ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarcyk, J. Covey, J. G. Endres, J. Iavicoli, F. A. Kummerow, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

RATE OF OXIDATION OF STEROL ESTERS IN DIFFERENT OILS. J. Sawicki *et al. Roczniki Technol. Chem. Zywnosci* 16, 115–121 (1969). The amount of non-oxidized fraction in both the oils and the sterol esters decreased with the degree of oxidation. The highest rate of oxidation was found for *Sebastes marinus* oil followed by sunflower seed, soybean, and rapeseed oils. (Rev. Franc. Corps Gras)

TRIGLYCERIDE COMPOSITION OF BEEF TALLOW BEFORE AND AFTER INTERESTERIFICATION. J. Narcinkiewicz *et al. Roczniki Technol. Chem. Zywnosci* 16, 71–77 (1969). Following interesterification, there was an increase in saturated acids at the 2-position, Palmitic acid predominated over stearic acid. In addition, there was an increase in completely saturated triglycerides, so that interesterification may not be desirable both from the technological and from the nutritional point of view. (Rev. Franc. Corps Gras)

STEADY-STATE PROPERTIES OF THREE PHASE OIL SEPARATORS. A. A. Lapsin *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1969(5), 116–118. The steady-state properties of oil separators can be given in the form of the following relations: $G_2=f(G_1)$ and $G_1=f(Q)$, where G_1 is the oil content (%), Q is the quantity (l/hr) of starting emulsion, and G_2 the oil content of the effluent separated water (%). These relations describe changes in the separation of the oil-water emulsion according to the oil content of the separated water. Separation of concentrated emulsions (70% oil) is more practical for industry than separation of dilute emulsions (30% oil). In the former case, the quantity of oil lost in the wash water is reduced by half. (Rev. Franc. Corps Gras)

EFFECT OF DIETARY LIPIDS ON THE FATTY ACID COMPOSITION OF CHICKEN EGG LIPIDS. J. Chudy *et al. Roczniki Technol. Chem. Zywnosci* 16, 61–69 (1969). The dietary lipids consisted of lard, rapeseed oil or hydrogenated rapeseed oil. No qualitative changes in the yolk lipids resulted, but there were some quantitative differences in the relative amounts of the different fatty acids. No erucic acid appeared in the yolk lipids. (Rev. Franc. Corps Gras)

SENSORY MEASUREMENT OF FLAVOR AND ODOR INTENSITY. D. J. Tilgner *et al. Roczniki Technol. Chem. Zywnosci* 16, 79–93 (1969). Quantitative data are presented characterizing the flavor and odor intensity of more than 50 raw materials, food products and condiments as determined by the dilution index method. (Rev. Franc. Corps Gras)

THE CAROTENE AND TOCOPHEROL CONTENTS OF BARLEY OIL. A. I. Demcenko. *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* (5), 18–20 (1969). The author determined the amounts of provitamin A and vitamin E in different varieties of barley grown in the Orenburg region of the USSR. Results in mg/100 g oil follow:

	Isomers				
Variety	α-carotene	β-carotene	of β-carotene	Xanthophylls	Tocopherols
Nutans-187	0.28	6.42	0.12	6.49	239.55
Kinel'skij-5	0.36	6.35	0.20	6.15	150.15
Europeum	0.36	8.47	0.13	7.05	141.45
Precocius-143	0.40	5.90	0.23	4.62	219.20
Pallidum-45	0.37	5.19	0.09	5.31	146.13

(Rev. Franc. Corps Gras)

CHANGES IN THE PHOSPHOLIPIDS OF SUNFLOWER SEEDS DURING DRYING. V. G. Scerbakov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1969(5), 21–23. At higher drying temperatures, the amount of phosphatidic acids in the seeds decreased while the amount of other phosphatides increased. These phosphatides can subsequently pass into the oil. (Rev. Franc. Corps Gras)

EFFECT OF CRYSTALLINE CAROTENE ON THE QUALITY AND STABILITY OF BUTTER. E. R. Stavrova *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1969(5), 68–70. β-Carotene is used to improve the color of winter butter. Samples containing crystalline carotene dissolved in the fat were more stable during storage than uncolored samples. (Rev. Franc. Corps Gras)

CALORIMETRIC STUDY OF COCONUT OIL. I. V. Nikonov (Polytechnic Inst. of Krasnodar). *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1969(5), 42–46. Melting and crystallization behavior was studied using a dynamic calorimeter. Equations for the specific heat in the interval 25–50C and for the heat of fusion are given. Crystal composition was determined by the cooling cycle. It was not possible to determine calorimetrically the different polymorphic forms of the crystals. (Rev. Franc. Corps Gras)

ANALYSIS OF CHLORO-ORGANIC PESTICIDES IN FOODS BY GAS CHROMATOGRAPHY USING AN ELECTRON CAPTURE DETECTOR (Ni^{63}). S. J. Kubacki *et al. Przemysl Spozywczy* 23(5), 195–198 (1969). Several methods are discussed for separating and determining chloro-organic pesticides in biological materials. A novel and rapid method for extracting the chlorinated hydrocarbons in the gas phase is used. The apparatus is described. Examples of the analysis of pesticide residues in soybean oil and pork meat are given. (Rev. Franc. Corps Gras)

FATTY ACID COMPOSITION OF CRUDE, BLEACHED AND HYDROGENATED RAPESEED OIL. A. Jakubowski *et al. Prace Inst. Lab. Badawczych Przemyslu Spozywczego* 19(2), 197–209 (1969). Crude rapeseed oils contain C_2–C_{22} acids in the free fatty acid fraction. Steam distillable acids (C_2–C_{12}) represent about 0.5% of the total quantity of free acids. The composition of the free fatty acids in crude, bleached and hydrogenated rapeseed oils is different from that of the acids in the glycerides. In pressed or extracted crude oils, the free acids contain less erucic and more of the other unsaturated acids than do the glycerides. (Rev. Franc. Corps Gras)

LOSS OF METHIONINE IN CASEIN DURING STORAGE WITH AUTOXIDIZING METHYL LINOLEATE. S. R. Tannenbaum, H. Barth and J. P. Le Roux (Dept. Nutrition, MIT, Cambridge, Mass. 02139). *J. Agr. Food Chem.* 17, 1353–54 (1969). A model system consisting of casein (nine parts) and methyl linoleate (one part) has been used to study changes in methionyl residues of proteins as a consequence of lipid oxidation. A modified McCarthy-Sullivan procedure was used to distinguish methionine from its oxidation products, since acid hydrolysis partially converts methionine sulfoxide back to methionine. The concentration of unreacted methionine was followed in the model system at storage relative humidities of 0, 33 and 75%; in each case the loss of methionine was proportional to the amount of protein-bound nonenzymatic browning pigment. Methionyl residues may act as peroxide decomposers with concomitant carbonyl compound formation which in turn would lead to nonenzymatic browning.

CONTRIBUTION OF MILK FAT TO THE FLAVOR OF MILK. A. Tamsma, F. E. Kurtz, R. S. Bright and M. J. Pallansch (Dairy Products Lab., Eastern Utilization Res. and Dev. Div., Washington D.C. 20250). *J. Dairy Sci.* 52, 1910–13 (1969). To obtain a better understanding of milk fat's flavor contribution to milk, beverages were prepared containing 1–3% fat, using whole milk concentrate, milk fat and various vegetable fats as the fat source. All fats except that in the whole milk concentrate were deodorized under two sets of conditions, designed so that one would be more effective than the other in removing volatile compounds. All of the deodorized fats along with deodorized samples of the same fats and untreated whole milk concentrate were combined with skimmilk. The resultant beverages and the skimmilks used in their preparation were evaluated for flavor and desirability for continued beverages use. Untreated milk fat in whole milk concentrate and partially deodorized milk fat were the only fats which improved the flavor of skimmilk. The data indicated that the desirable flavor characteristics of milk fat are attributable partly to nonvolatile compounds and also, to a significant extent, to volatile compounds which probably are unique to this fat.

RELATION BETWEEN THE PHYSICOCHEMICAL CONSTANTS AND THE EASE OF FILTRATION OF SUNFLOWER OIL. G. P. Mecenov *et al. Maslo-Sapunema Prom., Byul.* 5(3), 1–9 (1969). (Rev. Franc. Corps Gras)

SULFUR DIOXIDE EFFECT ON THE LIPID CONTENT OF POTATOES. N. I. Mondy and E. P. Sonoff (Grad. Sch. Nutrition, New York State College Home Econ., Cornell U., Ithaca 14850). *Food Technol.* 23, 1597–99 (1969). Unpeeled Ontario potatoes were exposed for one hour to an atmosphere of sulfur dioxide and were assayed for lipid content immediately, and after one week and one month of storage at 40F. Total crude lipid was fractionated into free fatty acids, neutral fats and phospholipid fractions. The total crude lipid decreased in both the cortex and pith sections in the potatoes stored for one week and for four weeks following treatment. The phospholipid fraction followed the same trend as crude lipid, decreasing significantly after one week and also four weeks following treatment. The neutral fat fraction decreased immediately following treatment and then increased. The free fatty acids increased following treatment.

