount of a clarifier, propylene glycol monooleate. The compositions are suitable for the continuous manufacture of baked goods. They may be metered into the shortening or directly into the dough or sponge in batch processes or into the liquid brew in continuous processes.

ESTER SYNTHESIS FOR PREPARATION OF SYNTHETIC FATS. L.C. Mitchell, P. Kobetz and W. Burns (Ethyl Corp.). *U.S. 3,796,736.* Use of catalytic quantities of amines such as 2,6-lutidine in the reaction of a carboxylic acid with epihalohydrin, or ester derivative promotes opening of the epoxy ring to form 1-propyl ester with a minimal amount of 2-propyl ester.

BAKERY PRODUCTS WITH A NONHYDROPHILIC AGENT, POLYPROPYLENE GLYCOL. J.R. Moneymaker and C.J. Forsythe (Top-Scor Products, Inc.). *U.S. 3,796,810.* Yeast-raised bakery products show improvements in various desirable characteristics upon the incorporation into the dough of polypropylene glycol having an average molecular weight of 1000–5000. This is a departure from traditional bakery product additives which have been classified broadly as "lipid type." The polypropylene glycols are predominantly hydrophobic, while lipid type additives contain both a functional hydrophilic and a functional hydrophobic moiety.

PREPARATION OF SOYBEAN PHOSPHATIDES. H. Shimazaki, N. Mitsuura, and A. Tsukamoto (Ajinomoto Co.). *U.S. 3,798,246.* Crude phosphatides recovered from soybean oil in a conventional manner are purified of undesirable color and odor by contacting a solution thereof in hexane with activated silica gel for at least 20 minutes, separating the silica gel from the solution, and evaporating the solvent. The purified material has a lighter color, more pleasing odor and flavor, and reduced acid and peroxide values. The silica gel may be returned to the process after washing in lower alkanols.

• Detergents

DIFFUSION OF NITROXYL SPIN PROBES IN MICELLAR DETERGENT SOLUTIONS. J. Brotherus and P. Törmälä (Dept. Biochem. and Dept. of Wood and Polymer Chem., U. of Helsinki, Finland). *Koll.-Z. u. Z. Polymere* 251, 774–5 (1973). Recent studies with nitroxyl radicals have elucidated the dynamic nature of solubilization of small molecules by ionic detergents as well as the dynamics of detergent molecules themselves. Times of solubilized spin probes confirm that the interior of a micelle is in a liquid condition. The notion of the fluid interior of the micelle can be extended to comprise the micelle surface which also seems rather loose in spite of the high electrostatic potential due to the partially ionized detergent polar groups.

POWDERY SOFTENING RINSING AGENT COMPOSITIONS. H.-W. Eckert and C. Werner (Henkel & Cie). *U.S. 3,795,610.* The composition comprises a combination of (1) an unsaturated carboxylic acid ester, (2) nonionic dispersing agents, (3) at least one solid diluent, and (4) other customary ingredients of solid softening rinsing agents for washed laundry. Component (1) is present (a) in a homogeneous mixture with the other components, or (b) in finely distributed form on the surface of component (3).

FABRIC SOFTENING COMPOSITIONS. H.E. Wixon (Colgate-Palmolive Co.). *U.S. 3,795,611.* The composition comprises the higher alkyl amides of 2-amino-2-methyl-1-propanol or 2-amino-2-ethyl-1,3-propanediol either alone or in combination with detergent materials.

BLEACHING COMPOSITIONS. X. Kowalski (Monsanto Co.). *U.S. 3,795,625.* The compositions are alkaline aqueous solutions containing a peroxy compound, an alkali metal silicate, and a stabilizer for reducing decomposition of the peroxy compound. An example is a combination of nitrilotriacetic acid, 1-hydroxy ethylidene-1,1-diphosphonic acid, and a magnesium or calcium salt. The compositions are useful for bleaching textile fabrics.

SOAP BAR. L.G. Allen (The Raymond Lee Organization, Inc.). *U.S. 3,796,665.* A buoyant cake of soap is formed of composite construction, the core consisting of an insoluble material such as plastic or wood, with the outer layer consisting of soap. A looped cord of plastic material is fastened to the insoluble core. The soap bar may be hung from the cord when not in use.

DETERGENT COMPOSITION. H.M. Priestley and J.H. Wilson (Lever Bros.). *U.S. 3,796,759.* Various sulfoxide compounds, such as dodecyl glyceryl sulfoxide, sulfide compounds, such as dodecyl acetonyl sulfide, and dodecyloxyethoxyethyl chloride are disclosed as suds stabilizer additives or intermediates therefor.

DETERGENT COMPOSITION. L. Tumerman (Krafteo Corp.). *U.S. 3,798,168.* The composition comprises an organic surface active detergent and an aluminate or borate compound of α-hydroxy carboxylic acids.

