ABSTRACTS

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

• Fats and Oils

MODIFIED RECTIFICATION OF TALL OIL. G.A. Uzlov, I.P. Zhukova, G.M. Kubetskii and V.Ya. Mukhina. *Gidroliz. Lesokhim. Prom.* 25(3), 22-4 (1972). The rectification equipment for tall oil at the Kotlas pulp and paper mill consists of 3 columns, the fatty acid fraction with a low content of rosin acids being obtained in the second column. The rosin acids are separated on the first column and, in the third column, the unsaponifiables are separated from the fatty acids. The rosin which was obtained in this equipment conformed to standard, while the fatty acids were strongly coloured and many complaints were received from consumers (mainly the paint industry). An investigation of the causes of colour disclosed that it resulted from corrosion of the equipment. The problem was eliminated by modifying the rectification procedure. (World Surface Coatings Abs. No. 380)

ACID COMPOSITION OF THE NON-OXIDIZED FRACTION SEPARATED FROM OXIDIZED OIL. J. Sawicki and H. Niewiadomski (Dept. of Fat Chem. and Technol., Gdansk Tech. Univ., Gdansk, Poland). *Roczniki Technol. Chem. Zywnosci* 19, 123-31 (1970). The autoxidation of red fish oil and rapeseed oil, at the temperatures of 37C and 55C was carried out. Oils before autoxidation, as well as oil samples taken during the oxidation process were separated by column chromatography on alumina. About 40 g adsorbent were used for the separation of 6 g oil. The non-oxidized fraction of oil (apolar fraction) was obtained by washing the column with 200 ml benzine. The amount of the apolar fraction and its acid composition in relation to the Peroxide Value were determined. The amount of apolar fraction was observed to diminish with an increase in the Peroxide Value; its fatty acid composition did, however, not change. This may be explained by the fact that autoxidation of fatty acids in triglycerides is non-selective.

INTERESTERIFICATION OF GLYCERIDES. J.J. Muller and T.J. Kock (Lever Bros. Co.). *U.S. 3,809,709.* Random and direct interesterification processes of glycerides can be accelerated by carrying out the processes at −30 to 150C in the presence of both an alkali metal or its catalytically active derivative and an aliphatic ketone containing 3 to 32 carbon atoms.

LOW CALORIE TOPPING, SPREAD, AND FROZEN DESSERT. J.L. Gabby, D.D. Corbin and J.B. Lowe (The Drackett Co.). *U.S. 3,809,764.* Low fat imitation oleaginous spreads, whipped toppings or ice cream are prepared by whipping an aqueous dispersion containing from 0.3 to 7.5% of a polyglycerol fatty ester and 0.2 to 3% of a hydrophilic colloid which acts as a stabilizer for the foam. No fat or oil as such is required in the preparation.

PRODUCTION OF FOODSTUFFS IN THE FORM OF POWDERS. A.O.T. Bratland. *U.S. 3,809,765.* A powdered foodstuff is prepared by initially mixing a milk membrane substance concentrate with a milk product and a fat. The mixture is emulsified and then homogenized after which it is dried. The milk product ingredient is selected from the group consisting of buttermilk, skim milk, whole milk, and mixtures of these while the fat is selected from the group consisting of cream, milk fat, vegetable fat, butter, animal fat and mixtures of these. The drying can be carried out by freeze drying or spray drying.

PRODUCTION OF ENHANCED FREEZE DRIED COFFEE. R.P. Stolz (General Foods Corp.). *U.S. 3,809,766.* An aromatized glyceride is distributed in discrete particle or droplet form onto the surface of a slab of partially frozen coffee extract which is then completely frozen, comminuted, and freeze dried. The aromatized glyceride may be in the form of frozen particles, and the aromatized slab of coffee extract may be covered with an upper layer of extract.

PRODUCTION OF ENHANCED SOLUBLE FOODSTUFFS. M.D. Jolly, G.A. Jasovsky, R.A. Vitti, G.J. De Ceglie, A.T. Nacci and H. Schechter (General Foods Corp.). *U.S. 3,809,770.* Soluble foodstuffs, such as soluble coffee, are enhanced by incorporating volatile enhancers into a liquid glyceride carrier, such as an oil, and then blending the enhanced glyceride with a liquid comestible maintained at a sufficiently low temperature to congeal the glyceride. The liquid comestible is preferably in the form of a slush. The liquid, containing particles of congealed glyceride uniformly distributed throughout, is then dried, preferably by freeze drying.

• Fatty Acid Derivatives

FATTY ACID AMIDE LUBRICANTS. R. Havinga and P.D. Swaters (Koninklijke Industrieele Maatschappij Noury & Van Der Lande N.V.). *U.S. 3,809,706.* N-acylmorpholines and N-mono and N,N-disubstituted fatty acid amides and similar derivatives of epithioamides are useful as base and extreme pressure lubricants and additives.

SYNTHESIS OF MIXED POLYOL ESTERS. J.J. Yetter (Procter & Gamble). *U.S. 3,809,711.* A partial polyol monocarboxylic acid ester is reacted with an acidic anhydride in the presence of a perfluoroalkyl sulfonic acid catalyst to produce specific complete mixed polyol esters, especially synthetic cocoa butter, with substantially no ester group rearrangement.

Ibid. U.S. 3,809,712. Similar to *U.S. 3,809,711* except that hydrogen bromide is claimed as the catalyst.

PREPARATION OF A FAT-CONTAINING POWDERED MILK PRODUCT. T. Nagasawa, T. Ryoki, T. Shinozaki, T. Watanabe and M. Kanayama (Morinaga Milk Ind. Co.). *U.S. 3,810,765.* The product which is readily soluble in cold water is obtained by

• Committee reports . . .

(Continued from page 580A)

ties and interests in the field of mycotoxins, and advised AOCS Mycotoxin Subcommittee members of activities of the joint committee.

Standards Committee
G.E. Goheen

The scope and membership of the Standards Committee is listed on page 22 of the Society's Directory for 1973-74.

Flavor Nomenclature and Standards presented a progress report (paper 25) at the Flavor Research in Fats and Fat Containing Foods held in New Orleans at the AOCS 1973 Spring Meeting. We have had ca. a dozen requests for this report from all over the world. The work we are doing in correlating an instrumental technique with flavor scores also was reported in New Orleans (paper 26) and also at the Fall AOCS 1973 (paper 86). At present, using gas liquid chromatography to evaluate the volatile components of oil flavor, we have found correlation coefficients for pentanal and hexanal contents vs flavor scores for a series of oil samples to be in the range of 0.75-0.96. We presently are working on Wesson Oil from Hunt-Wesson, safflower oil from Kraftco, Corn Oil from CPI, corn oil from Best Foods, and deodorized lard from Swift. A report of this data was made at the Mexico City Meeting at a committee meeting and the flavor symposium.

Proposed chapters on the "Nomenclature of Acylglycerols (Glycerides)" and the "Nomenclature of Alcohols and Simple Esters" are under review. A chapter on the "Nomenclature of Organic Nitrogen Compounds" was revised recently and will be circulated for review. A chapter on the "Nomenclature of Sphingolipids" is under consideration.

AOCS Procedure M 1-59 on the "Determination of Precision of Analytical Methods" was revised. Section H of the *Official and Tentative Methods of the AOCS* entitled "Specifications for Reagents, Supplies, and Apparatus" was reviewed, but no changes were made. ■

mixing a powdered milk with a kneaded, powdered lecithin-sugar mixture prepared by causing 0.2–1.5% of lecithin to be adsorbed in a water soluble saccharide.

PREPARATION OF HIGHER FATTY ACID ANHYDRIDES. J.B. McKelvey and R.R. Benerito (U.S. Sec'y of Agriculture). *U.S. 3,813,421.* The use of epoxides in the preparation of higher fatty acid anhydrides is disclosed.

DOUGH CONDITIONER. T.J. Kozak (SCM Corp.). *U.S. 3,806,604.* Shock resistance of bread dough compositions is increased by including therein a nonagglomerating and free-flowing particulate solid dough conditioner consisting of 70–90 parts of a polyoxyethylene derivative of a fatty acid ester of glycerol or propylene glycol and a partial glyceride. The ratio of these two components can range from 60:40 to 40:60. In addition, there is included 10–30 parts of triglyceride having a Wiley melting point of at least 140F.

LOW FAT WHIP TOPPING. B.A. Patterson. *U.S. 3,806,605.* The temperature stable, whippable composition can undergo repeated freeze-thaw cycles without adverse effects. It contains controlled amounts of at least one edible vegetable glyceride fat, a combination of mono- and diglycerides and lactylic esters of fatty acids, at least one nonionic emulsifying agent, a milk soluble sodium alginate, calcium gluconate, starch, sugar, salt, hydroxylpropyl cellulose and the balance water.

• Biochemistry and Nutrition

LIPID COMPOSITION OF LIVERS FROM LAYING HENS. R.H. Thayer, E.C. Nelson, E.T. Clemens, R.R. Johnson and A.L. Malle (Depts. of Animal Sci. and Industry, Biochem. and Vet. Pathol., Okla. Agr. Exp. Station, Okla. State Univ., Stillwater, Okla. 74074). *Poultry Sci.* 52, 2270–5 (1973). The changes in the quantity and composition of the lipid present in the liver during an egg production period of 36 weeks are reported. Total lipid concentration increased due to an increase in triglycerides. There was a significant change in the relative distribution of several fatty acids during the first 4 weeks: palmitate and stearate decreased, 29 and 38%, respectively; while oleate and linoleate increased, 46 and 48% respectively. With the exception of linoleate, which increased, the relative concentration of the fatty acids in the triglyceride fraction remained constant during the remainder of the laying period. Phospholipid content was somewhat variable with age, but made no major contribution to the increase in total lipid concentration. There were no significant differences in the percentage of cholesterol or cholesteryl ester in the dry liver relative to age or lipid concentration.

THE ENZYMOLOGY OF SHORT-CHAIN FATTY ACYL-COENZYME A SYNTHETASE FROM SEEDS OF PINUS RADIATA. O.A. Young and J.W. Anderson (Dept. of Bot., La Trobe Univ., Bundoora, Vic. 3083, Australia). *Biochem. J.* 137, 435–42 (1974). Short-chain fatty acyl-CoA synthetase from seeds of *Pinus radiata* was examined by acetate- and propionate-dependent PP_i-ATP exchange. Reaction mixtures came to equilibrium almost instantly as judged by rates of exchange and analysis of an incubation mixture. It was concluded that the first partial reaction catalysed by the enzyme is ordered; ATP is the first substrate to react with the enzyme and PP_i is probably the only product released.

STARVATION-INDUCED KETOSIS: REDUCTION IN DOGS ENRICHED WITH ODD-CARBON FATTY ACIDS. F. Xavier Pi-Sunyer (Med. Service, St. Luke's Hosp. Center and the Dept. of Med., College of Physicians and Surgeons, Columbia Univ., New York, N.Y.). *Proc. Soc. Exp. Biol. Med.* 145, 786–9 (1974). For 13 weeks, a litter of weanling dogs was fed a nutritionally complete diet containing 40% of its calories as fat: cottonseed oil exclusively in the control group (three dogs) (C) and triundecanoin substituted for 50% of the fat calories in the experimental group (four dogs) (E). In E, 23% of the total adipose tissue fatty acids were odd numbered. Throughout an 8-day fast, serum glucose concentration was maintained significantly higher in E than in C. Blood acetoacetate and beta-hydroxybutyrate were significantly lower in E than in C. On the eighth day of fasting, a greater mobilizable liver glycogen reserve was found in E. Thus, ketogenesis during fasting is strikingly inhibited in the odd-carbon-enriched animal. This inhibition is thought to relate directly to maintenance during starvation of blood glucose and insulin concentrations at appreciably higher values than is usual.

INDUCED FATTY LIVER-HEMORRHAGIC SYNDROME (FLHS) AND ACCUMULATION OF HEPATIC LIPID IN FORCE-FED LAYING CHICKENS. J.H. Wolford and D. Polin (Poultry Sci. Dept., Michigan State Univ., East Lansing, Mich. 48823). *Poultry Sci.* 53, 65–74 (1974). Weights of the liver components (water, lipid and non-lipid dry weight) were increased in adult female chickens proportional to the amounts of feed force-fed for 21 days at daily amounts up to 50% more than ad libitum fed control birds. Despite being force-fed, all force-fed chickens consumed feed, ad libitum, at amounts inversely proportional to the rate of force-feeding. Hepatic hemorrhages characteristic of Fatty Liver-Hemorrhagic Syndrome (FLHS) were induced in these force-fed birds and the hemorrhagic score, in particular, as well as, the hemorrhagic incidence were directly related to the total daily feed intake and to hepatic fatty metamorphosis. The excellent reproducibility of the experimental data from three experiments using gradient doses of force-feeding suggests that the force-feeding technique is adaptable to an assay procedure.

UTILIZATION OF FATTY ACID SUPPLEMENTS BY CULTURED ANIMAL CELLS. R.E. Williams, Bernadine J. Wisneiski, H.G. Rittenhouse and C.F. Fox (Dept. of Bacteriol. and the Molecular Biol. Inst., Univ. of Calif., Los Angeles, Cal. 90024). *Biochemistry* 13, 1969–77 (1974). Animal cells cultured in serum-free minimal essential medium (Eagle) containing a biotin antagonist can effectively utilize fatty acids from Tweens (sorbitan-fatty acid esters) provided as medium supplements. The fatty acid composition of the major phospholipids, phosphatidylethanolamine and phosphatidylcholine, was determined after mouse fibroblasts (LM cells) were grown in medium supplemented with Tweens synthesized to specifically contain an odd chain, unbranched, saturated fatty acid (C_{15}–C_{21}), an even chain, unbranched, saturated fatty acid (C_{16}–C_{22}), or an unsaturated or polyunsaturated fatty acid. Cells grown in serum-free medium without a Tween supplement had a phospholipid fatty acid composition approximately 26% saturated. The fatty acid content of the cellular phospholipids was not significantly altered when cells were grown with Tween supplements that contained even chain saturated fatty acids ranging from C_{16} to C_{22}. The lipids derived from cells grown with the C_{20} or C_{22} acids did not contain significantly more C_{20} or C_{22} fatty acids in phospholipids than cells grown with Tween containing hexadecanoic or octadecanoic acids.