EFFECT ON ANTIOXIDANTS AND SYNERGISTS ON PEROXIDE DECOMPOSITION IN MILK FAT. L. M. Hill, E. G. Hammond and R. G. Seals (Dept. Dairy Industry, Iowa State U., Ames 50010). *J. Dairy Sci.* 52, 1914–16 (1969). Antioxidants markedly accelerate milk fat peroxide breakdown in vacuo at 40C. Except for nordihydroguaiaretic acid the rate of breakdown of peroxides by the antioxidants increases with increasing antioxidant concentration. With nordihydroguaiaretic acid, the rate of breakdown decreased with increasing nordihydroguaiaretic acid concentration. The synergists, citric acid and isopropyl citrate, decreased the rate of breakdown of peroxides compared with controls and significantly inhibited the acceleration of peroxide decomposition caused by the addition of antioxidants.

ORGANOLEPTIC EVALUATION OF THE EFFECTIVENESS OF ANTIOXIDANTS IN MILK FAT. L. M. Hill, E. G. Hammond, A. F. Carlin and R. G. Seals. *Ibid.*, 1917–21. The ability of antioxidants to protect milk fat was determined by an accelerated stability test at 40C. The samples were evaluated organoleptically twice daily for five days by a panel of nine judges who scored them as oxidized or unoxidized. A control sample was included at each session, and the deviations of the samples containing antioxidant from the controls were analyzed statistically. The method proved satisfactory as a rapid screening method for antioxidants. Considerable variation in the effectiveness of antioxidants with different batches of milk fat made accurate comparisons difficult, but thiodipropionic acid, propyl gallate and butylated hydroxytoluene tended to rank high, and nordihydroguaiaretic acid and carboxymethylmercaptosuccinic acid tended to rank low. The effectiveness of antioxidants was not enhanced markedly by isopropyl citrate, except for nordihydroguaiaretic acid. Deodorization of the milk fat did not affect the results appreciably.

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. CARBON-13 SPECTRA OF STEROIDS. H. J. Reich, M. Jautelat, M. T. Messe, F. J. Weigert and J. D. Roberts (Gates Lab. of Chem., Calif. Inst. Tech., Pasadena 91109). *J. Amer. Chem. Soc.* 91, 7445–54 (1969). The natural abundance ^{13}C resonance spectra of a variety of sterols and steroidal hormones have been determined at 15.1 MHz. The chemical shifts of the carbons in these substances were found to span on the order of 200 ppm and for most steroids with the aid of complete proton decoupling it was possible to resolve all of the carbon resonances one from the other. It has also been possible by using specific single-frequency and off-resonance proton decoupling, hydroxyl acetylation effects on chemical shifts, deuteration and substituent influences in analogous compounds to make self-consistent and unambiguous assignments of nearly all of the resonances encountered. The carbon resonances are in general far more informative than proton resonances for structural analysis of steroids.

THE BINDING OF CALCIUM TO PHOSPHOLIPID-PROTEIN COMPLEXES. R. W. Joos and C. W. Carr (Dept. of Biochem., Univ. of Minnesota Med. School., Minneapolis 55455). *Proc. Soc. Exp. Biol. Med.* 132, 865–70 (1969). The ability of protamine, lysozyme and bovine serum albumin to compete for calcium binding sites on acidic phospholipids provides a method for quantitative studies of the electrostatic interactions of proteins with phospholipids. The results demonstrate the reversible, stoichiometric binding of proteins with phospholipids. Crude cephalin binds arginine but not glycine, leucine or phenylalanine. The data suggest a strong electrostatic interaction between negatively charged phospholipids and positively charged proteins and indicate that electrostatic bonding may occur in lipoproteins.

EFFECT OF ARTIFICIAL DRYING ON TOCOPHEROLS AND FATTY ACIDS OF CORN. C. K. Chow and H. H. Draper (Div. Nutritional Biochem., Dept. Animal Sci., Univ. Illinois, Urbana 61801). *J. Agr. Food Chem.* 17, 1316–17 (1969). A study was conducted on the stability of the fatty acids and individual tocopherols in corn under several conditions of artificial drying. Samples of corn were dried at temperatures ranging from ambient to 290F until the moisture content was reduced from about 25 to 15%. No effect on either the fatty acid or vitamin E content was discernible.

FATTY ACID COMPOSITION OF RAPESEED, SOYBEAN, SUNFLOWER AND PEANUT OILS. F. G. Sietz (Ger. Soc. Oil Plants. Mannheim, Ger.). *Fette Seifen Anstrichmittel* 71, 446–51 (1969). Alterations during the past decade in the mode of cultivation of oilseeds have modified the composition of vegetable oils. New analytical figures on vegetable oils where source and past history are exactly known are presented.

FREE AND TOTAL GLYCEROL CONTENT OF MONOGLYCERIDES AND MIXTURES OF PARTIAL ESTERS. A COMPARISON OF THE ENZYMATIC GLYCEROL ESTIMATION WITH CHEMICAL METHODS. G. Berner and G. Guhr (Unilever Res. Lab., Hamburg, Ger.). *Fette Seifen Anstrichmittel* 71, 459–63 (1969). The free and bound glycerol content of water-soluble, strongly emulsifying and water-insoluble monoglycerides was determined enzymatically. The values thus observed were compared with those obtained by chemical methods. Free glycerol could be determined in all the samples only with the help of the enzymatic method. A good agreement between the values obtained by the two methods was found only in the determination of total glycerol in water-insoluble monoglycerides. In the enzymatic procedure for glycerol determination, the relative standard deviation for various weighings lies between 0.86 and 1.26%, taking P as 95%, X rel. amounts to 1.9–2.8%.

ELUCIDATION OF THE STRUCTURE OF THE METHYL ESTERS OF CYCLIC FATTY ACIDS. III. OCCURRENCE OF METHYL ESTERS OF BICYCLIC FATTY ACIDS IN CYCLISED LINSEED OIL. W. R. Eckert, H. Scharmann and A. Zemon (Unilever Res. Lab., Hamburg, Ger.). *Fette Seifen Anstrichmittel* 71, 468–71 (1969). In the study of aromatic methyl esters in alkali-cyclised linseed oil, two hitherto unknown methyl esters of fatty acids were isolated by preparative gas chromatography. The structures of these compounds were elucidated by UV-, IR- and mass spectrometry, and they were found to be the methyl esters of ω-(methyl-indanyl)-octanoic and ω-(ethyl-indanyl)-heptanoic acids. The indane ring system is substituted in the 4,5-position.

INVESTIGATIONS ON THE AUTOOXIDATION OF MARGARINE. L. Forman and J. Zajic (Chem. Tech. Inst., Prague, Czechoslovakia). *Fette Seifen Anstrichmittel* 71, 493–99 (1969). The influence of storage temperature, method of packaging and the quality of dispersion upon the oxidative stability of margarine was investigated. The oxidative stability of margarine is improved with increasing fineness of the dispersion. Autooxidation can be prevented to a great extent by employing low storage temperature and suitable packaging materials. Packaging materials containing traces of heavy metals promote the autooxidation of the margarine in contact with the packaging materials.

OXIDABILITY OF OLIVE OILS REFINED BY DIFFERENT PROCESSES. M. Solinas and A. Montefredine (Prov. Chem. Lab., Pescara, Italy). *Riv. Ital. Sostanze Grasse* 46, 488–94 (1969). Samples of olive oil refined by different procedures have been subjected to oxidation under controlled conditions, with periodic measurement of free acidity, peroxide value, UV characteristics and Kreis reaction. It was observed that crude oils have a much lower rate of oxidation than refined oils and that the oxidation rate does not vary appreciably with the refining procedure used. Bleached oils are also subject to considerably faster oxidation. Refined husk oils are oxidized at a slightly slower rate than refined olive oils.

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CRYSTALLINE STRUCTURE OF COCOA BUTTER. H. Witzel and K. Becker (Inst. for Food Tech. and Packaging, Munich, Ger.). *Fette Seifen Anstrichmittel* 71, 507–16 (1969). Six crystalline modifications of cocoa butter are known from the literature of which only the pre-beta and the beta forms are important for the technology of chocolate manufacture. The elucidation of the crystalline structure of these two modifications is difficult because single crystals of appreciable size cannot be obtained from cocoa butter. It is shown that it is possible to analyze the structure with the help of X-ray diffraction studies of microcrystals as well as by comparison with structures of known mono-acid triglycerides. The lattice parameters and the arrangement of molecules in pre-beta and beta forms are given.

• Fatty Acid Derivatives

FATTY ACID BIGUANIDES AND THEIR USE FOR IMPREGNATING LEATHER. R. Biedermann (Geigy Chem. Corp.). *U.S. 3,460,983.* A fatty acid biguanide is produced by reacting a hydrohalide of C_{12}–C_{20} primary aliphatic amine with a dicyandiamide, in a molar ratio of 1:0.8 to 1:1.5. The reaction product is then dissolved in lower a alkanol, neutralized, filtered and mixed with 0.5 to 2.5 equivalents, per amine equivalent, of a C_{12}–C_{20} fatty acid. The fatty acid biguanide thus prepared can be used to impart hydrophobic properties to leather by impregnation.

BREAD SOFTENERS AND DOUGH IMPROVERS. J. J. Geminder and C. P. Hetzel (C. Pfizer & Co., Inc.). *U.S. 3,464,829.* A combination of at least one of the sodium, potassium, calcium and magnesium salts of monostearyl acid fumarate in microcrystalline form with finely divided stearic acid at a level of 15–50% of the fumarate salt afford an improved shelf life for bread and other finished bakery goods when incorporated into the dough of such goods prior to baking.