COMPOSITION FOR APPLICATION OF SOIL-RELEASE FINISH. R.E. Dickson and S.M. Barkin (Colgate-Palmolive Co.). *U.S. 3,798,169.* A composition for applying a nonpermanent soil-release finish to fabrics from dilute solution comprises a polycarboxylate polymer having an acid equivalent weight of 110–175, and a water soluble salt of a polyvalent metal. A preferred composition is a copolymer of ⅔ methacrylic acid and ⅓ ethyl acrylate. The composition is particularly useful in the rinse cycle of a home laundry process.

GRANULAR FREE FLOWING DETERGENT BATH COMPOSITION. J.A. Hellyer (Procter & Gamble). *U.S. 3,798,179.* The composition consists of a water soluble synthetic organic detergent and a microencapsulated water immiscible emollient (e.g., mineral oil or a mixture of mineral oil with isopropyl myristate). The microencapsulated bath oil has a hydrolyzed protein encapsulating wall material soluble in water at a temperature of

75–115 F to release the oil therefrom. In the bath, the compositions provide combined sudsing and skin emollient effects without mutual antagonism or interaction, providing a floating layer of emollient beneath a layer of suds. An alkaline builder salt such as sodium tripolyphosphate may also be used in combination with the detergent.

BUILDER-CONTAINING DETERGENT COMPOSITIONS. H. Westernacher (Chemische Werke Huls Ag.). *U.S. 3,798,180.* The builder is a water soluble salt of an amino partial amide of a polymeric carboxylic acid, e.g., styrene-maleic anhydride copolymer.

ENZYMATIC DETERGENT BAR. S.M. Vazquez (Colgate-Palmolive Co.). *U.S. 3,798,181.* The bar comprises a synthetic organic detergent; an enzyme, e.g., a protease; a builder or filter salt, e.g., alkali metal carbonate, alkali metal sulfate; a binder, e.g., corn starch; and water in such proportions as result in production of a form-retaining, hard, nontacky, readily soluble bar. A method for producing the bar is also disclosed.

MILDNESS ADDITIVE. R. Kelly and E.J. Ritter. *U.S. 3,798,182.* Formulations containing a skin irritating detergent have as an additive for reducing the irritation a compound with the formula: Y—R—Y′. R is a divalent organic radical containing a chain of at least 15 carbon atoms between the open valence of the radical, the majority of which are carbon atoms, and containing a cyclic moiety of at least 5 atoms. Y and Y′ are polar groups containing at least one nitrogen, oxygen, sulfur or phosphorus atom, or combination thereof.

DETERGENT BUILDER COMPOSITION. H.A. Bruson and H. Gould (Milchem Inc.). *U.S. 3,798,183.* The builder has the following formula: $NaOOC-CH_2-CH(SO_2Na)-COONa$.

PREPARATION OF A MILK SUBSTITUTE. A.C.-Y. Peng (Swift & Co.). *U.S. 3,798,339.* A nutritious milk substitute type product is prepared by mixing soybean material with certain milk materials, particularly whey, in a liquid mixture and then boiling and grinding the mixture to a smooth consistency. The characteristic beany flavor of the soybean materials will thereby be greatly reduced. Full fat, defatted toasted and untoasted whole and cracked beans as well as flaked beans and soy flour may be utilized. The mixture thus prepared may be further processed to produce a dry powder than can be reconstituted by mixing with water.

METHOD FOR CLEANING DISHES. A. Franke and K.L. Heinz (Lever Bros. Co.). *U.S. 3,799,879.* The method comprises applying to the dishes an aqueous solution of a dishwashing composition containing an amylolytic enzyme prepared from bacteria or fungi together with a detergent surfactant and a water soluble builder salt. The composition has a pH of 7–9 at a concentration of 3 g/l in aqueous solution.

SPRAY DRIED CONTROLLED DENSITY DETERGENT COMPOSITION. W.A. Kelly, L.H. Lander and F.C. Mlcoch Jr. (Lever Bros. Co.). *U.S. 3,799,880.* Soap and a resin which is a copolymer of maleic anhydride and either ethylene or methyl vinyl ether are used in combination as additives to nonionic detergent crutcher slurries to be spray dried for the purpose of controlling the bulk density of the spray dried product within a desirably low range.

SURFACE ACTIVE AGENT. Y. Nakamura, R. Ito, S. Aman and K. Kojima (Toho Chem. Ind. Co.). *U.S. 3,799,956.* The agent comprises a phosphorus triester-type compound having the following formula: $R_1O-P(OR_2)-OR_3$. R_1 is a conventional nonionic surface active agent residue to which ethylene oxide or both ethylene oxide and propylene oxide is added, and R_2 and R_3 are conventional nonionic surface active agent residues to which ethylene oxide or both ethylene oxide and propylene oxide are added or an alkyl group having 8–22 carbon atoms. The surface active agent is superior in surface activity, heat-resisting stability and a reduced foaming property.