GENETIC BASIS OF YOLK CHOLESTEROL CONTENT. K.W. Washburn and D.F. Nix (Dept. of Poultry Sci., Univ. of Georgia, Athens, Ga. 30602). *Poultry Sci.* 53, 109–15 (1974). The genetic basis of yolk cholesterol level was studied in two randombred populations (AC and ARB) of domestic fowl. The association of yolk cholesterol levels with blood cholesterol levels, fertility, hatchability, mortality, egg production and specific gravity were also examined. The yolk cholesterol con-

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Papers needed for conference on disposal of residues

Information Transfer, Inc., in cooperation with the Environmental Protection Agency, is calling for papers for the National Conference on the Management and Disposal of Residues from the Treatment of Industrial Wastewaters. The conference will be held in February 1975.

The subjects to be included are: planning, individual source management, regional management, institutional problems, wastewater treatment methods, residue characterization, residue treatment, residue collection and techniques, regional management, residue handling, resource recovery and reuse, and institutional techniques and problem areas.

Persons interested in presenting papers should submit a 350 word abstract. Papers accepted will be required by January 31, 1975. The closing date for receipt of abstracts is September 30, 1974.

Send abstracts to: National Conference on Management and Disposal of Industrial Wastewater Treatment Residues, c/o Environmental Quality Systems, Inc., 6110 Executive Blvd., Suite 750, Rockville, Md. 20852. ■

• Abstracts . . .

(Continued from page 582A)

tent in the AC population was 22.8 ± 2.8 mgs. cholesterol per gram of yolk compared to 19.2 ± 1.2 mgs. in the ARB population. There was a significant sire effect on yolk cholesterol level in both populations, but the variability was greater in the AC population. The mean heritability estimate for yolk cholesterol in the AC population was 0.3, while for the ARB population it was 0.2. There was no statistically significant phenotype correlation between yolk cholesterol level and hatchability, fertility, specific gravity or mortality. A significant correlation between yolk cholesterol level and egg production was observed, but this correlation was of low magnitude.

HYPERVITAMINOSIS D AND GLYCOSAMINOGLYCAN METABOLISM IN RATS FED NORMAL AND HIGH FAT CHOLESTEROL DIETS. S.T. Vijayakumar and P.A. Kurup (Dept. of Biochem., Univ. of Kerala, Trivandrum—695 001, India). *J. Nutr.* 104, 423–9 (1974). Hypervitaminosis D for a period of 3 weeks was found to result in increased total cholesterol, phospholipid and triglyceride levels of the serum, liver and aorta in both normal and high fat cholesterol diet-fed rats, the extent of increase being more in the latter group. Hypervitaminosis D was also found to result in decrease in the glycosaminoglycans—hyaluronic acid, heparan sulphate, chondroitin sulphates A, B and C and heparin—in the aorta of rats fed normal and high cholesterol diets, the decrease being more in the latter group. The lipoprotein lipase activity was found to decrease in the aorta, liver and heart of rats fed massive doses of vitamin D. DNA, RNA and soluble proteins were also found to decrease in the liver and aorta, while collagen was found to increase and elastin to decrease in the aorta. All these changes were observed to a greater extent in the high fat cholesterol diet fed rats receiving massive doses of vitamin D, as compared to the normal diet-fed rats receiving vitamin D.

IN VITRO PHOSPHATE TRANSPORT IN CHICK ILEUM: EFFECT OF CHOLECALCIFEROL, CALCIUM, SODIUM AND METABOLIC INHIBITORS. A.N. Taylor (Dept. of Phys. Biol., N.Y. State Vet. Coll., Cornell Univ., Ithaca, N.Y. 14850). *J. Nutr.* 104, 489–94 (1974). Three parameters of phosphate transport were monitored in everted gut sacs prepared from the ileum of rachitic chicks injected with cholecalciferol 48 hours before use and untreated rachitic chicks by measuring tracer ^{32}P movement: transfer from the outside (mucosal) compartment to inside (serosal) compartment; total transfer out of mucosal compartment, i.e., into intestinal tissue plus serosal compartment; and retention in the tissue. All three significantly increased by prior administration of cholecalciferol. When glycolysis was inhibited with metabolic inhibitors, the uptake and storage of phosphate was reduced by everted gut sacs from both rachitic and vitamin D-treated chicks. The inhibitor of intestinal alkaline phosphatase, L-phenylalanine, did not inhibit phosphate transport; contrariwise, it significantly increased tissue uptake and storage of phosphate by a mechanism not elucidated in these studies.

EFFECT OF DIETARY PROTEIN AND FAT ON THE PLASMA CHOLESTEROL AND PACKED CELL VOLUME OF CHICKENS EXPOSED TO DIFFERENT ENVIRONMENTAL TEMPERATURES. K.F.A. Soliman and T.M. Huston (Dept. of Poultry Sci., Univ. of Georgia, Athens, Ga. 30601). *Poultry Sci.* 53, 161–6 (1974). The effect of different levels of dietary protein and poultry fat on plasma cholesterol in White Plymouth Rock chickens was studied at three different environmental temperatures (8C, 19C and 30C). An inverse relationship between dietary protein and plasma cholesterol existed when poultry fat was added. Environmental temperature significantly influenced the plasma cholesterol level. Birds at 30C had a lower cholesterol level than similar groups at 8C or 19C. Increases in protein levels of diet from 22% to 25% did not affect the packed cell volume (pcv) significantly. Adding 5% poultry fat to the diet resulted in a significant increase in the pcv. However, no additional increase occurred with the increase of added poultry fat from 5% to 10%. The blood of birds maintained in hot environmental temperature (30C) was found to have significantly higher water content than those of the other two groups.

CHOLESTERYL ESTER METABOLISM IN LIVER AND BLOOD PLASMA OF VARIOUS ANIMAL SPECIES. K.T. Stokke (Inst. of Clinical Biochem., Univ. of Oslo, Rikshospitalet, Oslo 1, Norway). *Atherosclerosis* 19, 393–406 (1974). In eight different animal species the activities of the following enzymes were determined: (1) the plasma lecithin: cholesterol acyltransferase (LCAT); (2) the liver microsomal acyl-CoA:cholesterol acyltransferase; and (3) the liver lysosomal acid cholesterol esterase. In addition, the plasma and liver concentrations of free and esterified cholesterol were determined. The activities of the three enzymes differed considerably in the various animal species. The highest LCAT activity was observed in monkey and man, whereas calf displayed a rather low activity. In human no acyl-CoA: cholesterol acyltransferase could be demonstrated, and in liver from guinea pig a very low activity was observed. This is in contrast to the high activity found in rat liver. The highest cholesteryl ester hydrolyzing activity (at pH 4.5) was observed in rabbit and calf liver, whereas the hydrolytic activity in liver from rat, guinea pig, dog and swine was rather low.

PROTEIN SYNTHESIS IN THE SKELETAL MUSCLE OF VITAMIN E-DEFICIENT RABBITS. P. Simard and U. Srivastava (Inst. de dietetique et de nutrition, Faculte de Medecine, Universite de Montreal, Montreal 101, P.Q.). *J. Nutr.* 104, 521–31 (1974). A ribosomal system, permitting the incorporation of phenylalanine-^{14}C into proteins was used to evaluate protein synthesis in the muscle of control and vitamin E-deficient rabbits at various time intervals ranging from 1 to 4 weeks. Protein synthesis in the deficient muscle was always higher than in the control. The difference was significant only after 3 weeks of deficiency. The addition of poly-uridylic acid (poly-U) increased considerably the incorporation in the deficient muscle, indicating the possibility of reduction of messenger RNA in the deficient muscle. This was further confirmed by the sucrose density gradient analysis of the ribosomes of normal and deficient muscle. Such studies indicated that in the deficient muscle the heavier polysomal material decreased, whereas the lighter polysomes increased. When the poly-U was added, the ribosomal profile of deficient muscle became identical to that of control. The pH 5 enzyme fraction of the deficient muscle increased the incorporation at 3 weeks. It did not show the constant and remarkable changes that were observed in the muscle of genetically dystrophic mice. These studies indicate that deficiency of vitamin E could cause a shift in the synthesis of specific muscle proteins.

ARACHIDONIC ACID CAUSES SUDDEN DEATH IN RABBITS. M.J. Silver, W. Hoch, J.J. Kocsis, C.M. Ingerman and J.B. Smith (Cardeza Found. and Depts. of Phar. and Pathol., Thomas Jefferson Univ., Philadelphia, Pa. 19107). *Science* 183, 1085–7 (1974). Injection of sodium arachidonate (1.4 milligrams per kilogram) into the marginal ear veins of rabbits caused death within 3 minutes. Histological examination showed platelet thrombi in the microvasculature of the lungs. Rabbits were protected from the lethal effects of arachidonic acid by pretreatment with aspirin. Fatty acids closely related to arachidonic acid did not cause death.

CHANGES IN APOLIPOPROTEINS AND PROPERTIES OF RABBIT VERY LOW DENSITY LIPOPROTEINS ON INDUCTION OF CHOLESTEREMIA. V.G. Shore and R.G. Hart (Biomed. Div., Lawrence Livermore Lab., Univ. of Cal., Livermore, Cal. 94550). *Biochemistry* 13, 1579-84 (1974). The cholesteremia induced in rabbits by a diet of the usual rabbit food plus 1% cholesterol is manifest in very high levels of serum very low density lipoproteins (VLDL, $d < 1.006$ g/cm^3). The low density lipoproteins are moderately

Grain storage and marketing short course held

Ca. 25 students from various countries participated in the fourth annual U.S. Agency for International Development "Grain Storage and Marketing Short Course" which was held June 24-July 27 at Kansas State University.

Topics covered included grain kernel structure, moisture and its measurement, mold, grain inspection, movement of grain, aeration, grain drying, equipment maintenance, storage, insect control, rodent and bird control, principles of management and operation, bookkeeping, and marketing.

Participants also exchanged ideas about the methods and problems of grain storage and marketing in their own countries, including information on climate, topography, transportation, crops, production, storage, and marketing.

After the course at Kansas State, students had the opportunity to participate in a two week tour of rice producing areas and port facilities near Beaumont, Tex. ■

elevated and the high density lipoproteins are decreased. The VLDL undergo changes in their content of the various apolipoproteins and lipids and in their physical properties. The electrophoretic mobility of the VLDL in agarose changes from pre-β to β; and the average particle size is larger. The normal VLDL contain on the average 8% protein, 17% phospholipids, and large amounts of triglycerides. The cholesteremic VLDL contain 4% protein, 13% phospholipids, very little glycerides and large amounts of cholesteryl esters. Associated with these changes in VLDL properties and composition are changes in the relative amounts of several different apolipoproteins.

DYNAMICS OF THE HYDROCARBON LAYER IN LIPOSOMES OF LECITHIN AND SPHINGOMYELIN CONTAINING DICETYLPHOSPHATE. M. Shinitzky and Y. Barenholz (Dept. of Biophys., Weizmann Inst. of Sci., Rehovot, Israel). *J. Biol. Chem.* 249, 2652–7 (1974). Physical properties of the hydrocarbon region in lipid bilayers were studied in a series of liposomes of lecithin and sphingomyelin containing different concentrations of dicetylphosphate. The technique used was described previously and is based on fluorescence polarization analysis of a specific probe embedded in the analyzed region. The two probes employed in this study were perylene and 1,6-diphenyl-1,3,5-hexatriene, which simulate a rotating disc and a rotating rod, respectively. The determined dynamic properties of the hydrocarbon region in the lecithin liposomes differ markedly from those of the sphingomyelin liposomes. This indicates that the forces which dictate the dynamic properties of the hydrocarbon region in lipid bilayers predominantly originate from hydrophobic interactions.

TWO PICTURES OF A LIPID BILAYER. A COMPARISON BETWEEN DEUTERIUM LABEL AND SPIN-LABEL EXPERIMENTS. J. Seelig and W. Niederberger (Biocenter of the Univ. of Basel, Dept. of Biophys. Chem., Klingelbergstrasse 70, CH-4056 Basel, Switzerland). *Biochemistry* 13, 1585–8 (1974). The segmental order parameters in a lipid bilayer are measured by means of deuterium magnetic resonance and by means of spin-labels. The deuterium results show an almost constant order parameter over most of the chain, which decreases rapidly near the last three carbon atoms. In contrast, the spin probes reveal a continuous decrease of the order parameter. The deuterium results show the physical state of the unperturbed bilayer. They can be interpreted in terms of a kink model for the bilayer structure. The spin-labels reveal the reponse of the bilayer on a small perturbation.

STEROID 11β-HYDROXYLATION IN BEEF ADRENAL CORTEX MITOCHONDRIA. BINDING AFFINITY AND CAPACITY FOR SPECIFIC [^{14}C] STEROIDS AND FOR [^{3}H]METYRAPOL, AN INHIBITOR OF THE 11β-HYDROXYLATION REACTION. M. Satre and P.V. Vignais (Dept. de Recherche Fondamentale, Lab. de Biochimie, Centre d'Etudes Nucleaires, B.P. 85, et Univ. Scientifique et Medicale, 38041-Grenoble, France). *Biochemistry* 13, 2201–9 (1974). The binding of deoxycorticosterone and metyrapol to cytochrome P-450 in beef adrenal cortex mitochondria has been studied by a radioactive binding procedure. High-affinity binding sites for [^{3}H]metyrapol have only been found in the inner mitochondrial membrane in agreement with the localization of the mitochondrial P-450 in the same membrane. There was no significant binding of [^{3}H]metyrapol to the outer mitochondrial membrane, nor to the microsomes of adrenal cortex. The use of ferricyanide as a nonpenetrating electron acceptor has shown that the cytochrome P-450 involved in the 11β-hydroxylation of deoxycorticosterone is located on the matrix side of the inner mitochondrial membrane. [^{3}H]Metyrapol binding is a reversible and saturable process which proceeds rapidly towards the equilibrium state. Cyclohexyl isocyanide which reacts with cytochrome P-450 at its oxygen site competitively inhibits the binding of [^{3}H]metyrapol to the mitochondria.