PREPARATION OF OMEGA-HYDROXYALKANOIC ACIDS. M. J. Diamond (U.S. Sec'y of Agr.). *U.S. 3,466,310.* Ricinoleic acid (or one of its salts, esters or amides) is heated to 178–210C with a strong alkali, in a reaction medium consisting of a high-boiling primary or secondary alcohol, such as 1-octanol or 2-octanol, to yield a product having an enhanced ratio of 10-hydroxydecanoic acid to sebacic acid. The process is also applicable to lesquerolic acid and other hydroxy unsaturated acids having allylic or homoallylic systems with a double bond between the hydroxyl and carboxyl groups, to yield a product having an enhanced proportion of the corresponding omega-hydroxyalkanoic acid, e.g., 12-hydroxydodecanoic acid.

PRODUCTION OF LIGHT-COLORED FATTY ACID DERIVED AMINO-CONTAINING COMPOUNDS. T. H. Kritchevsky (Hodag Chemical Corp.). *U.S. 3,468,904.* A method is claimed for producing light-colored fatty acid derived amino-containing compounds, such as amino-amides and amino-imidazolines of lauric, myristic and oleic acid, which also possess enhanced color stability on storage. The reaction to produce the amino-containing compounds is carried out in the presence of a small proportion of an alkali metal borohydride or hydride.

• Biochemistry and Nutrition

INHOMOGENEITY OF VITAMIN K_2 IN ESCHERICHIA COLI. I. M. Campbell and R. Bentley (Dept. of Biochem., Faculty of Arts and Sciences and Grad. School of Pub. Health, Univ. of Pittsburgh, Pitts., Pa. 15213). *Biochemistry* 8, 4651–55 (1969). Gel filtration has been used to study the menaquinone content of *E. coli.* Menaquinones-6, -7, and -9 have been detected and isolated in addition to the previously encountered menaquinone-8. The principal 2-demethyl-menaquinone has been unambiguously characterized as 2-octaprenyl-1,4-naphthoquinone. It is accompanied by the corresponding heptaprenyl derivative. A comparison between the fractionation power of hydroxypropylated Sephadex G-25 and G-50 is made.

REDUCTION OF LINOLENIC ACID HYDROPEROXIDE BY A GLUTATHIONE PEROXIDASE. B. O. Christophersen (Inst. of Clin. Biochem., Rikshospitalet, U. Oslo, Oslo). *Biochim. Biophys. Acta* 176, 463–70 (1969). It has been shown that the reduction of linolenic acid hydroperoxide and of linoleic acid hydroperoxide by GSH is catalysed at approximately the same rate by a glutathione peroxidase in rat liver. The products formed by the enzymatic reduction of linoleic acid hydroperoxide have been identified as 9-hydroxy-10,12-15-octadecatrienoic acid, 12-hydroxy-9,13,15-octadecatrienoic acid, 13-hydroxy-9,11,15-octadecatrienoic acid, 16-hydroxy-9,12,14-octadecatrienoic acid and probably 8-hydroxy-9,12,15-octadecatrienoic acid. Since the glutathione peroxidase seems to accept both five isomeric linolenic acid hydroperoxides and two isomeric linoleic acid hydroperoxides as substrates, it is probable that it can catalyse the reduction of the hydroperoxides of all the polyunsaturated fatty acids that occur in subcellular membranes.

IMPROVED QUANTITATION OF PLASMA LIPIDS BY DIRECT GAS-LIQUID CHROMATOGRAPHY. A. Kuksis, O. Stachnyk and B. J. Holub (Banting and Best Dept. of Med. Res., Toronto, Canada). *J. Lipid Res.* 10, 660–7 (1969). A preliminary digestion of total plasma lipid extracts with phospholipase C, which converts the lysolecithins, lecithins and sphingomyelins into monoglycerides, diglycerides, and ceramides, respectively, has been shown to facilitate subsequent determination of the plasma lipids by gas-liquid chromatography. A further improvement in the chromatographic elution pattern results from acetylation or trimethylsilylation of the liberated alcohol moieties prior to injection into the chromatograph. If tridecanoin is used as internal standard, quantitative estimates can be rapidly obtained for plasma lysolecithins, free cholesterol, lecithins, sphigomyelins, cholesteryl esters and triglycerides, as well as for free fatty acids. Other plasma lipids do not occur in sufficiently high concentrations to interfere with the analysis. The determination requires 0.1–0.5 ml of plasma and about 6 hr of processing, but many samples can be processed at a time.

EFFECT OF THE STRESS OF UNILATERAL ADRENALECTOMY ON THE DEPLETION OF INDIVIDUAL CHOLESTERYL ESTERS IN THE RAT ADRENAL. L. E. Gidez and E. Feller (Dept. of Biochem. and Med., Albert Einstein College of Med., Yeshiva Univ., Bronx, N.Y. 10461). *J. Lipid Res.* 10, 656–9 (1969). Normal rats were subjected to unilateral adrenalectomy and were killed 3 hr later. The concentration and composition of the cholesteryl esters in adrenals removed at operation and after death were compared. The esterified cholesterol concentration

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was lower in the adrenals obtained 3 hr after surgery. Cholesteryl arachidonate decreased in concentration significantly more than any other ester, followed in order of magnitude by linoleate and oleate. The cholesteryl ester concentration of adrenals removed from sham-operated rats 3 hr after surgery was also greatly reduced. On the basis of comparison with other work on the hydrolysis of cholesteryl esters by adrenal homogenates, it is concluded that the apparent selectivity in depletion of cholesteryl esters is due to differences in their rates of hydrolysis.

FEEDBACK REGULATION OF BILE ACID BIOSYNTHESIS IN THE RAT. S. Shefer, S. Hauser, I. Bekersky and E. H. Mosbach (Dept. of Lab. Diagnosis, Public Health Res. Inst. of the City of New York, N.Y. 10016). *J. Lipid Res.* 10, 646–55 (1969). The hepatic biosynthesis of bile salts in the rat has been shown to be controlled homeostatically by the quantity of bile salt returning to the liver via the portal circulation. The feedback mechanism was demonstrated in two kinds of experiments. In the first, rats with bile fistulas were infused intraduodenally with sodium taurocholate 12 hr after surgery. If the rate of infusion was greater than 10 mg per 100 g rat per hr, the increase in bile acid output normally observed in bile fistula rats was prevented. In the second type of experiment, the rats were infused with taurocholate 48–72 hr after biliary diversion, when bile acid output had reached a maximal value. Provided the rate of infusion exceeded 10 mg per 100 g rat per hr, bile acid secretion returned to the low levels observed in intact rats. Previous attempts to demonstrate the feedback control have been unsuccessful because too little bile salt was infused. The taurocholate pool of the experimental animals was measured as approximately 15 mg per 100 g rat; it was calculated from this and the above results that this pool circulated 10–13 times daily.

CHARACTERIZATION OF PHOSPHOLIPASE B OF CULEX PIPIENS FATIGANS. R. Hanumantha Rao and D. Subrahmanyam (Biochem. Div., Nat. Inst. of Communicable Diseases, Delhi, India). *J. Lipid Res.* 10, 636–41 (1969). Phospholipase B has been found in the mosquito *Culex pipiens fatigans,* and some of its properties have been studied. The enzyme had a high optimum temperature (45C) and broad alkaline pH optimum (8–9). It was inactive toward diacylphospholipids, and hydrolyzed lysolecithin at a higher rate than lysophosphatidyl ethanolamine. The enzyme was heat labile, but lysolecithin protected it against heat inactivation. Phosphatidyl ethanolamine, phosphatidyl choline, deoxycholate, Fe^{+++} and Hg^{++} inhibited the enzyme markedly. The enzyme was present mainly in larvae; little enzyme activity was detected in pupae or adults. The total and specific activities were highest in IV instar (6 day) and I instar (1st day) larvae, respectively. It was localized in the microsomal fraction and was distributed mainly in the abdomen and thorax of the insect. The enzyme was present at much higher levels of activity in larvae of the mosquitoes *Anopheles stephensi* and *Aedes aegypti.*

BIOSYNTHESIS OF GALACTOLIPIDS BY ENZYME PREPARATIONS FROM SPINACH LEAVES. J. B. Mudd, H. H. D. M. Van Vliet and L. L. M. Van Deenen (Lab. of Biochem., Univ. of Utrecht, Utrecht, Netherlands). *J. Lipid Res.* 10, 623–30 (1969). The pH optimum for galactolipid synthesis from UDP-galactose by spinach chloroplasts is 7.2 in Tris-HCl or phosphate buffer. The products include sterol glycosides, trigalactosyl diglyceride (tentatively identified), digalactosyl diglyceride, and monogalactosyl diglyceride in increasing order of quantity. The proportion of monogalactosyl diglyceride decreases and that of digalactosyl diglyceride increases as the pH is lowered. The galactolipid synthesis is quite resistant to elevated temperature; maximal incorporation of galactose from UDP-galactose was observed at 45C. The proportion of monogalactosyl diglyceride was greater at the higher temperatures. As much as 40% of the galactolipid-synthesizing capability of a spinach leaf homogenate is not sedimented by centrifugation for 60 min at 100,000 g. An acetone powder of spinach chloroplasts contains enzymes which catalyze galactolipid synthesis. This preparation is dependent on added diglycerides in order to make galactolipid, whereas the chloroplast preparation is not dependent on added diglycerides. Molecular species of diglycerides were compared as requirements for galactolipid synthesis. The requirement was satisfied best by the diglycerides of highest unsaturation. Methylation of the free hydroxyl of the diglyceride eliminated the effectiveness.