CHARACTERIZATION OF PLASMA LIPOPROTEINS SEPARATED AND PURIFIED BY AGAROSE-COLUMN CHROMATOGRAPHY. L.L. Rudel, J.A. Lee, M.D. Morris and J.M. Felts (Lipid Res. Lab., Veterans Admin. Hosp., San Francisco, Calif. 94121). *Biochem. J.* 139, 89–95 (1974). A simple method for isolation of individual human plasma lipoprotein classes is presented. In this technique, lipoproteins are removed from plasma at d 1.225 by ultracentrifugation, after which they are separated and purified by agarose-column chromatography. Three major classes are obtained after agarose-column chromatography. Separation between classes is excellent; more than 95% of the lipoproteins eluted from the column are recovered in the form of a purified lipoprotein class. Each lipoprotein class was characterized immunologically, chemically, electrophoretically and by electron microscopy. A comparison of the properties of the column-isolated lipoproteins was made with very-low-density lipoproteins, low-density lipoproteins and high-density lipoproteins separated by sequential ultracentrifugation at densities of 1.006, 1.063 and 1.21 respectively. By each criterion, peak-I lipoproteins from the agarose column are the same as very-low-density lipoproteins, peak-II lipoproteins are the same as low-density lipoproteins, and peak-III lipoproteins are the same as high-density lipoproteins.

PLASMA CHOLESTEROL CONCENTRATION IN NORMAL AND CHOLESTEROL-FED RABBITS. ITS VARIATION AND HERITABILITY. D.C.K. Roberts, C.E. West, T.G. Redgrave and J.B. Smith (Dept. of Phys., Univ. of Melbourne, Parkville, Victoria, Australia). *Atherosclerosis* 19, 369–80 (1974). Studies of a large population of normal rabbits have shown a wide range of plasma cholesterol concentration. This variation is primarily associated with sex, age and season. The plasma cholesterol concentration: (a) is higher in females than males, (b) decreases with age in males and is unchanged in females, (c) shows greater seasonal variation in females than males, (d) is lower in pregnant and lactating females than in non-pregnant, non-lactating females. Male and female rabbits show a positive correlation between initial plasma cholesterol concentration and the increase observed after 3 weeks on a diet containing added cholesterol. A controlled breeding trial from selected hyper-responding and hypo-responding parents established that the cholesterolaemic response to dietary cholesterol is heritable. The heritability, estimated from the regression of progeny response on midparent response, is 50 $\pm$ 4.7%. It is suggested that the transmission of the character for cholesterolaemia is polygenic.

ENZYMATIC INTERCONVERSION OF OLEIC ACID, 10-HYDROXYOCTADECANOIC ACID AND TRANS-Δ^{10}-OCTADECENOIC ACID. REACTION PATHWAY AND STEREOSPECIFICITY. C.E. Mortimer and W.G. Niehaus, Jr. (Dept. of Biochem., Pa. State Univ., Univ. Park, Pa. 16802). *J. Biol. Chem.* 249, 2833–42 (1974). A soluble enzyme preparation from *Pseudomonas* sp. NRRL B-3266 catalyzes the interconversion of cis-Δ^{9}-octadecenoic acid (oleic acid), trans-Δ^{10}-octadecenoic acid and 10-D-hydroxyoctadecanoic acid. Oleic acid and 10-D-hydroxyoctadecanoic acid are directly interconvertible by hydration and dehydration. The cis and trans unsaturated fatty acid isomers are interconvertible by direct isomerization of the double bond. Trans-Δ^{10}-octadecenoic and 10-D-hydroxyoctadecanoic acid do not undergo direct interconversion without the intermediate formation of (enzyme-bound) oleic acid. Both hydration and isomerization reactions are very specific for a cis-Δ^{9} double bond, but the isomerization reaction is much more sensitive to changes in the hydrocarbon tail of the substrate distal to the double bond.

AN APPRAISAL OF THE FUNCTIONAL SIGNIFICANCE OF THE IN-

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HIBITORY EFFECT OF LONG CHAIN ACYL-CoAs ON MITOCHONDRIAL TRANSPORTS. F. Morel, G. Lauquin, J. Lunardi, J. Duszynski, and P.V. Vignais (DRF/Biochimie, CEN-G, B.P. 85 et Univ. Sci. et Med., 38041, Grenoble, France). *FEBS Letters* 39, 133–8 (1974). Values of the inhibitor constant (K_i) were compared for long chain acyl-CoAs of mitochondrial carriers concerned with the transport of ADP, phosphate, malate and citrate. The effects of the fatty acid chain length and of the degree of unsaturation of the fatty acid moiety on the inhibitory potency of the acyl-CoAs were examined. The specificity of palmityl-CoA as an inhibitor of the ADP translocation is compared to that of atractyloside and carboxyatractyloside. Data is presented on the binding of [^{14}C] palmityl-CoA and [^{14}C]oleyl-CoA to mitochondria. The results taken together impose some reservation to the idea that the sensitivity of the mitochondrial transport systems to long-chain acyl-CoAs might be of physiological significance.

METABOLIC ADAPTATIONS DURING LACTOGENESIS. FATTY ACID SYNTHESIS IN RABBIT MAMMARY TISSUE DURING PREGNANCY AND LACTATION. R.W. Mellenberger and D.E. Bauman (Dept. of Dairy Sci., Univ. of Ill., Urbana, Ill. 61801). *Biochem. J.* 138, 373–9 (1974). Mammary tissue was obtained from rabbits at various stages of pregnancy and lactation and used for tissue-slice incubations (to measure the rate of fatty acid synthesis and CO_2 production) and to determine relevant enzymic activities. A biphasic adaptation in fatty acid synthetic capacity during lactogenesis was noted. During pregnancy and lactation there was a close temporal relationship between fatty acid synthetic capacity and the activities of ATP citrate lyase ($r = 0.94$) and acetyl-CoA carboxylase ($r = 0.90$).

EFFECT OF THE CONSUMPTION OF GLYCERIDES CONTAINING BEHENIC ACID ON THE LIPID CONTENT OF THE HEART OF WEANLING RATS. F.H. Mattson and J.A. Streck (Procter & Gamble Co., Miami Valley Labs., Cincinnati, Ohio 45239). *J. Nutr.* 104, 483–8 (1974). For 7 days weanling rats were fed diets containing 19% of fat that consisted of various levels of the glycerides of behenic or erucic acid. The animals were killed and the level of lipids in the heart was determined. The amount of lipids in the heart increased in proportion to the level of erucic acid in the diet. When erucic acid constituted approximately 50% of the dietary fat, there was a two- to threefold increase in heart lipids. By contrast, the consumption of a fat containing behenic acid resulted in no accumulation of lipids in the heart. A similar lack of an increase in heart lipids was observed when the dietary fat was 2-behenoyl dilinolein. The observations may be the result of either the inability of behenic acid to accumulate in heart lipids or the inability of the animal to absorb a significant amount of behenic acid. The impaired absorption of behenic acid was demonstrated in thoraic duct cannulated rats; following the feeding of 2-behenoyl dilinolein, only 24% of the behenate moiety was found in the lymph.

SPECIFICITY OF CYCLOPROPANE FATTY ACID SYNTHESIS IN ESCHERICHIA COLI. UTILIZATION OF ISOMERS OF MONOUNSATURATED FATTY ACIDS. L.A. Marinari, H. Goldfine and C. Panos (Dept. of Microbiol., Univ. of Pa. Schl. of Med., Phildelphia, Pa. 19174). *Biochemistry* 13, 1978–83 (1974). The conversion of a series of monounsaturated fatty acids to cyclopropane acids has been investigated in *Escherichia coli* K1060, an unsaturated fatty acid auxotroph which is also blocked in fatty acid degradation. In overnight cultures almost complete conversion of cis-9-hexadecenoic acid was observed. Substantial conversion of cis-10-hexadecenoic acid, of cis-9- and of cis-11-octadecenoic acids was also seen, ranging from 29 to 38% of the incorporated unsaturated acids. Eleven per cent conversion of incorporated cis-11-hexadecenoic acid to a cyclopropane acid was observed under similar conditions. Cyclopropane acids formed from all of these precursors had retention times on an open capillary gas-liquid chromatography column consistent with addition of the methylene bridge at the position of the double bond. All the fatty acids tested were capable of supporting as rapid growth of the auxotroph as the natural isomers, palmitoleic acid (cis-9-hexadecenoic acid) and cis-vaccenic acid (cis-11-octadecenoic acid).

AN ELECTROPHORETIC METHOD FOR THE QUANTITATIVE ISOLATION OF HUMAN AND SWINE PLASMA LIPOPROTEINS. R.W. Mahley and K.H. Weisgraber (Sect. on Exptl. Atherosclerosis, Natl. Heart and Lung Inst., Natl. Inst. of Health, Bethesda, Md. 20014). *Biochemistry* 13, 1964–9 (1974). A procedure for the isolation and purification of human and swine plasma lipoproteins using the combination of ultracentrifugation and Geon-Pevikon block electrophoresis has been described. Normal human and swine lipoproteins isolated by this procedure were compared to lipoproteins isolated by the standard method of ultracentrifugation and were found to be essentially identical with respect to chemical composition, immunochemical reactivity, size by electron microscopy and apoprotein content polyacrylamide gel electrophoresis. This procedure allowed the isolation of plasma lipoproteins in a shorter period of time without subjecting the lipoproteins to repetitive ultracentrifugation and washing procedures. In addition, the plasma lipoproteins from cholesterol-fed swine, which could not be separated by ultracentrifugation alone, were purified by the Geon-Pevikon electrophoretic procedure. These swine developed a hyperlipoproteinemia characterized by the presence of two different lipoproteins which had overlapping densities in the low density fraction.

EFFECT OF VITAMIN A INTOXICATION ON INTRACRANIAL PRESSURE AND BRAIN WATER IN RATS. G.W. MADDUX, F.M. Foltz and S.R. Nelson (Depts. of Anat. and Phar., Kansas Univ. Med. Center, Kansas City, Ka. 66103). *J. Nutr.* 104, 478–82 (1974). Increased intracranial pressure occurs in both acute and chronic hypervitaminosis A in man, but decreased cerebrospinal fluid (CSF) pressure has been reported in various laboratory animals treated chronically with vitamin A. In order to clarify this difference in findings, measurements of brain water and CSF pressure were made in immature and mature rats treated with high doses of vitamin A. No pressure or brain water changes were observed in the acutely treated mature rats, but those treated chronically for 6 to 8 days had a 93% decrease in CSF pressure. Brain edema was also present in the treated animals; brain volume decreased 2.0% in immature rats and 4.8% in mature rats. When the CSF pressure of chronically treated mature rats was raised to a normal CSF pressure by the addition of artificial CSF, their pressures dropped to near their opening pressure within 24 minutes. These data suggest that the decreased CSF pressure in rats given vitamin A is associated with an increased bulk absorption of CSF, probably due to pathological membrane or connective tissue changes.

EFFECT OF BODY WEIGHT CHANGES ON PLASMA LIPIDS IN PATIENTS WITH PRIMARY HYPERLIPOPROTEINEMIA. H.-J. Lisch, K. Bolzano, M. Herbst, S. Sailer, F. Sandhofer and H. Braunsteiner (Med. Dept., Univ. of Innsbruck, A-6020 Innsbruck, Austria). *Atherosclerosis* 19, 477–84 (1974). In 30 untreated patients with type IIb, III, IV and type V hyperlipoproteinemia plasma lipid concentrations were studied in relation to body weight over a period of up to 5 years. Significant intraindividual correlations were demonstrated between weight index and the logarithms to base 10 of the plasma triglyceride level in 2 of 3 type IIb patients, 2 of 3 type III patients, 8 of 13 type IV patients, and only 1 of 11 type V patients. These correlations were paralleled in about two thirds of the cases by correlations between weight index and the logarithm to base 10 of plasma cholesterol, and in approximately one half of the cases by correlations between weight index and the logarithm to base 10 of plasma phospholipid concentration, both of lower-grade significance. Total starvation led to a pronounced but transient reduction of all plasma lipid fractions, even in those patients without correlations between weight index and plasma lipids.

FACTORS INFLUENCING THE QUANTITY OF ABDOMINAL FAT IN PHOLIPIDS AND TRIGLYCERIDES OF THE BABOON, PAPIO URSINUS. DIETARY CHOLINE CHLORIDE AND INOSITOL SUPPLEMENTATION. L.F. Kubena, J.W. Deaton, T.C. Chen and F.N. Reece (USDA, ARS, South Central Poultry Res. Lab.). *Poultry Sci.* 53, 211–4 (1974). Trials were conducted to study the effects of rearing temperature, sex, age or weight, and dietary choline chloride and inositol supplementation on the quantity of abdominal fat in broilers. Within each sex, there was no significant difference in the quantity of abdominal fat at 7, 8 or 9 weeks of age, when expressed as a percentage of body weight. In general, females had a larger percentage of abdominal fat than the males. Also, as the rearing temperature increased the percentage of abdominal fat increased. Dietary choline chloride and inositol supplementation did not significantly affect the percentage of abdominal fat in males or females.

THE FATTY ACID COMPOSITION OF CHOLESTERYL ESTERS, PHOSPHOLIPIDS AND TRIGLYCERIDES OF THE BABOON, PAPIO URSINUS. J.P. Kotze, J.S. Neuhoff, G.P. Engelbrecht, G.J. Van Der Merwe, J.P. Duplessis and L.P. Horn (Div. of Physiol. Chem., Natl. Res. Inst. for Nutr. Diseases, South African Med. Res. Council, Private Bag X380, Pretoria, South Africa). *Atherosclerosis* 19, 469–76 (1974). Analysis of the sera of more than 100 wild baboons, *Papio ursinus*, revealed that the cholesteryl

esters had the following fatty acid composition: 22.7 palmitic, 5.8 palmitoleic, 10.4 stearic, 24.8 oleic, 31.7 linoleic, 1.0 linolenic, and 5.0% arachidonic acids. The total unsaturated cholesteryl fatty acids comprised 68.4% of the total cholesteryl esters. The average fatty acid composition of the phospholipids was as follows: 29.1 palmitic, 3.1 palmitoleic, 21.5 stearic, 16.9 oleic, 20.0 linoleic, 1.1 linolenic and 7.2 arachidonic acids. The total phospholipid contained 48.3% unsaturated acids. The fatty acid composition of the triglycerides was the following, i.e. 34.7 palmitic, 7.5 palmitoleic, 11.2 stearic, 32.0 oleic, 14.3 linoleic, 1.3 linolenic and 2.5% arachidonic acids. Very low density lipoproteins of baboon sera contained a higher proportion of the saturated fatty acids in cholesteryl esters, phospholipids and triglycerides than the high density lipoproteins. In baboon sera the high density lipoprotein fractions contained about 55%, 59% and 80% of the total cholesterol fatty acids, and phospholipids, respectively. Of the total triglyceride content of baboon sera, about 64% was found in the very low density fraction.

POLYENE ANTIBIOTIC-STEROL INTERACTIONS IN MEMBRANES OF ACHOLEPLASMA LAIDLAWII CELLS AND LECITHIN LIPOSOMES. I. SPECIFICITY OF THE MEMBRANE PERMEABILITY CHANGES INDUCED BY THE POLYENE ANTIBIOTICS. B. De Kruijff, W.J. Gerritsen, A. Oerlemans, R.A. Demel and L.L.M. Van Deenen (Biochem. Lab., State Univ. Utrecht, Vondellaan 26, Utrecht, The Netherlands). *Biochim. Biophys. Acta* 339, 30–43 (1974). The effect of filipin, amphotericin B, nystatin, etruscomycin and pimaricin upon the permeability properties of *Acholeplasma laidlawii* cells and egg lecithin liposomes was investigated. When cholesterol was present in the membrane, the different polyene antibiotics produced permeability changes which were different for the various antibiotics. Various sterols were incorporated in *A. laidlawii* and liposomal membranes after which the interaction of filipin and amphotericin B with these membranes was investigated by ultraviolet spectroscopy and K^+ permeability. Only those sterols which had a 3β-OH group, a planar molecule and hydrophobic side chain at C_{17} were able to interact with these polyene antibiotics and thereby enhance the membrane permeability.

BINDING OF BILE SALTS IN VITRO BY NONNUTRITIVE FIBER. D. Kritchevsky and J.A. Story (Wistar Inst. of Anat. and Biol., 36th St. at Spruce, Philadelphia, Pa. 19104). *J. Nutr.* 104, 458-62 (1974). Binding in vitro of sodium taurocholate and glycocholate from 0.15 M NaCl by anion exchange resins (cholestyramine and colestipol), synthetic nonnutritive fiber (NNF) (cellophane spangles and cellulose), and natural NNF (alfalfa, wheat straw, sugar cane pulp, sugar beet pulp, bran, and oat hulls) was measured. The use of labeled bile salts greatly simplified the binding measurements without loss of accuracy. Alfalfa bound significantly more bile salts than any of the other NNF. However, all the natural NNF had a greater capacity for binding bile salts than did the synthetic NNF. The amount of binding by alfalfa and wheat straw seems to be linear both with respect to amount of binding substance and amount of bile salt available for binding. The NNF component of a diet must be considered when evaluating its metabolic effects.

AORTIC CHOLESTEROL ESTERASE IN RABBITS. EFFECT OF DURATION OF CHOLESTEROL FEEDING. D. Kritchevsky, S.A. Tepper, J.C. Genzano and H.V. Kothari (Wistar Inst. of Anatomy and Biol., 36th St. at Spruce, Philadelphia, Pa. 19104). *Atherosclerosis* 19, 459–462 (1974). The cholesteryl ester synthesizing (S) and hydrolysing (H) activities of rabbit aorta have been assayed in rabbits fed an atherogenic regimen (2% cholesterol in 6% corn oil). Both synthesis and hydrolysis of cholesteryl esters increase over control levels, but the increase in synthetase activity is much greater than that of hydrolase activity. The S/H ratio is sharply increased after 5–7 days on the atherogenic diet, a time when serum and liver cholesterol levels have risen but no atheromata are grossly visible.

LIPID CONTENT AND PHOSPHOLIPID METABOLISM OF SUBCELLULAR FRACTIONS FROM TESTES OF CONTROL AND RETINOL-DEFICIENT RATS. R.F. Krause and K.C. Beamer (Dept. of Biochem., Schl. of Med., West Va. Univ., Morgantown, W. Va. 26506). *J. Nutr.* 104, 629-37 (1974). Lipid composition and phospholipid metabolism were studied in the subcellular fractions of normal and retinol-deficient rat testes. The total lipid from normal subcellular particles was highest in mitochondria (138 ± 4.4 mg·100 mg protein) and lowest in microsomes (70 ± 2.5 mg/100 mg protein). Approximately 60% of mitochondrial and microsomal lipid was phospholipid. In all subcellular fractions total cholesterol constituted about 12% of total lipid. Retinol deficiency produced in mitochondria and microsomes an increased lipid associated with protein. This increase was primarily phospholipid and cholesterol. Phosphatidylcholine was the major phospholipid of all fractions. Control phospholipid fatty acid patterns were similar for microsomes and soluble fractions. Deficiency caused a decreased percentage of docosapentaenoate in both of these fractions, while microsomes also exhibited an increased percentage of stearate and oleate and soluble fraction an increased percentage of linoleate and arachidonate. The peak incorporation of ^{14}C-choline into phospholipids was about 12 hours for all subcellular fractions. Deficient rats had about 2.5 times greater incorporation.

MANNOHEPTULOSE AND FATTY SYNTHESIS IN THE RAT. G.J. Klain and A.W. Meikle (Physiology Div., U.S. Army Med. Res. and Nutr. Lab., Fitzsimons Army Med. Center, Denver, Colo. 80204). *J. Nutr.* 104, 473–7 (1974). Since metabolic alterations induced by mannoheptulose appear to affect fatty acid synthesis, the present study was conducted to elucidate this relationship. The results indicate that mannoheptulose suppresses hepatic fatty acid synthesis as indicated by a reduced incorporation of glucose-^{14}C into fatty acids and by a decreased activity of acetyl CoA carboxlase. Fatty acid synthesis was restored by exogenous insulin. Mannoheptulose had no effect on the activity of several other lipogenic enzymes and did not affect adipose tissue fatty acid synthesis. The effect of mannoheptulose in the liver appears to be mediated by glucagon.

EFFECT OF SELENIUM AND LIPOTROPIC FACTORS ON LIVER FAT ACCUMULATION IN LAYING HENS. L.S. Jensen, G.W. Schumaier, A.D. Funk, T.C. Smith and L. Falen (Dept. of Animal Sci., Washington State Univ., Pullman, Wash. 99163). *Poultry Sci.* 53, 296–302 (1974). Two experiments were conducted with Single Comb White Leghorn laying hens to determine the effect of dietary additions of selenium, choline, inositol, vitamin B_{12} and vitamin E on liver fat accumulation and other criteria. In Experiment 1, adding 1 p.p.m. selenium to corn-soybean meal rations, with and without added fat, significantly reduced total fat accumulation per liver. Adding a combination of choline, inositol, vitamin B_{12} and vitamin E to the corn-soy diet without added fat significantly reduced liver fat accumulation and percent fat of the liver. On the other hand, a wheat-pea-fat basal containing about half the selenium content of the corn-soy diets resulted in a liver fat accumulation significantly lower than that observed with the corn-soy basal diets. Adding selenium or the lipotropic mix to this diet failed to significantly affect fat accumulation. None of the dietary treatments significantly affected egg production, egg weight and body weight changes. In the second experiment, individually supplementing a corn-soy fat basal ration with vitamin E, inositol, vitamin B_{12}, choline and selenium or combinations of these nutritional factors failed to significantly affect liver fat accumulation or other criteria measured. The fat accumulation tended to be lower with choline supplementation, but the effects were not statistically significantly ($P > 0.05$).

COMPARATIVE EFFECTS OF TALLOW, LARD AND SOYBEAN OIL, WITH AND WITHOUT SUPPLEMENTAL CHOLESTEROL, ON GROWTH, TISSUE CHOLESTEROL AND OTHER RESPONSES OF CALVES. N.L. Jacobson, M. Richard, P.J. Berger and J.P. Kluge (Dept. of Animal Sci. and Dept. of Veterinary Pathol., Iowa State Univ., Ames, Iowa 50010). *J. Nutr.* 104, 573–9 (1974). Three groups of male Holstein calves, 4 to 14 days of age, were fed for 23 weeks a reconstituted milk containing 9% nonfat dry milk solids and 3.5% tallow, lard or refined soybean oil. All diets were supplemented with vitamins and minerals. Half of the calves in each group received supplemental cholesterol in the milk at 175 mg per 100 g milk. Milk was fed at a daily rate of 100 g per kg body weight. Blood samples and body weight were taken weekly, and all calves were slaughtered at the end of the experiment. Plasma cholesterol was higher ($P < 0.01$) in calves fed supplemental cholesterol than in those receiving none and was higher ($P < 0.10$) in those fed tallow and lard than in those fed soybean oil. Supplemental cholesterol significantly increased body gains ($P < 0.05$) and cholesterol content of the liver ($P < 0.01$) but had no significant effect on cholesterol content of muscle, fat, brain, aorta and coronary artieries. As compared with calves fed the other diets, those fed soybean oil had significantly higher cholesterol, per unit dry tissue, in the liver ($P < 0.05$), muscle ($P < 0.01$), fat ($P < 0.01$), aorta ($P < 0.05$) and coronary arteries ($P < 0.01$).

INFLUENCE OF LINOLEATE ON CHOLESTEROL TURNOVER IN RATS. N. Iritani and J. Nogi (Tezukayama-Gakuin College, Sumiyoshi-ku, Osaka 558, Japan). *J. Nutr.* **104**, 546–52 (1974). The oral administration of linoleate to rats fed a fat-free diet increased the half-life of cholesterol to 1.7 and 1.5 times greater than the half-life when oleate or palmitate were administered. Plasma cholesterol, however, was significantly lowered by the oral administration of linoleate compared to administration of oleate. After the injection of cholesterol-^{3}H, the total amount of cholesterol and its metabolites, and the amount of radioactivity excreted in the feces was higher in the oleate group than in the linoleate group. But the excretions into bile were not influenced by feeding linoleate. The major fecal metabolites, coprostanol and hyodeoxycholic acid, formed by intestinal microflora, were decreased by feeding linoleate, compared to feeding oleate. The long half-life of cholesterol in the linoleate group may be caused by the increased reabsorption of cholesterol and the secondary effect of linoleate on the multiplication of intestinal microorganisms. On the other hand, oral administration of linoleate rather than feeding an equivalent amount of lard had no effect on the half-life of cholesterol and its metabolites in rats fed a diet containing 5% fat. Therefore, dietary fat might have an influence on the effects of linoleate on cholesterol metabolism.

SERUM LIPID CHANGES PRODUCED IN DOGS BY SUBSTITUTING COCONUT OIL FOR EITHER SUCROSE OR PROTEIN IN THE DIET. F. Grande and W.F. Prigge (Jay Phillips Res. Lab., Mount Sinai Hosp., Minneapolis, Minn. 55404). *J. Nutr.* **104**, 613–18 (1974). The effect on the fasting serum lipids of feeding for 2 weeks diets containing coconut oil (CNO) in amounts corresponding respectively to 10, 20, and 40% of total calorie intake was studied in 12 dogs. Two comparisons were made. In one, CNO was substituted for sucrose; in the other CNO was substituted for protein. All diets tested contained a constant amount of commercial dog food (60% of total calorie intake). Compared with the low fat diets (without CNO and containing 40% of total calories as either sucrose or added protein), all CNO-containing diets caused significant elevations of serum cholesterol and phospholipids. The elevations increased with the CNO content, but not in proportion to the calories supplied by the oil. For equal levels of dietary CNO there was no significant difference in serum cholesterol between sucrose and protein diets. Serum triglycerides were higher with the sucrose diets. The mean fasting levels of cholesterol and phospholipids showed very high correlation (+0.9926 and +0.9915, respectively) with the corresponding mean postprandial levels of plasma FFA, when CNO was substituted for protein.

EFFECT OF CANDICIDIN ON PLASMA CHOLESTEROL AND AVIAN ATHEROSCLEROSIS. H. Fisher, P. Griminger and W. Siller (Dept. of Nutr., Rutgers Univ., New Brunswick, N.J.). *Proc. Soc. Exp. Biol. Med.* **145**, 836–9 (1974). Day-old cockerels were fed a control or a candicidin-containing diet (0.01%) with or without cholesterol in the form of whole egg powder. The birds were maintained for 18–27 months on their respective regimens and plasma cholesterol was measured at different intervals. At 6 and at 18 months cholesterol-fed birds were killed and the coronary arteries and the aorta evaluated histologically for atherosclerosis. The birds on the cholesterol-free diets were killed after 27 months and similarly evaluated. Initially, in the cholesterol-fed birds, plasma cholesterol was drastically reduced below that of the controls by candicidin feeding. However, the plasma cholesterol level of the controls then decreased, and the differences in cholesterol concentration between candicidin-fed and control birds became smaller or nonexistent. No differences in plasma cholesterol occurred at any time in the cocks on the cholesterol-free diet. A lower incidence of coronary artery lesions and a lower severity and incidence of aortic atherosclerosis was observed in the candicidin-treated cocks, regardless of the presence or absence of dietary cholesterol.