DIETARY PROTEIN AND THE CONTROL OF FATTY ACID SYNTHESIS IN RAT ADIPOSE TISSUE. M. Jomain and R. W. Hanson (Fells Res. Inst., Philadelphia, Penn. 19140). *J. Lipid Res.* 10, 674–80 (1969). Fatty acid synthesis in adipose tissue normally proceeds at a high rate when fasted animals are refed a diet containing carbohydrate, protein and low levels of fat. This study investigated the effect of omitting protein from the refeeding diet. Rats were fasted for 48 hr and refed either a protein-free diet or a balanced diet, and the rate of fatty acid synthesis from glucose, pyruvate, lactate and aspartate was measured. Refeeding the animals a diet devoid of protein resulted in a low rate of fatty acid synthesis from each of these substrates as well as a reduction in carbon flow over the citrate cleavage pathway. The activities of glucose-6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase, NADP-malate dehydrogenase, and ATP-citrate lyase were also reduced in epididymal fat pads from these rats. On the other hand, adipose tissue phosphoenolpyruvate carboxykinase activity was five times as great as that in tissue from animals refed a balanced diet. This difference could be eliminated if actinomycin D was injected coincident with refeeding. Refeeding rats diets high in carbohydrate is not, therefore, capable of inducing high rates of fatty acid synthesis in adipose tissue in the absence of dietary proteins. Thus, liver and adipose tissue respond differently to dietary protein.

IMPROVED SYNTHESIS OF 3-HYDROXY-3-METHYLGLUTARYL-CoA (HMG-CoA). A. I. Louw, I. Bekersky and E. H. Mosbach (Dept. of Lab. Diagnosis, Public Health Res. Inst. of the City of New York, Inc., New York 10016). *J. Lipid Res.* 10, 683–86 (1969). An improved method for the chemical synthesis of HMG-CoA is described. The procedure is designed to prevent the formation of 3-acetoxy-HMG-CoA.

INHIBITION OF LYMPHATIC ABSORPTION OF CHOLESTEROL BY CHOLESTANE-3β,5α,6β-TRIOL. M. Ito, W. E. Connor, E. J. Blanchette, C. R. Treadwell and G. V. Vahouny (Dept. of Internal Med., Univ. Hospitals, Univ. of Iowa, Iowa City, Iowa 52240). *J. Lipid Res.* 10, 694–702 (1969). The effect of cholestane-3β,5α,6β-triol (CT) on the intestinal absorption of cholesterol and oleic acid, as well as the absorption of labeled CT, was studied in lymph duct-cannulated rats. Intragastric administration of 50 mg of CT in an emulsion with cholesterol-7α-^{3}H and oleic acid-1-^{14}C resulted in 50% inhibition of sterol transfer into lymph but only 8% depression of fatty acid absorption over at 8 hr period. The absorption of labeled CT into lymph was only 2–3% compared with 50% absorption of cholesterol when each was fed alone. About 10% of the fed CT was recovered in the intestinal mucosa, and of this, one-half was associated with the brush border fraction. In rats fed CT 6 days prior to cholesterol and fatty acid administration, there was no effect on fatty

acid absorption, while cholesterol absorption was reduced by almost 30%. When the intestinal mucosa from these animals were investigated by electron microscopy, it appeared that CT feeding resulted in numerous enlarged mitochondria and a marked increase in length of the microvilli. If animals were allowed to recover for 6 days from the CT prefeeding regime, the intestinal mucosa appeared normal, and the absorption of cholesterol approached that in controls.

EFFECT OF VITAMIN E AND SELENIUM DEFICIENCIES ON LYSOSOMAL AND CYTOPLASMIC ENZYMES IN SHEEP TISSUES. J. G. Buchanan-Smith, E. C. Nelson and A. D. Tillman (Oklahoma Agric. Exp. Station, Okla. State U., Stillwater, Okla.). *J. Nutr.* **99**, 387–394 (1969). Forty-eight ewe and 12 ram lambs, about 4 months of age, were fed a purified diet during growth and reproduction. The experimental design was a 2 × 2 factorial arrangement in which the factors were subcutaneous injections of vitamin E (700 IU as *d*-α-tocopheryl acetate) and selenium (5 mg as sodium selenate), given separately and in combination at weekly intervals. Ewes and rams on the basal treatment died of muscular dystrophy before day 230 of the experiment and the activities of blood plasma creatine phospholinase, lactate dehydrogenase, α-hydroxy butyrate dehydrogenase and glutamate-oxaloacetate transaminase were elevated. Elevations of these enzymes in blood plasma were transient in the basal plus selenium-treated sheep. Free activity of acid protease in skeletal muscle was not affected by treatment. Total activity of acid protease was greater in livers of the vitamin E-treated sheep but vitamin E deficiency affected neither the activity of acid protease in liver nor the stability of liver lysosomes. Treatment had no effect on lysosomal enzymes in uterus and placenta.

MOBILIZATION OF LIVER VITAMIN A IN MATURE SHEEP. J. A. Boling, G. E. Mitchell, Jr., C. O. Little, C. L. Fields and K. E. Webb, Jr. (Dept. Animal Sci., U. Kentucky, Lexington 40506). *J. Nutr.* **99**, 502–504 (1969). Six mature rams averaging 63.3 kg were injected intrajugularly with 268 μCi of 11,12-^{3}H vitamin A acetate in 4 ml of aqueous 20% Tween 80. The sheep were fed alfalfa hay ad libitum plus 680 g of cracked shelled corn per head daily, supplemented with vitamin A palmitate at a level necessary to maintain liver vitamin A stores. The decline in serum radioactivity postinjection indicated rapid clearance of the injected dose of vitamin A from the blood. The excretory pattern of radioactivity in the feces and urine during 14 days postinjection suggested equilibration of body vitamin A stores. Liver was sampled at 14-day intervals postinjection by aspiration biopsy and analyzed for vitamin A and tritium activity. Vitamin A turnover in the liver was calculated using changes in specific activity units (dpm/μg vitamin A). The half-time of liver vitamin A was 163 ± 48 days and the turnover time was 234 ± 69 days. Using an average liver weight of 1 kg per ram, daily turnover rate of vitamin A was 968 ± 84 μg.

THE ROLE OF DIETARY FAT IN PROTECTING THE RAT AGAINST OXYTHIAMINE-PRODUCED THIAMINE DEFICIENCY. C. D. Bennett, J. H. Jones and J. Nelson (Lab. of Biochem., Dept. of Animal Biol., U. Penn., Philadelphia, Pa.). *J. Nutr.* **99**, 288–292 (1969). Dietary fat decreases the thiamine requirements of the rat and provides extended protection against the thiamine antagonist oxythiamine. We have measured the changes in the activities of three major thiamine-requiring enzymes of the brain and liver in rats fed low fat and high fat oxythiamine diets. Brain activities were unchanged with both diets. Liver and blood transketolase activities were decreased to the same extent with both diets. With the high fat oxythiamine diet, the oxidation of pyruvate by the liver was decreased to 51% of the control, whereas with the low-fat oxythiamine diet, it was decreased to 26% of the control (significantly lower than for the high-fat oxythiamine diet). These data provide additional evidence to support the idea that dietary fat spares thiamine by supplying energy through a route which requires a minimum of thiamine. On the basis of the results from our study, it appears that the cause of death in the thiamine deficiency produced by oxythiamine is a decreased ability of the rat to convert dietary carbohydrate into utilizable energy. The importance of the hexose monophosphate shunt in the metabolism of fat is discussed.

THE BIOCHEMISTRY OF LONG-CHAIN, NONISOPRENOID HYDROCARBONS. III. THE METABOLIC RELATIONSHIP OF LONG-CHAIN FATTY ACIDS AND HYDROCARBONS AND OTHER ASPECTS OF HYDROCARBON METABOLISM IN SARCINA LUTEA. P. W. Albro and J. C. Dittmer (Dept. Biochem., St. Louis Univ. Med. School, St. Louis 63104). *Biochemistry* **8**, 1913–1918 (1969). Fatty acids added to cultures of *Sarcina lutea* caused changes in the hydrocarbon composition of the cells. These changes were consistent with a mechanism of synthesis in which the major fatty acid of the cells condensed with the added fatty acid or with fatty acids that increased in response to the added fatty acid and in which one of the fatty acids participating in the condensation was decarboxylated. In the presence of acetate in the medium, exogenous palmitate was incorporated into the hydrocarbon by a mode of entry in which it was specifically not decarboxylated. In media with low acetate, 60–70% of exogenous palmitate incorporated into the hydrocarbon was decarboxylated. Under conditions of incorporation in which the palmitate was not decarboxylated, the carboxyl carbon of the palmitate occurred in monounsaturated hydrocarbons specifically on the side of the double bond opposite that in which the remainder of the aliphatic chain from palmitate was located. Evidence for the direct conversion of monounsaturated hydrocarbons into saturated derivatives and for the failure of ketones to serve as intermediates in the incorporation of fatty acids into hydrocarbons is presented. Alternative mechanisms for the intermediary conversion of fatty acids into hydrocarbons by the condensation of the carboxyl carbon and α-carbon of acids with decarboxylation of one of the acids (head-to-head condensation) that bypasses the requirement for ketones or secondary alcohols are presented.