CHOLESTEROL AND CHOLESTEROL SULFATE AS SUBSTRATES FOR THE ADRENAL SIDE-CHAIN CLEAVAGE ENZYME. R.B. Hochberg, S. Ladany, M. Welch and S. Lieberman (Depts. of Biochem. Obstetrics, and Gynecol. and the Internatl. Inst. for the Study of Human Reproduction, College of Physicians and Surgeons, Columbia Univ., New York, N.Y. 10032). *Biochemistry* **13**, 1938–45 (1974). The rates of enzymatic cleavage of the side chains of cholesterol and cholesterol sulfate have been studied using subcellular fractions from the adrenal cortex of the rat and cow. Although impermeable to exogenous TPNH, intact mitochondria in vitro can convert doubly labeled [^{3}H]-cholesterol [^{35}S]sulfate into [^{3}H]pregenolone [^{35}S]sulfate. When Ca^{2+} is present, exogenously added TPNH accelerates the rates of side-chain cleavage of both cholesterol sulfate and cholesterol. The addition of isocitrate also increases the oxidation of both substrates. However, succinate accelerates (by about 70%) the rate of side-chain cleavage of only cholesterol sulfate. The rate of oxidation of cholesterol is only slightly affected by succinate. Determination of the kinetic parameters of the two substrates indicated that the apparent K_m for cholesterol sulfate is smaller than that of cholesterol and also that the V_{max} for the conjugate is greater than that of the free sterol. Inhibition studies have shown that each of the substrates can inhibit the cleavage of the other. Cholesterol glucuronide inhibits the oxidation of neither cholesterol nor its sulfate.

LIPID AND BONE MATRIX CALCIFICATION IN VITRO. J. Ennever, J.J. Vogel and B.M. Levy (Univ. of Tex., Dental Sci. Inst. at Houston, P.O. Box 20068, Houston, Tex. 77025). *Proc. Soc. Exp. Biol. Med.* **145**, 1386–8 (1974). A calcifiable matrix was prepared by decalcification of marmoset femurs. Lipid extraction rendered the matrix noncalcifiable. The crude phospholipid fraction of the lipid extract induced apatite crystallinity in a metastable calcium phosphate solution. The acetone-soluble fraction did not. The results show lipid is involved in calcification of a bone matrix, in vitro, and that the nucleator is in the crude phospholipid fraction.

DEPENDENCE OF THE CIRCADIAN RHYTHM OF HEPATIC β-HYDROXY-β-METHYLGLUTARYL COENZYME A ON RIBONUCLEIC ACID SYNTHESIS. A POSSIBLE SECOND SITE OF INHIBITION BY DIETARY CHOLESTEROL. P.A. Edwards and R.G. Gould (Dept. of Med., Stanford Univ. Schl. of Med., Stanford, Calif. 94305). *J. Biol. Chem.* **249**, 2891–6 (1974). The circadian rhythm in the level of activity of rat hepatic β-hydroxy-β-methylglutaryl-CoA reductase (EC 1.1.1.34) is characterized by a rapid, 5- to 8-fold increase in activity from the basal level (9 a.m. to 4 p.m.) to a peak at midnight followed by a rapid decrease back to the basal level. Cholesterol administration during the basal level period gave a 50% reduction of enzyme activity 5 hours later. Preliminary results on microsomal-free and esterified cholesterol indicated that 4 to 7 hours after cholesterol feeding a decrease in microsomal reductase activity was correlated with an increase in the ester fraction. It is at present not clearly established whether an increase in concentration of microsomal cholesterol esters must precede the inhibition of reductase activity brought about by dietary cholesterol.

PLASMA VITAMIN E AND CHOLESTEROL RELATIONSHIP IN WESTERN CANADIAN INDIANS. I.D. Desai and M. Lee (Div. of Human Nutr., Schl. of Home Econ., Univ. of British Columbia, Vancouver, B.C., Canada). *Am. J. Clin. Nutr.* **27**, 334–8 (1974). Plasma vitamin E, cholesterol, vitamin A and β-carotene were determined for five groups of Indians (911 persons) from British Columbia and the Yukon Territory. The best correlation for plasma vitamin E was found to be with plasma cholesterol and age. It is suggested that the relationship between cholesterol and vitamin E reflects their close association with the plasma β-lipoprotein fraction, which may be the determining factor in the regulation of circulating levels of vitamin E and cholesterol.

SERUM LIPOPROTEINS IN PIGS ON HIGH-CHOLESTEROL-HIGH-TRIGLYCERIDE DIETS. G.D. Calvert and P.J. Scott (Dept. of Med., Auckland Univ. Schl. of Med., Auckland, New Zealand). *Atherosclerosis* **19**, 485–92 (1974). A diet including 33% clarified butter and 1% cholesterol induced moderate hypercholesterolaemia in young female pigs. Very low density, low density and high density lipoproteins were isolated quantitatively by preparative ultracentrifugation at solution densities 1.0006, 1.063 and 1.21 g/ml respectively. Serum cholesterol and triglyceride, and cholesterol, phospholipid and protein concentrations for each density class, were determined. There was a rise in serum low density lipoproteins, and a minor rise in high density lipoproteins, without any change in lipoprotein density or composition.

ASSESSMENT OF ATHEROSCLEROSIS FROM ANGIOGRAPHIC IMAGES. D.H. Blankenhorn, S.H. Brooks, R.H. Selzer, D.W. Crawford and H.P. Chin (Dept. of Med., Univ. of Southern Calif. Schl. of Med., Los Angeles, Calif. 90033). *Proc. Soc. Exp. Biol. Med.* **145**, 1298–1300 (1974). Raised aortic atheromas can be quantitated by densitometer-computer analysis of edge irregularity on angiographic shadows. Combined measurement of edge irregularity and variation in cross-sectional density provides an angiographic index indicative of local cholesterol concentration in aorta walls and atheromas.

MITOCHONDRIAL ω-HYDROXYLATION OF CHOLESTEROL SIDE CHAIN. I. Bjorkhem and J. Gustafsson (Dept. of Chem, Karolinska Inst., Stockholm, Sweden). *J. Biol. Chem.* 249, 2528-35 (1974). The mitochondrial fraction of rat liver homogenate catalyzed the conversion of cholesterol into 5-cholestene-3β,25-diol and 5-cholestene-3,26-diol in the presence of an NADPH-generating system and oxygen. 5-Cholestene-3β,26-diol was the predominant product. Experiments with sonically disrupted mitochondria supported the contention that the mitochondrial 26-hydroxylase was mainly bound to the inner membranes. Experiments with $^{18}O_2$ and ^2H_2O showed that in 25- as well as 26-hydroxylation of cholesterol the oxygen incorporated is derived from molecular oxygen.

EFFECT OF ZINC ON LIPID PEROXIDATION AND METAL CONTENT IN SOME TISSUES OF RATS. M. Chvapil, Yei Mei Peng, A.L. Aronson and C. Zukoski (Div. of Surgical Biol., Dept. of Surgery, Univ. of Arizona, College of Med., Tucson, Ariz. 85724). *J. Nutr.* 104, 434 443 (1974). Adult rats were fed diets containing 40 and 1000 ppm zinc and only half of the usual content of *d,l*-α- tocopherol. The endogenous and induced content of malondialdehyde (MA), the profile of total fatty acids, the ratio of arachidonic to palmitic acid and the content of Zn, Cu and Fe were measured in the liver, liver microsomal fraction, lung, kidney, testes and brain. Spontaneous hemolysis of erythrocytes under incubation at 37C in a buffer was studied as another index of lipid peroxidation. The magnitude of spontaneous hemolysis of erythrocytes was inhibited in rats fed a 1000 ppm zinc diet. We conclude that dietary zinc controls lipid peroxidation only in such tissues as the liver and the red blood cells. This may be related to the capacity of the tissue to retain zinc in proportion to dietary zinc intake.

DIFFERENTIAL EFFECTS OF DIETARY ACIDULATED SOYBEAN OIL SOAPSTOCK, COTTONSEED OIL SOAPSTOCK AND TALLOW ON BROILER CARCASS FAT CHARACTERISTICS. I. Bartov, B. Lipstein and S. Bornstein (Div. of Poultry Sci., Agr. Res. Organization, Bet Dagan, Israel). *Poultry Sci.* 53, 115-24 (1974). The degree of saturation of carcass fat (both visceral and muscular) of broilers was significantly affected by the type of dietary fat and its level. The most saturated carcass fat was obtained from feeding diets supplemented with tallow, or diets not containing any fat supplement, followed by dietary acidulated cottonseed oil soapstock (ACS), with soybean oil soapstock (ASS) leading to the best saturated body fat. The effect of ACS seems to be partly due to interference with the metabolic desaturation of stearic acid. Withdrawing the ASS from the diet at 5 weeks of age, or replacing it at this stage by either tallow or ACS, decreased significantly the degree of unsaturation of muscular and visceral fat at 8 weeks. The degree of saturation of visceral fat was reflected in pronounced changes in the latter's melting point and stability towards oxidation. ACS resulted in body fat having a higher melting point than expected from the degree of its unsaturation. The stability of meat (TBA test) of broilers fed ASS was significantly lower than that obtained on diets containing tallow.

PATHOPHYSIOLOGY OF AORTIC BARORECEPTORS IN RABBITS WITH VITAMIN D SCLEROSIS AND HYPERTENSION. J.E. Angell-James (Dept. of Physiol., St. Bartholomew's Hosp. Med. College, London, EC1M 6BQ, England). *Circulation Res.* 34, 327-38 (1974). Calciferol (vitamin D_2) (50,000-100,000 IU) and calcium lactate (1 g) were added to the normal diet of 22 rabbits for 7-11 days. When mean arterial blood pressure had risen from a control value of 87.2 ± 3.7 mm Hg to an experimental value of 137.8 ± 5.7 mm Hg (11-145 weeks), the aortic arch of 9 of these rabbits was isolated and perfused with Krebs-Henseleit solution. The impulse activity in 75 aortic baroreceptor fibers from the left aortic nerve was studied during nonpulsatile perfusion at different pressures and was compared with the impulse activity in 29 fibers from 17 normal rabbits. The threshold pressures and the pressure at the point of inflection of the curves were lower in these fibers than they were with fibers from normal rabbits. The change in the sensitivity of the baroreceptors was more closely related to the time interval after the calciferol treatment ($r = -0.95$) than it was to the mean arterial blood pressure ($r = -0.76$). The pressure-volume curves show that it was also related to the decreased distensibility of the aortic arch region. Histologically, the aortic arch region had extensive medial sclerosis with calcification.

MILK FAT GLOBULE MEMBRANE COMPOSITION AND DIETARY CHANGE: SUPPLEMENTS OF COCONUT OIL FED TWO PHYSICAL FORMS. M. Anderson (Natl. Inst. for Res. in Dairying, Shinfield, Reading, RG2 9AT, England). *J. Dairy Sci.* 57, 399-404 (1974). Milk fat globule membrane composition was compared in two diets, E and F. Both contained coconut oil supplement emulsified with casein, but in diet F the supplement had been treated with formaldehyde. More membrane was secreted in diet E, and it contained a greater proportion of neutral lipid and a lower proportion of protein than diet F. No difference in neutral lipid fatty acid composition of membrane was observed between diets E and F. The amounts of coconut oil fatty acids in membrane neutral lipids were higher in diets E and F than in a ration containing no coconut oil. Individual phospholipids were unaffected by diet, and no incorporation of the supplemented lipid into membrane polar lipids occurred. Proportions of major membrane proteins changed as shown by sodium dodecyl sulphate-polyacrylamide gel electrophoresis.

ENVIRONMENTAL FACTORS ASSOCIATED WITH PRESCHOOL OBESITY. I. OBESITY IN SIX MONTH OLD CHILDREN. R.L. Huenemann (School of Public Health, Univ. of Calif., Berkeley). *J. Am. Dietetic Assoc.* 64, 480-7 (1974). A study of environmental factors in the development of infant obesity involved: physical measurements of 448 six month old infants, three day food records, one day activity records, and personal interviews with the mothers to determine socioeconomic status, health histories, opinions and beliefs, and other data. Factors associated with obesity were: more rapid weight gain since birth, lower birth weight, primary birth order, higher caloric intake, obesity of the mother, with less nutritional knowledge and a less conventional life style.

II. OBESITY AND FOOD PRACTICES OF CHILDREN AT SUCCESSIVE AGE LEVELS. *Ibid.*, 488-91. As the babies in the preceding report grew older, growth patterns were followed. Between six months and three years of age, many shifted from one classification to another, and the majority of fat six month olds had moved to leaner classifications. Nutrient intake of these children up to three years was satisfactory, except for calcium and iron, according to the Recommended Daily Allowances. Protein and riboflavin consistently exceeded the allowances. From these studies, it was concluded that the first six months of life may indeed be a vulnerable period for obesity development. Life style appears to be significantly associated with fatness. Numerous factors and forces appear to be working toward obesity prevention and control. These include an awareness by many mothers of the desirability of obesity prevention, an appreciation of the importance of food and activity in weight control, a trend toward breast feeding, and a generally good nutrient intake among children.

ANTI-OBESITY PROCESS. W.H. Fishman and W.G. Linscheer. *U.S. 3,809,752.* The intestinal absorption of fatty acids is inhibited by the administration of specific inhibitors for intestinal alkaline phosphatase. Inhibition is temporary and reversible.

METHOD FOR REDUCING PLASMA LIPID LEVELS. S.I. Lerner (Ethyl Corp.). *U.S. 3,809,761.* Plasma lipid levels are reduced by internally administering a phenol having a nitrogen-containing group bonded to the phenolic nucleus. Examples of such phenols are 2,6-di-tert-butyl-α-dimethylamino-p-cresol, α,α^1-(methylimino)-bis(2,6-di-tert-butyl-p-cresol), and $\alpha^2,\alpha^4,\alpha^6$-tris (dimethylamino)-mesitol. Trinuclear phenols and salts such as hydrochlorides are also disclosed.