FLUOROMETRIC SUBSTRATE FOR SULFATASE AND LIPASE. G. G. Guilbault and J. Hieserman (Dept. Chem., Louisiana State Univ., Lakefront Campus, New Orleans 70122). *Anal. Chem.* **41**, 2006–2009 (1969). New fluorometric substrates are described for the assay of the enzyme sulfatase and lipase. β-Naphthol sulfate and 4-methyl umbelliferone sulfate are useful for the assay of sulfatases, and N-methyl indoxyl myristate is an excellent substrate for the analysis of lipase. As little as 10^{-4} unit per ml of lipase or 10^{-3} unit per ml of sulfatase can be determined by a direct reaction rate method in 2–3 minutes with a precision and accuracy of about 1.5%.

PEROXIDATION OF SUBCELLULAR ORGANELLES: FORMATION OF LIPOFUSCIN-LIKE FLUORESCENT PIGMENTS. K. S. Chio, U. Reiss, B. Fletcher and A. L. Tappel (Dept. Food Sci., Univ. California, Davis, Calif. 95616). *Science* **166**, 1535–36 (1969). Lipid peroxidation of subcellular organelles gives fluorescent products which have fluorescence and excitation spectra similar to those of lipofuscin pigments. Fluorescence and excitation spectra and total fluorescence in the 460-nanometer region are useful for qualitative identification and quantitative measurement of the Schiff base product, a molecular damage site of lipid peroxidation which develops during some aging processes.

HIGH-RESOLUTION NMR SPECTRA OF HIGH-DENSITY SERUM LIPOPROTEINS. D. Chapman, R. B. Leslie, R. Hirz and A. M. Scanu (Molecular Biophysics Unit, Unilever Res. Lab., The Frythe, Welwyn, Herts, G. B.). *Biochim. Biophys. Acta* **176**, 524–536 (1969). High-resolution 220 Mcycles/sec and 100

Mcycles/sec proton resonance spectra have been observed with high-density serum lipoproteins (HDL_2 and HDL_3) dissolved in ^2H_2O and examined at different temperatures. Signals associated with the lipid and the amino acids of the protein are prominent. The lipid in the lipoproteins is in an extremely fluid condition and probably in a magnetically isotropic environment. The spectrum of the lipid is similar to that which is observed when lipids are dissolved in organic solvents, or alternatively, dispersed in water by bile salts or detergents or in a sonicated form. The organization of lipids and proteins in these lipoproteins is much looser than occurs in erythrocyte membranes. After reconstitution of the apoprotein with phospholipid, a similar spectrum to that of the original lipoprotein is observed. The reconstituted lipoprotein, however, appears to have a somewhat looser structure than the original lipoprotein. No marked differential broadening effect is observed with any of the signals associated with this phospholipid-protein complex.

THE EFFECT OF ESTRADIOL-17β-MONOPALMITATE AND SURGICAL CAPONIZATION ON PRODUCTION EFFICIENCIES, YIELDS AND ORGANIC CHARACTERISTICS OF CHICKEN BROILERS. L. R. York and J. D. Mitchell (Dept. Dairy Sci., Kansas State U., Manhattan 66502). *Poultry Sci.* 48, 1532–1536 (1969). A study was conducted to compare the effects of caponization and estradiol-17β-monopalmitate (EMP) injection on production, yields, chemical composition and organoleptic quality of chicken roasters. Meat strain chickens were either caponized at 4 weeks of age, administered 10 mg of EMP at 5 wks of age or untreated. All birds were processed at 11 wks of age. EMP-treated birds gained slightly more weight than controls during the 7 wk test period. Both EMP and control birds gained significantly more weight than capons. Feed efficiency was better for controls than for the treated birds. Both EMP birds and capons had a significantly higher dressing percentage than controls. Fat content of light meat, dark meat and liver was significantly increased by caponization and EMP treatment. Moisture content of light meat and dark meat was significantly decreased by EMP treatment. Moisture content of liver was significantly decreased by both caponization and EMP treatment. Thawing loss, cooking loss and cooking time were not affected by the caponization and hormonization treatments. Although treated birds consistently received slightly higher scores for juiciness, tenderness and flavor, the differences were not significant. Treated birds averaged a slightly more desirable overall preference rating than controls. Some individuals of the taste panel preferred birds from a particular treatment.

THE GROWTH PROMOTING PROPERTIES OF CRUDE SOY PHOSPHOLIPIDS. P. Vohra and J. R. Heil (Dept. Poultry Husbandry, U. California, Davis, Calif. 95616). *Poultry Sci.* 48, 1661–67 (1969). Zinc-deficient, purified diets (about 18–19 p.p.m. Zn) containing either 33% isolated soybean protein (SB), or 25% casein and 8% gelatin (CG) as protein sources supplemented with 0.45% DL-methionine were used to compare the growth stimulating properties of the following substances, singly or in combination with each other, at the indicated dietary levels for turkey poults: 0.03% EDTA-$Na_2 \cdot 2H_2O$; 2% crude soy phospholipids (SPL); and 0.01% Zn. The gains in body weight (in gm) over 21 days were as follows with the two diets for various treatments: SB, 45; SPL, 47; SPL, EDTA, 165; SPL, Zn, 224; SPL, Zn, EDTA, 227; EDTA, An, 222; An, 212; EDTA, 126; and CG, 143; SPL, 261; SPL, EDTA, 299; SPL, Zn, 321; SPL, Zn, EDTA, 339; EDTA, Zn, 241; Zn, 256; EDTA, 265. The poults grew much better on a zinc deficient CG-diet than on a SB-diet. EDTA improved the growth on both the diets but SPL was significantly growth promoting only on the CG-diet. The improvement in growth due to SPL in CG-diets was not due to any variations in the dietary Zn, Mn, Cu or Fe contents. The data on the effect of various treatments on mineral contents of tibia and liver are given. EDTA improved the growth by improving the availability of dietary zinc from both the diets. This is ruled out for SP1 because no growth improvement was observed when SB-diet was used.

BROWN FAT: ITS POSSIBLE ROLE IN IMMUNOSUPPRESSION DURING HIBERNATION. Y. A. Sidky, L. R. Daggett and R. Auerbach (Dept. Zoology, U. Wisconsin, Madison, Wis.

(Continued on page 128A)

Call for Nominations for Seventh AOCS $2,500 Award in Lipid Chemistry

Sponsored by Applied Science Laboratories

In April 1964 the Governing Board of the American Oil Chemists' Society established an Award in Lipid Chemistry under the sponsorship of the Applied Science Laboratories Inc., State College, Pennsylvania. Previous awards were presented as follows: Erich Baer, August 1964; Ernest Klenk, October 1965; H. E. Carter, October 1966; Sune Bergstrom, October 1967; Daniel Swern, October 1968 and H. J. Dutton, October 1969.

The award consists of $2,500 accompanied by an appropriate certificate. It is now planned that the seventh award will be presented at the AOCS Fall Meeting in Chicago, Illinois, Sept. 27–Oct. 1, 1970.

Canvassing Committee Appointees

Policies and procedures governing the selection of award winners have been set forth by the AOCS Governing Board. An Award Nomination Canvassing Committee has been appointed. Its membership is L. N. Norcia, Chairman; J. G. Coniglio, Morris Kates, J. C. Hamilton and F. T. Lindgren. The function of this committee is to solicit nominations for the seventh award. Selection of the award winner will be made by the Award Committee whose membership will remain anonymous.

Rules

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

Letters of nomination together with supporting documents must be submitted in octuplicate to L. N. Norcia, Temple University, Health Science Center, School of Medicine, Philadelphia, Pennsylvania 19140, before the deadline date of April 15, 1970. The supporting documents shall consist of professional biographical data, including a summary of the nominee's research accomplishments, a list of his publications, the degrees he holds, together with the names of the granting institutions, and the positions held during his professional career. There is no requirement that either the nominator or the nominee be a member of the American Oil Chemists' Society.

Remember the DEADLINE, April 15, 1970

(Continued from page 126A)

53706). *Proc. Soc. Exp. Biol. Med.* 132, 760–763 (1969). Brown fat from hibernating ground squirrels can depress the primary immune response of hamster spleen fragments in tissue culture. The immunosuppressive activity is preserved in brown fat homogenates and appears to be associated with the crude lipid layer.

VITAMIN K AND THE SYNTHESIS OF FACTORS VII-X BY ISOLATED RAT LIVER CELLS. G. S. Ranhotra and B. C. Johnson (Univ. of Oklahoma, School of Med., Biochem. Dept., Oklahoma City, Okla. 73104). *Proc. Soc. Exp. Biol. Med.* 132, 509–13 (1969). Isolated liver cells from normal rats and from vitamin K-deficient rats injected with vitamin K continued to produce factor VII-X activities *in vitro* for at least 1.5 hr while cells from K-deficient rats showed little formation of factors VII-X. Both types of cells showed a sustained oxygen uptake for at least 1.5 hr before starting to decline. Cycloheximide and puromycin failed to inhibit vitamin K-dependent production of factor VII-X activities in surviving isolated liver cells. However, puromycin administered *in vivo* inhibited production of vitamin K-dependent factors VII-X in such liver preparations. Warfarin added to liver cells inhibited formation of factors VII-X but at the same time inhibited their oxygen uptake.