MEASUREMENT OF SULFATED AND NONSULFATED BILE ACIDS IN HUMAN SERUM AND URINE. I. Makino, K. Shinozaki, S. Nakagawa and K. Mashimo (Second Dept. of Med., Hokkaido Univ. Schl. of Med., Sapporo, Japan). *J. Lipid Res.* 15, 132-8 (1974). Amberlite XAD-2 was used to extract bile acids from urine or diluted serum of patients with hepatobiliary diseases. Columns containing Sephadex LH-20 were then used to separate the sulfated and nonsulfated bile acids. Thin-layer chromatography of the sulfated bile acid fraction obtained from urine revealed several spots with R_F values different from those of the taurine or glycine conjugates. According to thin-layer chromatographic mobilities, gas-liquid chromatographic analyses, infrared spectra and elementary analysis of the sulfated material, one of these sulfated bile acids was identified as glycochenodeoxycholic acid monosulfate, and the others were presumed to be taurochenodeoxycholic acid sulfate and glycocholic acid sulfate. A large amount of bile acid sulfate was found in urine of patients with hepatobiliary diseases. They accounted for 35 5 93.3% of total urinary bile acids and consisted of both di- and trihydroxycholanoic acids with chenodeoxycholic acid as the major acid. Sulfated bile acids were also found in serum and accounted for 1.8 21.2% of the total bile acids. Only dihydroxycholanoic acids (mainly chenodeoxycholic) were identified.

PHASE BEHAVIOR AND STRUCTURE OF AQUEOUS DISPERSIONS OF SPHINGOMYELIN. G.G. Shipley, L.S. Avecilla and D.M. Small (Biophysics Div., Dept. of Med., Boston Univ. Schl. of Med., Boston, Mass. 02118). *J. Lipid Res.* 15, 124–31 (1974). The phase behavior of bovine brain sphingomyelin in water has been determined by polarizing light microscopy, differential scanning calorimetry and X-ray diffraction. Lamellar phases, in which water is intercalated between sheets of lipid molecules arranged in the classical bilayer fashion, are present over much of the phase diagram. An order-disorder transition separates the high temperature, liquid crystalline, lamellar phase from a more ordered lamellar phase at lower temperatures. The hydration characteristics of sphingomyelin are similar to the structurally related lecithin in that only limited amounts of water are incorporated above and below the transition. Above the transition at 47C, a maximum of 35% by weight of water can be incorporated between the lipid bilayers, the total thickness at maximum hydration being 60.2 Å, the lipid thickness 38 Å, and the surface area per lipid molecule at the interface 60 $Å^2$. Water in excess of 35% by weight is present as a separate phase. Below the phase transition, at 25C a maximum of 42% by weight of water may be incorporated between the lipid bilayers. On increasing the hydration, the lamellar repeat distance increases from 63.5 Å to a limiting value of 76 Å. Within this hydration range the calculated lipid thickness decreases from 63.5 to 42.5 Å, and the surface area per lipid molecule increases from 36.1 to 53.6 $Å^2$.

SYNTHESIS AND TURNOVER OF CEREBROSIDE SULFATE OF MYELIN IN ADULT AND DEVELOPING RAT BRAIN. F.B. Jungalwala (E K. Shriver Center for Mental Retardation, Inc., Waltham, Mass. 02154). *J. Lipid Res.* 15, 114-23 (1974). The turnover of cerebroside sulfate (sulfatide) was followed in both microsomal and myelin fractions of developing and adult rat brains after an intracerebral injection of $Na_2{}^{35}SO_4$. In the adult rats, the specific radioactivity of sulfatide of the microsomal fraction reached a maximum 12 hr after the injection, and after 3 days it was reduced to less than 30% of the maximum. In contrast, the specific radioactivity of the myelin sulfatide did not reach a peak until 3 days after the injection and remained essentially at the same level for as long as 6 months. In the case of 17-day-old rats, the specific radioactivity of myelin sulfatide reached a maximum level around 12 hr after the injection and then appeared to decline. The decline was most marked 2–6 days after the injection, suggesting an apparently rapid turnover of myelin sulfatide. When a correction was made for deposition of newly formed sulfatide, the results indicated that the turnover of myelin in the developing animals was also relatively slow. In vitro experiments with purified mylein and 3′-phosphoadenosine-5′-[^{35}S]phosphosulfate showed that myelin does not catalyze the galactocerebroside sulfotransferase reaction. This enzyme was found mainly in the microsomal fraction. In vivo studies suggested that a transfer of sulfatide molecules from the endoplasmic reticulum to myelin might occur.

SKELETAL MUSCLE LIPIDS. II. CHANGES IN PHOSPHOLIPID COMPOSITION IN MAN FROM FETAL TO MIDDLE AGE. A. Bruce (Dept. of Neurochem., Psychiatric Res. Centre, Fack, S-400 33 Göteborg 33, Sweden). *J. Lipid Res.* 15, 103–108 (1974). Phospholipid compositions were determined in samples of gastrocnemius muscles of individuals from fetal stage to the age of 55 yr. The lipids were separated by thin-layer chromatography. To enable characterization of the individual phospholipids, a lipid extract was prepared from pooled samples of gastrocnemius muscles from adult males and separated by ion-exchange chromatography on TEAE-cellulose. The individual phosphoglycerides were purified by thin-layer chromatography and then characterized according to their content of fatty acids, aldehydes, phosphorus and the identity of the bases. The relative amounts of the major phospholipids, choline and ethanolamine phosphoglycerides, changed little with age, and in adult males they constituted 47% and 24%, respectively. Cardiolipid increased from 3% in the fetal stage to 9% by the end of the first year of life. Sphingomyelin and serine phosphoglyceride decreased with increasing age, while inositol phosphoglyceride increased. In adult males, cardiolipin constituted 10% of total lipid phosphorus, inositol phosphoglyceride constituted 9%, serine phosphoglyceride 3% and sphingomyelin 7%.

III. CHANGES IN FATTY ACID COMPOSITION OF INDIVIDUAL PHOSPHOGLYCERIDES IN MAN FROM FETAL TO MIDDLE AGE. 109-13. The fatty acids in cardiolipid, choline phosphoglyceride, ethanolamine phosphoglyceride, inositol phosphoglyceride and serine phosphoglyceride in the human gastrocnemius muscle were studied for changes between early fetal age to middle age. In cardiolipin, choline phosphoglyceride and ethanolamine phosphoglyceride the relative total amount of the linoleic acid series increased considerably during the prenatal period and reached maximum values during the first year of life. In inositol phosphoglyceride and serine phosphoglyceride, only slight changes in the sum of fatty acids of the linoleic acid series were found. An increase in the concentration of fatty acids of the linolenic acid series was found in ethanolamine phosphoglyceride and serine phosphoglyceride, while only minor amounts of these fatty acids were present in choline phosphoglyceride and inositol phosphoglyceride and not at all in cardiolipin. During the period studied, the amount of plasmalogen in ethanolamine phosphoglyceride decreased slightly during the first year of life and then remained at 40%. The amount of plasmalogen increased in choline phosphoglyceride from 8% at the middle of the gestational period to 15% 1 yr after birth. The individual phospholipids were found to have characteristic fatty acid patterns.

COMPLEMENTARY OBSERVATIONS ON THE SUBJECT OF THE NUTRITIVE VALUE OF LIPIDS. A. Jakubowski. *Przem Spoz.* 27, 411–12 (1973). The necessity of having the right lipids (saturated and unsaturated fatty acids, essential fatty acids, phospholipids and vitamins A,D,E and K) in the food is emphasized. A program is proposed for food industry in which the exact amount of lipids needed in nutrition will be supplied. (Rev. Franc. Corps Gras)

NUTRITIVE VALUE OF FATS AND THE PROCESS OF TRANSFORMATION. A Suckewer et al. *Przem. Spoz.* 27, 404–11 (1973). Of the modifications of lipid compounds which occur during the manufacture and storage of food products, the most evident are the losses in essential fatty acids and vitamins A and E. The largest loss of these vitamins occur during the refining of edible oils. The ratio of vitamin E and essential fatty acids is diminished during the production and storage of food products. The authors recommend that in margarine production the physiologically justified proportion between the quantity of saturated and unsaturated fatty acids be maintained. (Rev. Franc. Corps Gras)

PREPARATION OF CAROTENOID COMPOUNDS. P. Chabardes and M. Julia (Rhone-Poulenc S.A.) *U.S. 3,803,252.* Carotene compounds, e.g., β-carotene, are prepared by reacting a sulfone. Ret—SO_2—R, in which Ret represents retinyl or substituted retinyl, and R represents a hydrocarbon radical, in the presence of an alkaline reagent, with an ester Ret—X, in which X represents an acid residue. The product is then desulfonated, for example, with an alkaline reagent.

• Edible Proteins

INFLUENCE OF THE YEAST PROTEIN ON THE SUPPLEMENTATION OF GLUTEN PROTEIN AND ON THE LEVEL OF PROTEIN AND NUCLEIC ACIDS IN THE LIVER OF RATS. A. Pronczuk, T. Bernacka and J. Bartnik (Dept. of Technol. and Hygiene of Human Nutr., Warsaw Agric. Univ.). *Roczniki Technol. Chem. Zywnosci* 20, 63–75 (1971). The nutritive value of yeast protein and yeast + gluten mixed protein was estimated by the method of PER. The changes in protein and nucleic acid concentrations in the liver of rats fed these diets were also determined. Four weeks feeding of rats with the diet containing yeast (as an only source of protein) gave much lower values of body weight gain, liver weight and the level of liver protein and nucleic acid as compared to the casein diet. When the yeast was given to rats in the diet containing gluten, the nutritive value of such a diet was much higher. The values of PER, liver weight, and the level of protein and nucleic acid were close to the values obtained from rats fed the casein diet. It was also observed that the different quality of dietary protein produced changes in protein/DNA and RNA/DNA ratios in the liver. Changes in these ratios were parallel to the changes in PER. Thus it seems that the evaluation of liver protein/DNA ratio can serve as an additional test for the quality of protein, including yeast protein. The results of this study have proved the possibility of the practical use of yeast as a protein supplement for some foods of poor protein quality.

PREPARATION OF VEGETABLE PROTEIN CONCENTRATES. L. Sair and I. Melcer (The Griffith Labs, Inc.). *U.S. 3,809,767.* The protein is extracted from defatted meal. The undesirable flavor impurities are washed out and the protein dried. The

pH is raised to 5.5–10 and the protein concentrate dried and may be comminuted. Initially the nitrogen solubility index is above 15, and preferably above 40, and the process, including the drying steps, are controlled to keep it within this range. The resulting product is tasteless, of good solubility and has good water binding properties. It contains at least 60% protein. While comminution results in loss of some of the natural texture, the product has enhanced emulsifying properties.

PREPARATION OF FULL-FAT OILSEED PROTEIN BEVERAGES. G.C. Mustakas (U.S. Sec'y of Agriculture). *U.S. 3,809,771.* The beverage is prepared by suspending full-fat oilseed flour in water, inactivating the lipoxygenase, precipitating the lipid-protein, resuspending the precipitate in water at pH of about 9, heating and cooling the suspension, adjusting the pH to about 7 and clarifying.

PRODUCTION OF EXPANDED TEXTURED PROTEIN PRODUCTS. D.H. Waggle (Ralston Purina Co.). *U.S. 3,810,764.* A mixture of oleaginous seed materials and an aqueous liquid having a specified pH is formed. It is then mechanically tempered to impart surface orientation characteristics to the material. Heating produces a bland, expanded, functional protein product.

TREATMENT OF SOYBEANS WITH YEAST. H.-C. Chien (Krafteo Corp.). *U.S. 3,810,997.* An aqueous dispersion containing protein is prepared and then treated to provide a substrate that is relatively free of microbiological contamination. A viable culture of a particular yeast or mixture of yeasts is added to the substrate. The yeast is selected so as to be capable of utilizing the carbohydrate material in the vegetable protein source. Fermentation is effected under conditions which minimize production of alcohol.

EXTRUDED PROTEINACEOUS MATERIALS. W.T. Atkinson (Archer Daniel Midland Co.). *U.S. 3,812,267.* Meat substitute food products comprise extruded protein materials containing a mixture of solvent extracted oilseed material (e.g., soy protein) and fish protein concentrate.

SOY PROTEIN PRODUCTS: TECHNOLOGY AND NUTRITIVE VALUE. *J. Am. Dietetic Assoc.* **64**, 398–401 (1974). Nutritional value, use of soybean products as meat extenders, and governmental regulations affecting soy products are reviewed. The information was drawn chiefly from papers presented at the World Soy Protein Conference in Munich, November, 1973.

PRODUCTION OF PROTEIN-CONTAINING LAMELLAR STRUCTURE MEAT SUBSTITUTE. V.B. Tolstoguzov, A.I. Mzhelsky, V.A. Ershova, E.E. Braudo and N.V. Mikheeva. *U.S. 3,801,713.* The meat substitute is prepared by first diffusing polyvalent metal ions through a semi-permeable membrane into a colloidal solution to form a gel, followed by freezing and thawing of the gel to develop the lamellar structure. Then the structural elements are impregnated by an edible binder.

IMPROVING THE VALUE OF CAKES OF VEGETABLE ORIGIN TO OBTAIN PROTEINS. T.J. Staron (Etablissement Public, Inst. Nat. de la Rech. Agronomique). *U.S. 3,803,328.* The crude cakes are macerated in an aqueous medium with strains of microorganisms, notably the yeast *Geotrichum candidum.* The cakes are thus freed of sulfur containing impurities and aflatoxins and have an improved nutritive value. Pure proteins can be isolated from the maceration liquids by precipitation at the isoelectric point in the presence of saline solution.

PRODUCTION OF A BLAND TEXTURED SOY PROTEIN. K.J. Valentas and G J. Van Hulle (General Mills Inc.). *U.S. 3,803,339.* The method includes the steps of fermenting moistened vegetable protein material and then treating it in a flowing stream of hot, pressurized vapor, such as steam.

METHOD AND APPARATUS FOR TREATING FISH. K.R.M. Hogstedt, V. Frounda, T.L. Knutsen, A. Statiin, E.T.L. Svensson and S.-O. Osterman (Aktiebolaget Astra Nutrition). *U.S. 3,804,964.* Fish can be treated to produce a high protein material having reduced taste, odor and fat content by cutting individual fish into pieces, washing the fish, spraying them with water, and coagulating the pieces with a concurrent steam flow while passing them through a direct steam boiler. Bones and other nonfibrous hard pieces are separated from the coagulated material which is then homogenized and centrifuged to remove fat, soluble substances and skin fragments. Preferably the homogenizing and centrifuging steps are repeated, and the material is then pressed and dried.

EDIBLE PROTEIN FIBERS. K. Sawada, S. Moritaka, Y. Nakao and K. Yasumatsu (Takeda Chem, Inds.). *U.S. 3,806,611.* Edible protein fibers are prepared by (1) making an alkaline spinning solution containing protein and a thermo-gelable polysaccharide, (2) extruding the spinning solution through a spinneret into an acid coagulating bath to form protein fibers and (3) neutralizing the excess acid on the filaments. The resulting fibers are characterized by their soft, smooth texture and white pleasing appearance.

STABILIZED PRESS CAKE FOR FPC MANUFACTURE. G. Pelroy, J. Spinelli, R. Miller, D. Wieg and L. Lehman (U.S. Dept. of Commerce, National Oceanic and Atmospheric Admin., National Marine Fisheries Serv., Pacific Fishery Prod. Technol. Ctr., 2725 Montlake Blvd., Seattle, Wash. 98112). *Food Technol.* **28**(3), 64–74, 82 (1974). A process is described for the preparation of fish protein press cake that is stable at ambient temperatures to microbiological and oxidative deterioration. The press cake was stabilized with antioxidants and sodium metabisulfite or isopropanol. Fish protein concentrate made from the stored press cake had the same organoleptic and nutritional properties as FPC made by conventional processing.

FISH PROTEIN CONCENTRATE AS A MINERAL NUTRIENT SOURCE. F.H. Hoskins (Dept. of Food Sci., Louisiana State Univ., Baton Rouge, La. 70803) and J. Loustaunau. *Food Technol.* **28**(3), 56–62 (1974). Fish protein concentrate has been studied primarily for its value as a source of protein. However, other nutrients, namely minerals, may also be present in FPC in considerable quantities. This study indicates that FPC products prepared from one freshwater and three marine species of fish are exceptional dietary sources of calcium, phosphorus, iron, and magnesium.

PLANT PROTEINS: PROGRESS AND PROBLEMS K.M. Bird (Head, Nutrition Programs Group, Nutrition and Tech. Services Staff, Food and Nutr. Serv., USDA, Washington, DC 20250). *Food Technol.* **28**(3), 31–9 (1974). The United States is entering a transition period in which our food economy will shift from being predominantly animal-protein-based to being predominantly plant-protein-based. The author describes current programs in which textured vegetable proteins are being used, projected usage of plant proteins by 1980, and questions that must be answered in order to make the transition smoothly.

EFFECTS OF SOY CURD ON THE ACCEPTABILITY AND CHARACTERISTICS OF BEEF PATTIES. V. Yeo (Dept. of Animal Sci., Cornell Univ., New York State College of Agr. and Life Sci., Ithaca, NY 14850), G.H. Wellington and K.H. Steinkraus. *J. Food Sci.* **39**, 288–92 (1974). Soy curd-beef patties were made containing 0%, 5%, 10%, 20%, 75% and 100% of curds which had been pressed at 300 psi, 600 psi and 1100 psi during manufacture. Taste panel test results showed that by increasing pressure on the soy curd or by the addition of flavoring to the curd before patty formation, increased soy concentration became less detectable and the acceptability of the patties was increased. Soy curd-beef patties made with 1100 psi curd and with color and flavor added were favorably accepted even at levels as high as 75% curd. The easy detectability of flavored soy in patties did not greatly change the high acceptability of the patties. The chemical composition, functional characteristics and physical properties of the soy-beef patties were also studied.

DENATURATION OF PLANT PROTEINS RELATED TO FUNCTIONALITY AND FOOD APPLICATIONS. A REVIEW. Y.V. Wu and G.E. Inglett (USDA, Northern Reg. Res. Lab., ARS, Peoria, IL 61604). *J. Food Sci.* **39**, 218–25 (1974). Proteins can be denatured by heat, changes in pH, organic solvents, detergents, urea, guanidine hydrochloride or other methods that modify the secondary, tertiary or quaternary structure, without breaking any covalent bonds. Physical-chemical measurements or functionality related to denaturation include solubility, viscosity, dissociation into subunits, sedimentation constant, optical rotation, association and ultraviolet spectra. The relationship between pH, temperature and rate of denaturation of wheat and soy proteins is complex. Optimum heat treatment of soy flakes, for example, inactivates nearly all biologically active components, but the protein retains most of its functionality. Knowledge about protein denaturation helps to produce food products with desirable functional properties.

VARIATIONS IN THE PROTEIN LEVELS OF A WIDE RANGE OF PEANUT GENOTYPES (ARACHIS HYPOGAEA L.). C.T. Young (Dept. of Food Sci., Georgia Station, Georgia 30212) and R.O. Hammons. *Oléagineux* **28**, 293–7 (1973). A total of 105 genotypes were

examined for protein content including the effect of seasonal variations on protein level. Protein (N × 5.46) varied from an average low of 22.7% to a high of 29.3%. These genotypes provided a rational choice of germ plasm for the breeding development of new and improved cultivars with significant alteration in protein content.

• Detergents

THE APPLICATION OF MICROCALORIMETRY TO RESEARCH IN THE FIELD OF TOILET PREPARATIONS. G.P. Adams (Unilever Res. Isleworth Lab. Middlesex) *J. Soc. Cosmet. Chem.* 25, 49–58 (1974). A differential microcalorimeter has been adapted for adsorption studies on biological substrates. The instrument provides reproducible quantitative information on the heat change associated with the interaction of the material of interest with the substrate. When this heat change is combined with information on the amount of material adsorbed obtained using conventional analytical techniques, an indication of the adsorbate-adsorbent interaction is obtained. The calorimeter is also capable of giving information on the rate of adsorption, the time required to reach thermal equilibrium and whether or not appreciable adsorption occurs in times encountered during product application. Subsidiary experiments indicate whether the adsorbed material is likely to withstand rinsing or whether the adsorption characteristics are grossly affected by the presence of detergent. Described are the apparatus and techniques employed and general examples of the applications of the method.

SPECIALIZED TECHNIQUES FOR THE ANALYSES OF COSMETICS AND TOILETRIES. D.M. Gabriel (Unilever Res., Isleworth Lab., Unilever Ltd., Isleworth, Middlesex). *J. Soc. Cosmet. Chem.* 25, 33–48 (1974). Only during the last century have scientific principles been applied to the development of cosmetics and toiletries, but during the same span of time there have been dramatic advances in analytical techniques, many of which have been applied to solve particular analytical problems associated with this industry. Modern analysis is generally a two stage procedure—first the separation and isolation of the various components of interest followed by characterization, identification and estimation. Examples illustrate the use of a wide range of techniques which have been applied to the analysis of shampoos, aerosol hairsprays, hairdressings, toothpastes, antiperspirant/deodorants and talcum powders.

THE SUBSTANTIVITY OF COSMETIC INGREDIENTS TO THE SKIN, HAIR AND TEETH. N.J. Van Abbé (Beecham Products, Applied Res. and Evaluation Unit, Leatherhead, Surrey). *J. Soc. Cosmet. Chem.* 25, 23–31 (1974). Substantivity conveys the idea of prolonged association between a material and a substrate, an association which is greater or more prolonged than would be expected with simple mechanical deposition. This review is intended to discuss the advantages and disadvantages of substantive effects, various ways of achieving substantivity and methods for its detection and assessment.

THE CHEMISTRY OF HUMAN HAIR CUTICLE—I: A NEW METHOD FOR THE PHYSICAL ISOLATION OF CUTICLE. J.A. Swift and B. Bews (Unilever Res. Isleworth Lab., Unilveer Ltd., Isleworth, Middlesex). *J. Soc. Cosmet. Chem.* 25, 13–22 (1974). The cuticle of human hair has been isolated in bulk by a new method involving vigorous agitation of fibres in water. The cuticle fractions have been shown to be of high morphological purity using various technics of electron microscopy. The significance of amino acid analyses is discussed.

USE OF BROMATED ANILIDE DERIVATIVES OF SALICYLIC ACID IN THE SOAP. J. Tolman et al. *TSPK Pollena* 17, 354–60 (1973). The activity of the soap, of two disinfectants produced in Czechoslovakia (Disanyl and Trisanyl) has been tested in the Research Institute of Oil and Fat Industry of Rakovnik (Czechoslovakia). On the basis of the results obtained, one disinfectant soap has been formulated and is now being produced. (Rev. Franc. Corps Gras)

INVESTIGATIONS INTO THE BIODEGRADABILITY OF NITRILOTRIACETIC ACID (NTA). L. Huber (Bayer Biological Inst., München). *Tenside Detergents* 11(1), 17–26 (1974). The biodegradability of the organic complex-former, nitrotriacetic acid, was investigated in the Sapromat test and in a laboratory activated sludge plant with a view to using it as a replacement for polyphosphates in textile detergents. The extent of biodegradation, which was determined by the substance-specific detection of the BSB and CSB decrease as well as for nitrate formation, shows a marked dependence on the state of adaptation of the bacterial cultures used. In adapted activated sludge systems, NTA is readily biodegradable as the sole C, N and energy source. The substance-specific BSB amounts to 0.78 ± 0.27 mg O_2/mg NTA. The most important degradation product was found to be nitrate. With an NTA sludge loading of 1.4 kg/kg TS.d, no significant influencing of the degree of degradation is apparent. One side or reciprocal inhibition of peptone and NTA degradation is not present in the activated sludge test even at higher concentrations of NTA (250 mg/1).

DETERMINATION OF THE CLOUD POINT OF NONIONIC SURFACTANTS. H. Hoffmann (Frankfurt/M). *Tenside Detergents* 11 (1), 30–1 (1974). Values are given for several nonionics and the reproducibility of the method by several laboratories.

ASSESSMENT OF SODIUM NITRILOTRIACETATE AS BUILDER IN DETERGENT FORMULATIONS: DETERMINATION OF THE ANTIFLOCCULATING POWER OF SODIUM NITRILOTRIACETATE COMPARED WITH SOME INORGANIC BUILDERS. S. Gafá and F. Burzio (Detergent and Tensioactive Lab. Montedison, Rho(Milano)). *Tenside Detergents* 11(1), 7–16 (1974). Concerning the antiflocculant properties of sodium nitrilotriacetate compared with those of sodium tripolyphosphate and postassium pyrophosphate operating in the presence of hardness due to calcium and magnesium, in a system including a pigment or an oil finely dispersed in the colloid state as artifical model soils. The performance of three builders is assessed by means of a turbidimetric test. Mechanisms of Ca^{++}/builder and Mg^{++}/builder/ interaction, which differ for sodium nitrilotriacetate compared with the two polyphosphates examined, are suggested on the basis of the results of flocculation of the dispersions and emulsions obtained in function of the hardness due to calcium and magnesium salts. Moreover, the true softening capacities of the three builders are assessed and coincide, in calcium hardness tests, with those encountered in a previous study on the anti-redepositing properties of the builders examined.

INACTIVATION OF ANTI-MICROBIAL ACTIVITY OF SURFACE ACTIVE SUBSTANCES. G. Koppensteiner and H. Mrozek (Microbiological Lab. Henkel & Cie,. GmbH, Düsseldorf). *Tenside Detergents* 11(13), 1–7 (1974). The inactivation of the microbiostatic and microbiocidal effects of certain surface-active compounds (quaternary ammonium compounds, amines, amphosurfactants) by polysaccharides (agar, starch, cellulose), meat and milk was examined. In every case it was possible to observe a decrease in the effect. The microbiostatic effect was more definitely reduced in certain gram negative bacteria (pseudomonades), than in gram-positive ones. The decrease in microbiocidal effect was comparable for the bacteria examined. Adsorption tests with a quaternary ammonium compound on dissolved and undissolved agar resulted in an increased linkage through dissolved agar. Three different types of bacteria *(Staph. aureus, E. coli and Ps. aeruginosa)* were found to absorb the same amounts of a quaternary ammonium compound.

A QUICK METHOD OF DETERMINING ANION AND CLEANING SUBSTANCES WITHIN THE MICRO RANGE. A. Marks (COSMETOCHEM AG, Zug, Switzerland). *Seifen-Öle-Fette-Wachse* 100 (3), 63–5 (1974). Starting with titration according to Epton, several basic dyes are discussed, which can be used for determination of small amounts of cleaning substances with the aid of spectrophotometry. Determination within the micro range during inspection of goods received, evaluation or adsorption measurements is described in detail, by means of exact working instructions.

LIGHT FASTNESS, LIGHT STABILITY AND WHITENESS AS A RATING CRITERION FOR DETERGENT BRIGHTENERS. R. von Rütte. *Seifen-Öle-Fette-Wachse* 100(3), 55–60 (1974). The reduction of the optical whiteness effects by the influence of light energy is mainly determined by the structure and concentration of the fluorescent whitening agents (FWA), by the light quality and the atmospheric conditions and by the properties of the whitened medium. Other than the FWAs used in the fiber and textile industry, the incorporation of optical whiteners in a wash application provide fiber effects which are produced in most cases by uncontrolled consumer process. The meaningful evaluation of the light stability of such compounds should therefore be based either on large consumer tests or on laboratory work which was set up with a detailed knowledge of the local washing conditions.