VITAMIN A DEFICIENCY IN THE RAT PRIOR TO WEANING. W. E. Rogers, Jr. and J. G. Bieri (Lab. Nutr., Nat. Inst. Arthritis, NIH, Bethesda 20014). *Proc. Soc. Exp. Biol. Med.* 132, 622–624 (1969). Female rats maintained on retinoic acid and given a supplement of 1 μg of retinyl acetate during part of pregnancy delivered normal offspring that became vitamin A deficient in the first 2 weeks of life. If the rats were not supplemented with vitamin A, reversible crippling of the front legs occurred frequently in the second week of life. If retinoic acid supplementation was started a few days after birth, the rats developed normally but their growth would stop in 4 days whenever the supplement was removed from the diet. Growth resumed promptly when retionic acid was again supplied.

THE STEREOCHEMISTRY OF TRITIUM AT CARBON ATOMS 1,7, AND 15 IN CHOLESTEROL DERIVED FROM (3R,2R)-(2-^{3}H)-MEVALONIC ACID. P. J. Ramm and E. Caspi (Worcester Found. Exp. Biology, Inc., Shrewsbury 01545). *J. Biol. Chem.* 244, 6064–6073 (1969). It was shown that during the transformation from lanosterol to cholesterol the 2-*pro*-R hydrogen of mevalonic acid at C-1 retains its β configuration, at C-7 is inverted from the α to the β orientation, and at C-15 is inverted from the β to the α configuration. It follows that the proton originating from the 2-*pro*-S hydrogen of mevalonic acid is lost at both carbon atoms 7 and 15.

INTERACTIONS OF CYTOCHROME C AND ^{14}C-CARBOXYMETHYLATED CYTOCHROME C WITH MONOLAYERS OF PHOSPHATIDYLCHOLINE, PHOSPHATIDIC ACID AND CARDIOLIPIN. P. J. Quinn and R. M. C. Dawson (Dept. of Biochem., Agr. Res. Council, Babraham, Cambridge, England). *Biochem. J.* 115, 65–75 (1969). The interactions between cytochrome *c* (native and ^{14}C-carboxymethylated) and monolayers of phosphatidylcholine, phosphatidic acid and cardiolipin at the air/water interface was investigated by measurements of surface radioactivity, pressure and potential. On a subphase of 10 mM- or M-sodium chloride, penetration of cytochrome *c* into egg phosphatidylcholine monolayers, as measured by an increase of surface pressure, and the number of molecules penetrating, as judged by surface radioactivity, were inversely proportional to the initial pressure of the monolayer and became zero at 20 dynes/cm. The constant of proportionality was increased when the cytochrome *c* was carboxymethylated or decreased when the phospholipid was hydrogenated, but the cut-off point remained at 20 dynes/cm.

DETERMINATION OF THE STRUCTURES OF SPHINGOLIPID BASES BY COMBINED GAS CHROMATOGRAPHY-MASS SPECTROMETRY. A. J. Polito, J. Naworal, and C. C. Sweeley (Dept. of Biochem., Grad. School of Public Health, U. Pittsburgh, Pitts., Pa. 15213). *Biochemistry* 8, 1811–15 (1969). Analysis of the N-acetyl-*O*-trimethylsilyl derivatives of sphingolipid bases by combined gas chromatography-mass spectrometry gives detailed information about the chemical structures of these substances. In addition to defining the chain length and degree of unsaturation of an unknown base, mass spectral data provide information to classify the base as a sphinganine or 4-hydroxysphinganine type. The positions of double bonds in the aliphatic chains of these bases can be determined by mass spectrometry of the osmium tetroxide oxidation products of *N*-acetyl derivatives after conversion of the products into trimethylsilyl derivatives. Characteristic mass spectral fragmentations at positions of vicinal trimethylsilyloxy groups give conclusive evidence for the location of double bonds in the parent base.

A LONG-TIME STUDY OF THE BLOOD LIPIDS OF TWO STUDENTS OF ATHEROSCLEROSIS. I. H. Page and Lena A. Lewis (Res. Div., Cleveland Clinic Found., Cleveland, Ohio). *Circulation*, 40, 915–918 (1969). A study of serum cholesterol and lipoproteins covering periods of 28 years in a male physician and 17 years in a female research worker showed relative constancy for the cholesterol levels and greater variability for the lipoproteins. Cholesterol was reduced sharply and temporarily just after each influenzal infection. In the male, the level of cholesterol was slightly above 300 mg/100 ml for more than 13 years. An extremely low cholesterol and high carbohydrate diet proved unacceptable. A more liberal, relatively low-saturated fat, low-cholesterol, and high polyunsaturated fatty acid diet with about 30% of the calories from fat, maintained the cholesterol level between 230 and 270 mg and has been followed with relish for a number of years. A myocardial infarction occurred 27 years after the study began. Clofibrate since then has reduced the cholesterol level further. The female subject is in good health and maintains cholesterol levels slightly below 300 mg on a usual American diet. She is 10 years younger than the male. Her β-S 40–70 lipoproteins have usually been well below the male subject's. Weight gain and lack of exercise seemed regularly to increase both levels.

INFLUENCE OF DIETHYLSTILBESTROL ON BODY WATER SPACE IN RUMINANTS. R. L. Preston (Dept. Anim. Husb., U. Missouri, Columbia, Mo. 65201). *Proc. Soc. Exp. Biol. Med.* 132, 401–404 (1969). Four wether lambs were used to determine body water space following DES implantation. Tritium-labeled water was used as the tracer. Body water space was 60.3 and 59.8% of the body weight for the control and DES-implanted lambs, respectively. It is concluded that body water space is not changed 12 days after DES implantation in lambs; therefore, this does not explain the decrease in PUN observed following DES administration in ruminants.

SIGNIFICANCE OF ADIPOSE TISSUE AND LIVER AS SITES OF FATTY ACID SYNTHESIS IN THE PIG AND THE EFFICIENCY OF UTILIZATION OF VARIOUS SUBSTRATES FOR LIPOGENESIS. E. K. O'Hea and G. A. Leveille (Div. of Nutr. Biochem., Dept. Animal Sciences, U. Illinois, Urbana 61801) *J. Nutr.* 99, 338–344. A combination of *in vivo* and *in vitro* techniques as well as the assay of the activity of several enzymes presumably involved in lipogenesis have been employed to study the relative importance of liver and adipose tissue in overall fatty acid synthesis in the pig. Both the *in vivo* and *in vitro* results indicate that when glucose-U-^{14}C is used as substrate, virtually all the newly synthesized fatty acids are formed in the adipose tissue. The incorporation of acetate-1-^{14}C into liver fatty acids was, however, much greater than that of glucose-U-^{14}C, suggesting that, if acetate was freely available *in vivo*, the contribution of liver to overall lipogenesis may be appreciable. Data on the activity of citrate cleavage enzyme and of three NADPH-generating dehydrogenase enzymes in liver and adipose tissue complement the results obtained in the lipogenic studies. The hepatic capacity for the production of cytoplasmic acetyl CoA from mitochondrially derived citrate is insignificant, as is its ability to generate NADPH required in the reductive synthesis of fatty acids. Collectively the results indicate that the adipose tissue plays a major, if not a nearly exclusive role in fatty acid synthesis in the pig. Nonsaponifiable lipid synthesis in the liver requires acetate rather than glucose as a starting substrate.

INFLUENCE OF FASTING AND REFEEDING ON LIPOGENESIS AND ENZYMATIC ACTIVITY OF PIG ADIPOSE TISSUE. E. K. O'Hea and G. A. Leveille (Dept. of Animal Sci., U. Illinois, Urbana 61801). *J. Nutr.* 99, 345–352 (1969). Fatty acid synthesis and $^{14}CO_2$ production from glucose-U-^{14}C were virtually abolished in biopsy adipose tissue samples obtained from pigs subjected to a 4-day fast. Refeeding for 2 days fully restored lipogenesis to the prefasting level, and refeeding for 4 days was associated with a twofold overshoot in the capacity for glyceride-glycerol synthesis. No overshoot in fatty acid synthesis could be detected after 4, 6 or 12 days of refeeding. When pigs were refed diets high in protein or fat after a 4-day fast, the restoration of the lipogenic capacity of the

adipose tissue was limited to about 50% of that observed in animals refed a high carbohydrate diet. The nonparallel behavior of citrate cleavage enzyme activity and lipogenesis discounts any regulatory role for this enzyme in fatty acid synthesis. Among the NADPH-generating dehydrogenase enzymes studied, malic enzyme appeared more adaptive than the pentose pathway enzymes. The rate of lipogenesis was more closely correlated with the activity of acetyl CoA carboxylase than with any other enzyme assayed. The regulartory implications of these findings in relation to lipogenic control in pig adipose tissue are discussed.