NEW DEVICE FOR CONTINUOUS MEASUREMENT OF TOTAL PHOSPHATE CONTENT OF WASTE WATER AND SURFACE WATER. K-H. Papst (Siemens Aktiengesellschaft, Karlsruhe). *Seifen-Öle-Fette-Wachse* 47(5), 121–24 (1974). A continuously operating measuring device is described, which serves to record the total phosphate content in order to monitor the discharge of sewage treatment plants and to control surface water. It also serves as a transmitter for automation of the addition of precipitating agents.

IR AND NMR INVESTIGATIONS OF THE BONDS BETWEEN FATTY ACIDS AND POLYOXYETHYLENE ALKYL ETHERS. B. Lincoln, S. Friberg and S. Gravsholt (Swedish Inst. for Surface Chem. Stockholm and Inst. of Physical Chem. Technical Univ. of Denmark, Lyngby, Denmark). *Colloid Polymer Sci.* 252(1), 39–45 (1974). Bonds between octanoic acid and oxyethylene dodecyl ethers with varying numbers of oxyethylene ether groups were investigated by IR and NMR. The results gave evidence of the formation of a complex containing two acids and one tetraoxyethylene dodecyl ether and showed the influence of low percentages of added acid on the conformation of the ether.

SOLUBLE SILICATES. Engler (Woellner-Werke, Ludwigshafen/Rhein). *Seifen-Öle-Fette-Wachse* 100(7), 165–70 (1974). The progress made to date with soluble silicates is reviewed. The physical-chemical properties, the analytical constants and the most important ranges of application are described.

RESEARCH ON THE MICROBIOLOGICAL-PHYSIOLOGICAL RELEVANT PROPERTIES OF CERTAIN POLY(HYDROXYCARBOXYLATE)-COMPLEX COMPONENTS (I. COMMUNICATION). H. Haschke and G. Morlock (Degussa-Deutsche Gold- and Silberscheideanstalt vorm Rössler, Frankfurt). *Tenside Detergents* 11(2), 57–74 (1974). The possibility of the mobilization of heavy-metal ions by sequestering agents like NTA and poly(hydroxycarboxylates) made by Cannizzaro-reaction with acrolein-acrylic acid-copolymerization has been studied. A thermodynamic discussion is given. With such poly(hydroxycarboxylates) some biodegradability tests have been done using the "closed bottle test," the "Sapromat-test" and the official German detergents test. The special shape of the biodegradation-versus-time diagrams found with these poly(hydroxycarboxylates) is explained as a consequence of their molecular weight distribution.

RESEARCH ON THE MICROBIOLOGICAL RELEVANT PROPERTIES OF CERTAIN POLY(HYDROXYCARBOXYLATE)-COMPLEX COMPONENTS (2. COMMUNICATION). H. Haschke and G. Morlock (Degussa-Deutsche Gold- and Silberscheideanstalt vorm Rössler, Frankfurt). *Tenside Detergents* 11(2), 75–97 (1974). Starting with the "law of the exponential growth of microorganism-populations" and with the Monod equation, a kinetic model for the description of biodegradation under conditions of the "closed bottle test" (GF-Test) and analogous oxygen-consumption test (Sapromat test) has been developed. Based on the results of experimental investigations on the influence of the initial concentration of microorganisms in GF-test measurements to the corresponding GF-test results, the model has been formulated suitable for computers. The computer programs allow an idea of the influence of the initial substrate concentration, of the BSBT of the substrate and of the initial microorganism concentration to the results of measurements following the method of the GF or analogous oxygen consumption methods.

THE DETERMINATION OF CONTACT ANGLES OF AQUEOUS SURFACTANT SOLUTIONS ON POWDERS. H.G. Bruil and J.J. van Aartsen (Akzo Res. Labs. Corporate Res. Dept., Arnhem, Netherlands). *Colloid Polymer Sci.* 252(1), 32–38 (1974). The wetting behavior of aqueous sodium dodecyl sulfate solutions on polyester, polyamide, aluminum and graphite powders has been studied. The method described is based on the unopposed penetration of the liquid into a plug of powder packed in a glass tube. Using the Washburn equation for the flow of a liquid through a capillary, it is possible to calculate from the rate of penetration the magnitude of the advancing contact angle and the work of adhesion between the liquid and the powder. The results show details as to the mechanism of adsorption of the surface-active molecules on polymer and metal surfaces.

CRITICAL EXAMINATION OF PUBLISHED DATA CONCERNING THE RATE OF MICELLE DISSOCIATION AND PROPOSAL OF A NEW INTERPRETATION. T. Nakagawa (Res. Lab., Shionogi & Co. Ltd., Osaka, Japan). *Colloid Polymer Sci.* 252(1), 56–64 (1974). The rate of micelle-monomer conversion in a surfactant solution has been determined by two principal methods; the relaxation method including stopped flow, pressure jump, temperature jump, and ultrasonic absorption on the one hand, and the magnetic method utilizing the analysis of signal shape of NMR or ESR on the other. The examination of published data revealed that the rate constants obtained by the relaxation method were generally smaller than those estimated by the magnetic method. The discrepancy seems to originate mainly from the different models of micelle-monomer conversion assumed at the interpretation of experimental data. Proposed is a new analysis of relaxation data, by which the discrepancy can be eliminated or at least much reduced.

HYDRODYNAMICS OF THIN LIQUID FILMS. EFFECT OF THE SURFACTANT ON THE RATE OF THINNING. B.P. Radoëv, D.S. Dimitrov and I.B. Ivanov (Dept. Physical Chem. Faculty of Chem. Univ. of Sofia, Sofia, Bulgaria). *Colloid Polymer Sci.* 252(1), 50–5 (1974). A theory of the effect of the surfactant on the rate of thinning of foam films is presented. The formulae obtained for the separately treated cases of low and high concentrations cover the whole concentration range. The effect of both bulk and surface diffusion is taken into consideration and it is demonstrated that the relative importance of the latter increases with the decrease of the film thickness. The role of the surface diffusion for the stability of foam films is discussed. It is shown that films stabilized with soluble surfactants never strictly obey Reynolds' equation so that the actual velocity of thinning can be substantially higher than that calculated by the quoted equation.

SYNTHESIS AND PROPERTIES OF BLOCK COPOLYMER SURFACTANTS OF PROPYLENE AND ETHYLENE OXIDES. S. Kucharski (Inst. of Organic and Plastics Technol., Technical Univ., Wroclaw, Poland). *Tenside Detergents* 11(2), 101–5 (1974). The block copolymers of the RPE type obtained by the successive addition of propylene and ethylene oxides to n-butanol, n-hexanol and n-octanol in the presence of sodium have been described. It was established that polyoxypropylenation of the alcohols took

the theoretical course until about 9 moles of propylene oxide per mole of alcohol was introduced. Further addition of propylene oxide was disturbed by side-reactions. Surface-active properties were evaluated, i.e. surface tension decrease, wetting power and foaming ability of the copolymers containing 3–15 oxypropylene units (mean value) in a molecule. The increase of polyoxypropylene chain resulted in better surface activity of copolymers, the best foaming and wetting properties, comparable with that of polyoxyethylene nonylphenol, were obtained with the derivatives of n-octanol. The cmc values of copolymers, determined from surface tension isotherms, decreased with increasing polyoxypropylene chain. It was established that the decrease of cmc due to 3 oxypropylene units was equivalent to that of 1 CH_2-group of aliphatic alcohol.

RESEARCH ON THE RECIPROCAL EFFECT OF POLYMERIC TENSIDES. III. INFLUENCE OF POLYVINYLPYRROLIDONES (PVP) ON THE CRITICAL MICELLE CONCENTRATION (CMC) OF ANIONIC TENSIDES. M. Radu, G. Popescu and D. Anghel ("P. Poni" Inst. for Macromolecular Chemistry, Colloid Div., Bucharest). *Koll.-Z. u. Z. Polymere* 251(12), 1039–43 (1973). The influence of PVP on the cmc of the sodium salts of saturated and unsaturated C_{16} and C_{18} carboxylic acids was investigated. The surface tension curves displayed transition points t_1 and t_2 corresponding to the adsorption outset and to the saturation of the polymer in tenside ions, respectively. While t_1 only depends on the cmc of the tenside, t_2 depends both on the cmc of the tenside and on the polymer concentration. The presence in solution α polymer-tenside adsorption complexes shifts the cmc towards higher concentrations, corresponding to the t_2 concentration. The polymer-tenside interaction increases with the increasing PVP concentration range (0.25–0.50%) and with the strengthening of the hydrophobic character of the tensides, in the order: Stearate > palmitate > eladinate > oleate. Conductivity curves did not display the two transition points.

SURFACTANTS IN THE '70'S—MAJOR APPLICATIONS. D.H. Scharer (Shell Development Co., Houston, Texas), H. Stupel and J.G. Moffett, Jr. *Soap/Cosmetics/Chemical Specialties* 50(4), 33–6, 53 (1974). The authors review the major types of surfactants used by the U.S. household detergents industry, describe their manufacture and properties and discuss the range of formulations in use today and under development. Phosphate-based products and phosphate-free products are discussed separately. Alpha olefin sulfonates and, in Europe, paraffin sulfonates appear to be capable of becoming major workhorse surfactants in the future.

PRODUCTION OF A CARBOXYMETHYL STARCH. F. Baumann, F. Bayerlein, P.-H. Habereder and H. Stache (Diamalt Ag.). *U.S. 3,808,137.* Carboxymethyl starch suitable as a soil suspending agent in detergent compositions is produced by reacting the starch with an alkali and an alkali salt of chloroacetic acid in a nonaqueous alcoholic medium.

CLEANING FLUID. N.O. Raley. *U.S. 3,808,144.* A cleaner for fabrics contains soap, glycerin and sodium thiosulfate.

DETERGENT COMPOSITION. W.J. DeWitt and M.E. Tuvell (Ethyl Corp.). *U.S. 3,808,157.* Olefin sulfonates obtained by saponifying the reaction product of SO_3 and olefins having 12–16 carbon atoms per molecule provide excellent hard water detergent materials when the olefins are predominantly unbranched acyclic terminal monoolefins mixed with 3–10% of beta-branched terminal olefins and 3–12% internal olefins. Preferred olefin sulfonates are the sodium and potassium salts of alkene sulfonic acids and of hydroxy alkane sulfonic acids.

HEXITOL, GLUCOSE AND SUCROSE ESTERS OF α-SULFO FATTY ACIDS. R.G. Bistline, Jr., F.D. Smith, J.K. Weil and A.J. Stirton (U.S. Sec'y of Agriculture). *U.S. 3,808,200.* Esters of α-sulfo fatty acids with mannitol, sorbitol, glucose and sucrose are prepared by direct esterification, acid chloride or alcoholysis methods. The products are easily soluble, biodegradable, anionic surface active agents with foaming, detergent, emulsifying and lime soap dispersing properties and excellent stability to metal ions and to acid or alkaline hydrolysis.

PREPARATION OF BIODEGRADABLE ALKANE SULFONAMIDES. O.C. Kerfoot, A.J. Lundeen, C.D. Kennedy and W.A. Wentworth (Continental Oil Co.). *U.S. 3,808,272.* High quality biodegradable alkane sulfonamides are prepared from the alkane sulfonyl chloride reaction mixture obtained by reacting normal paraffin hydrocarbons with chlorine and sulfur dioxide under ultraviolet light. The crude reaction mixture is stabilized by the removal of impurities. Unreacted hydrocarbons are removed from the stabilized mixture which is then reacted with a nitrogen base compound such as ammonia and amines to form the linear alkane sulfonamides.

HAIR CONDITIONING SHAMPOO. F.W. Olson, Jr. and K. Hutcheson (Colgate-Palmolive Co.). *U.S. 3,808,311.* A shampoo for improving the combing properties and luster of hair washed therein comprises a single phase aqueous detergent composition containing a higher alkyl amine oxide, an amphoteric surfactant, a cationic surfactant and an oil such as mineral, vegetable, animal or synthetic oil.

LIQUID SHAMPOO. R.E. Bolich, Jr., F.M. Joffe and D.C. Mohl (Procter & Gamble). *U.S. 3,808,329.* Mild shampoo compositions comprise polyoxyethylene sorbitan mono fatty acid ester, triethanolamine alkyl sulfate, triethanolamine fatty acid soap and fatty acid ethanolamide.

AMMONIOPHENOLATE COMPOUNDS. T.W.M. Spence (Procter & Gamble). *U.S. 3,809,646.* These novel surface active compounds are able to exist in either cationic or zwitterionic form. They are effective as textile softening agents substantive to fabrics at the ordinary pH of fabric rinsing operations and removable from fabrics in a zwitterionic form under succeeding alkaline washing conditions.

AMINE OXIDES. J.F. Gerecht (Colgate-Palmolive Co.). *U.S. 3,809,659.* Hydroxy higher alkyl morpholine oxides have beneficial effects in detergent and cosmetic compositions. They are particularly desirable for application to the skin and for modification of the foaming power of detergent compositions.

SHAMPOO COMPOSITION POSSESSING SEPARATE LOTION PHASE. F.W. Olson, Jr. and K. Hutcheson (Colgate-Palmolive Co.). *U.S. 3,810,478.* A two phase shampoo composition is prepared by mixing together polar and lipophilic portions. As a result, the lipophilic portion becomes emulsified and creamy in appearance, forming a lotion which is stable, lighter than the polar phase, and floats on top. The shampoo is used as a homogeneous temporary emulsion of the lotion and polar phase created by shaking prior to use. A conditioning action is imparted to the hair washed with it due to the actions of the oil, amphoteric and cationic surface active agents, and the conditioners in the formula.

MILDNESS ADDITIVE. R. Kelly and E.J. Ritter (Cincinnati Milacron, Inc.). *U.S. 3,813,350.* The degree of skin irritation of detergent compositions is reduced by adding a mildness additive having the general formula Y–R–Y′ wherein R is a divalent organic radical containing a chain of at least 15 atoms 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, phosphorus, sulfur or combination thereof. Suitable mildness additives include esters of polymerized unsaturated C_{12}–C_{26} fatty acids and glycols or polyoxyalkylene glycols. ■

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