EFFECT OF HIGH LEVEL SUPPLEMENTED VITAMIN A ON AVIAN LEUKOSIS AGENTS IN CHICKS. M. Mitrovic, W. L. Marusich and D. Deutsch (Chemical Res. Div., Hoffmann-La Roche Inc., Nutley, N.J. 07110). *Poultry Sci.* 48, 1633–36 (1969). The addition of supplemental vitamin A (2600, 10,000, 50,000 and 100,000 I.U./kg) to the low vitamin A basal ration (<220 I.U. of vitamin A per kg) neither increased nor decreased the resistance or susceptibility of chicks to 3 agents of the avian leukosis complex. The agents evaluated included Rous sarcoma virus, Marek's disease agent and Reticuloendotheliosis virus strain T.

EFFECT OF VARYING LEVELS OF ETHOXYQUIN AND VITAMIN E ON REPRODUCTION IN WHITE LEGHORN MALES FED DIETS HIGH IN LINOLEIC ACID. R. V. Kuhns and G. H. Arscott (Dept. Poultry Sci., Oregon State U., Corvallis 97331). *Poultry Sci.* 48, 1646–1651 (1969). An experiment was conducted to determine if ethoxyquin was as effective as vitamin E in restoring fertility in male chickens fed a low vitamin E-high linoleic acid diet and if lower levels of vitamin E and ethoxyquin could maintain fertility. Forty-two dubbed adult White Leghorn males were placed on various experimental treatments for a 50-week period. The treatments were: 1) 0.075% ethoxyquin fed continuously; 2) vitamin E (32.4 mg/kg) continuously; 3) negative control; 4) as three (0–38 weeks) and as one (38–50 weeks); 5) as four but with 0.3% ethoxyquin; 6) as three (0–38 weeks) and as two (38–50 weeks) and 7) as six but with vitamin E (162 mg/kg). The findings were: 1) in the absence of vitamin E and ethoxyquin fertility and sperm concentration were reduced; 2) both levels of ethoxyquin or vitamin E fed after 38 weeks of vitamin E-depletion restored fertility and semen concentration to levels comparable to males fed vitamin E or ethoxyquin continuously; 3) the lower levels of vitamin E or ethoxyquin used maintained fertility and sperm concentration over the 50-week experiment; 4) no differences were observed in semen volume, hatchability of fertile eggs, feed consumption, body weights and dead sperm; 5) testes weights were unaffected by treatment except for an apparent increase in testes size of males fed ethoxyquin continuously. The results show that sterility following vitamin E depletion can be reversed effectively with either ethoxyquin or vitamin E and that levels of vitamin E and ethoxyquin lower than those previously reported are equally effective.

ABSORPTION OF VITAMIN E BY THE RAT FROM A LOW FAT DIET. D. C. Herting, M. I. Ludwig and E. E. Drury (Health and Nutr. Res. Div., Tennessee Eastman Co., Rochester, New York 14603). *J. Nutr.* 99, 481–484 (1969). To determine whether absorption and utilization of vitamin E are as efficient on a low fat diet as on a diet containing abundant quantities of fat, groups of rats were fed for 8 weeks with low or high fat diets supplemented with graded levels of *d-α*-tocopheryl acetate (0 to 7.61 IU/100 g diet). Erythrocytes from animals fed the low fat diets were less susceptible to hemolysis by dialuric acid than those from animals fed the high fat diets. Hepatic storage of the supplemented vitamin E was not influenced by dietary fat except at the highest dose administered, at which level the high fat diet enhanced storage. Thus, by both criteria, vitamin E is effectively absorbed and utilized whether the animal is fed a low or a high fat diet.

PROSTAGLANDINS E_1 AND E_2 ANTAGONIZE NOREPINEPHRINE EFFECTS ON CEREBELLAR PURKINJE CELLS: MICROELECTROPHORETIC STUDY. B. J. Hoffer, G. R. Siggins and F. E. Bloom (Lab. Neuropharmacology, NIMH, St. Elizabeths Hosp., Washington D.C. 20032). *Science* 166, 1418–1420 (1969). In microelectrophoretic experiments, prostaglandins E_1 and E_2 antagonize the reduction in discharge rate of cerebellar Purkinje cells produced by norepinephrine. Slowing of discharge evoked by 3′,5′-adenosine monophosphate or gamma aminobutyric acid is not antagonized. These data provide the first indication that endogenous prostaglandins may physiologically function to modulate central noradrenergic junctions.

CONFIGURATION OF 2-HYDROXY ACIDS FROM BRAIN CEREBROSIDES DETERMINED BY GAS CHROMATOGRAPHY. S. Hammarstrom (Inst. for Medicine Kemi, Kungliga Veterinarhogskolan, Stockholm). *FEBS Letters* 5, 192–195 (1969). The results indicate the D-configuration for cerebronic acid. The cerebronic acid used in these studies, however, was not free from homologs. It has been assumed, but it has never been shown, that the homologs have the same configuration as cerebronic acid. A recently published method for steric analyses by GC using (–)menthylformate esters has been applied to long chain Hfa from brain cerebrosides. The results show that only one optical isomer of each of these acids is present and that this isomer has the D-configuration.

TRIGLYCERIDE CONFIGURATION AND FAT ABSORPTION BY THE HUMAN INFANT. L. J. Filer, Jr., F. H. Mattson, S. J. Fomon (Dept. of Pediatrics, Univ. of Iowa and Miami Valley Labs., Procter & Gamble Co., Cincinnati, Ohio.) *J. Nutr.* 99, 293–298 (1969). A metabolic balance study was performed with 11 newborn infants fed formulas identical except for the type of fat. Five infants received a formula containing natural lard (palmitic acid primarily in the 2-position of the triglyceride molecule) while six infants received a formula containing randomized lard (palmitic acid equally distributed among the 1-, 2-, and 3-positions of the triglyceride molecule). Excretion of fat by infants fed the formula containing natural lard averaged 0.30 g/kg per day (range 0.15 to 0.50) while that by infants fed randomized lard averaged 1.79 g/kg per day (range 1.09 to 3.11). All of the fatty acids of the natural lard were absorbed better, but this was most marked in the case of palmitic and stearic acids. The greater absorption of palmitic acid from lard is believed to result from the greater content of 2-monopalmitin and the lower content of free palmitic acid present in the intestine after hydrolysis. Although there is no obvious mechanism to explain the greater absorption of stearic acid from lard, it may be due to a more rapid rate or greater extent of micellization in the presence of greater amounts of 2-monopalmitin.

INFLUENCE OF FEEDING COTTONSEED OIL TO LAYING HENS ON THE LOW DENSITY LIPOPROTEINS OF THEIR EGGS. R. J. Evans, D. H. Bauer, S. B. Vaghefi and C. J. Flegal (Dept. Biochem., Michigan State U., East Lansing 48823). *J. Nutr.* 99, 485–490 (1969). Low density lipoproteins, isolated from yolks of eggs produced by hens fed a normal diet and from those of hens fed 2.5% cottonseed oil in the diet, were studied to determine the effect of crude cottonseed oil on properties of the yolk lipoproteins. Low density lipoproteins isolated from eggs produced by hens fed crude cottonseed oil contained more saturated fatty acids and less monoenoic fatty acids than did those isolated from normal eggs. Differences in amino acid content of the vitellenins from normal and "cottonseed" eggs were small. When low density lipoproteins were separated into six fractions by ultracentrifugation, most of those from normal eggs were in the top four fractions, but most from the cottonseed oil eggs were on the average larger in size than the normal ones as determined by gel filtration through a Bio-gel A-15m column. The floating fraction of normal low density lipoproteins isolated by ultracentrifugation contained more lipid and the molecules were larger than the soluble low density lipoproteins in the bottom fraction, and the lipoproteins in intermediate fractions were intermediate in lipid content and size of molecule. Cottonseed oil low density lipoproteins were also separated according to molecular size, but the different fractions were similar in lipid content.

EFFECT OF ODD AND EVEN NUMBERED MEDIUM CHAIN FATTY ACIDS ON GLUCOSE UPTAKE BY ADIPOSE TISSUE. J. P. Devi, F. Pi-Sunyer and S. A. Hashim (Dept. Med., St. Luke's Hospital, Columbia U., New York 10025). *Proc. Soc. Exp. Biol. Med.* 132, 632–635 (1969). The effect of odd and even numbered medium chain fatty acids (MCFA) on glucose uptake by rat adipose tissue was studied *in vitro*, in the absence and presence of varying concentrations of insulin. The MCFA studied were octanoate (C8), nonanoate (C9) and decanoate (C10), and a three carbon fatty acid, propionate. The effect of the odd numbered fatty acid, nonanoate, differed strikingly from that of an equimolar amount of the even homologues. The presence of nonanoate in the incubation medium was associated with a significant increase in glucose uptake with and without insulin, while octanoate, decanoate, and propionate exerted no such en-

hancing effect on glucose uptake. Incubation studies of adipose tissue with varying amounts of nonanoate indicate that the glucose uptake varied directly with the concentration of the fatty acid in the medium. Enhanced glucose uptake in the presence of nonanoate is not likely to be related to the glucogenic potential of the propionate moiety of the odd numbered fatty acid and has been ascribed to increased incorporation of this fatty acid into triglyceride of adipose tissue.

LINOLEIC ACID AND LINOLENIC ACID ELONGATION PRODUCTS IN MUSCLE TISSUE OF SYNCERUS CAFFER AND OTHER RUMINANT SPECIES. M. A. Crawford and M. M. Gale (Nuffield Inst. of Comparative Med., Zoological Soc. London, Regent's Park, London, N.W. 1). *Biochem. J.* 115, 25–27 (1969). The metabolic elongation products of both linoleic acid and linolenic acid were found in muscle tissues of *Syncerus caffer* and other ruminants. The acids with four double bonds were predominantly in the linoleic acid series, whereas the higher degrees of unsaturation, mainly five double bonds, were in the linolenic acid series. The total linoleic acid and linolenic acid groups were present in the relative proportions of about 4:1, in contrast with the fish oils, where the acids are mainly in the linolenic acid series. The consistent occurrence of members of both groups of acids in the animals studied here suggests to us that both may be important for structural purposes.

STUDIES ON THE MECHANISM OF FATTY ACID SYNTHESIS. XXII. SALT ACTIVATION OF THE FATTY ACID-SYNTHESIZING ENZYMES OF ESCHERICHIA COLI. H. Schulz, G. Weeks, R. E. Toomey, M. Shapiro and S. J. Wakil (Dept. Biochem., Duke Univ. Medical Center, Durham, N.C. 27706). *J. Biol. Chem.* 244, 6577–83 (1969). Salts activate the fatty acid-synthesizing system of *Escherichia coli* and several of its component enzymes. The 3-hydroxyacyl coenzyme A dehydrogenase from pig heart, one of the enzymes of fatty acid oxidation, is also stimulated by salts. Although all cations examined produce this stimulation, the activation patterns caused by monovalent cations are clearly distinct from those of divalent cations. When acyl carrier protein (ACP) and CoA thioesters are used as substrates, the activities of the β-ketoacyl-ACP reductase and the enoyl-ACP reductase are stimulated by salts. However, there is no stimulation when N-acetylcysteamine thioesters serve as substrates. With the β-ketoacyl-ACP reductase an increase of the salt concentration causes an increase in V_{max} for both acetoacetyl-ACP and acetoacetyl-CoA and a decrease in K_m only for acetoacetyl-ACP. The chromatographic behavior of ACP on Sephadex G-100 is influenced by salts. ACP interacts with $MgSO_4$ to form complexes which elute in earlier fractions from Sephadex G-100 than salt-free ACP, although the molecular weight of the ACP is unchanged. When acetoacetyl-ACP, complexed with $MgSO_4$, is used as substrate for the β-ketoacyl-ACP reductase, an increase of the salt concentration increases the V_{max} for the reaction but has no effect on the K_m for the acetoacetyl-ACP-$MgSO_4$ complex. It is suggested that cations complex with the protein moiety of ACP substrates, thereby facilitating binding to the enzymes, and that cations increase reaction rates possibly by reducing the repulsion between the negatively charged groups of the substrates and their respective enzymes.

LIPID COMPOSITION OF SYNAPTIC PLASMA MEMBRANES ISOLATED FROM RAT BRAIN BY ZONAL CENTRIFUGATION. C. Cotman, M. L. Blank, A. Moehl and F. Snyder (Oak Ridge Assoc. Univ., Medical Div., Oak Ridge, Tenn. 37830). *Biochemistry* 8, 4606–12 (1969). A plasma membrane fraction derived from rat brain nerve endings or the synaptic plasma membrane fraction, isolated by zonal centrifugation, was analyzed for their lipid content and their composition of lipid classes and their aliphatic moieties. With the exception of glycolipids and sphingomyelin, the lipid classes of synaptic plasma membrane are very similar to whole brain. Phosphatidylcholine and phosphatidylethanolamine are the major lipids and make up 62% of the total membrane lipid. Cholesterol and ceramide make up the major neutral lipids and 21% of total brain lipid. The 22:6 acyl chains in synaptic plasma membrane account for approximately 32% of the total fatty acids in phosphatidylethanolamine and in phosphatidylserine + phosphatidylinositol, but in whole brain the 22:6 fatty acids account for only about 26 and 20% of phosphatidylethanolamine and of phosphatidylserine + phosphatidylinositol, respectively.

LIPID CHANGES IN THE CHICK HATCHING MUSCLE. C. Y. Y. Hsiao and F. Ungar (Dept. of Biochem., Col. of Med. Sci., Univ. of Minnesota, Minneapolis, Minn. 55455). *Proc. Soc. Exp. Biol. Med.* 132, 1047–51 (1969). GLC analyses of the hatching muscle of the developing fetal chick revealed that both hatching muscle and shank muscle had similar compositions of total fatty acids, although shank muscle was richer by 50% in total lipids. There was a loss of total lipids during the hatching period in both muscles, the relative loss being greater in hatching muscle. Analysis of lipid constituents on TLC using a densitometric assay procedure demonstrated the larger decrease specifically of triglycerides in the hatching muscle during this period. The participation of lipids in the contraction of the hatching muscle of the chick embryo at the time of pipping is suggested.

THE INCORPORATION OF β-HYDROXY FATTY ACIDS INTO A PHOSPHOLIPID OF ESCHERICHIA COLI B. S. Taylor and E. C. Heath (Dept. Physiological Chem., Johns Hopkins U. School of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 244, 6605–16 (1969). Using long chain ^{14}C-β-hydroxyacyl derivatives of acyl carrier protein, the enzymatic incorporation of β-hydroxydecanoate, β-hydroxylaurate, and β-hydroxymyristate into a phospholipid has been demonstrated in *Escherichia coli* B. The enzymatic product was characterized as *O*-(1-β-hydroxyacyl-2-acyl-*ns*-glycero-3-phosphoryl)ethanolamine.

EXPERIMENTS DIRECTED TOWARD THE TOTAL SYNTHESIS OF TERPENES. XV. THE SYNTHESIS OF 3,10-DIMETHOXY-6aβ,12bβ-DIMETHYL-5,6,6a,6bα,7,8,12b,13-OCTAHYDROPICENE, A POTENTIAL INTERMEDIATE IN TRITERPENE SYNTHESIS. R. E. Ireland, D. A. Evans, D. Glover, G. M. Rubottom and H. Young, (Gates and Crellin Lab. of Chemistry, Calif. Inst. Tech., Pasadena 91109). *J. Org. Chem.* 34, 3717–29 (1969). An approach to the total synthesis of the pentacyclic triterpene alnusenone through the 3-alkoxy-10-hydroxydecahydropicene derivative is outlined, and the initial phases of the scheme were reduced to practice. Three isomers of the 3,10-dimethoxy-6a,12b-dimethyloctahydropicene were prepared and characterized. The 6aα, 12bβ-dimethyl derivative resulted from the tricyclic unsaturated ketone in 38–50% overall yield by either of two methods. The two isomeric 6aβ,12bβ-dimethyl derivatives were prepared from the tricyclic α,β-unsaturated ketone by an alternate sequence in 24 and 50% overall yields, respectively. In this latter effort it was found necessary to investigate the course of the catalytic hydrogenation of derivatives of the β,γ-unsaturated keto acid, and the effect of the substituents present in the C ring on the stereochemical outcome of this reduction was evaluated.

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• Detergents

INFLUENCE OF CRITICAL MICELLE CONCENTRATION ON THE WASHING ACTION OF SODIUM DODECYL SULFATE. C. P. Kurzendorfer and H. Lange (Res. Lab., Henkel and Cie. Gmbtt., Dusseldorf, Ger.). *Fetten Seifen Anstrichmittel* 71, 561–67 (1969). The influence of critical micelle concentration (cmc) of an anionic surfactant on the removal of different types of soils (soot, paraffin oil or a mixture of olive oil and oleic acid) from wool was investigated in a model system. The interfacially active single ions and not the micelles are responsible for the removal of soot and oil. At the cmc (C_k) removal of soot reaches the uppermost limit due to the constant zeta potential of the soot particles attained at C_k. Whereas non-polar oil is removed by wetting, the higher degree of elution of the polar oil compared to the non-polar one is due to the superimposition of the wetting effect on the formation of a mixed phase.

DETERMINATION OF ANIONIC SURFACTANTS USING AN AUTO-ANALYZER. A. L. de Jong (Unilever Res. Lab., Vlaardingen, Netherlands). *Fette Seifen Anstrichmittel* 71, 567–69 (1969). A procedure is described for the determination of anionic surfactants via methylene blue complex using an auto-analyzer. Thirty determinations per hour in the concentration range of 0.5 to 30 mg surfactant per liter can be carried out by this method with an accuracy of 0.5 mg/l.

THE FATTY ACID COMPOSITION OF SOME SOAPMAKING FATS AND OILS. PART 4. GROUNDNUT OIL. A. Allen, G. H. Padley and G. R. Whalley. *Soap, Perfumery Cosmetics.* 42, 725–26 (1969). The use of peanut oil fatty acids in soapmaking in Great Britain is described. Peanut oil fatty acids are found in about only 5–7% of the total base charge. Peanut oil fatty acids produce soaps poorly soluble in water, and do not respond well to bleaching. Tables showing both qualitative and quantitative fatty acid compositions of peanut oil are presented.

DESIRABLE CHARACTERISTICS OF RAW MATERIALS FOR DETERGENT PRODUCTION BY A RAPID MIXING PROCESS. I. LIQUID RAW MATERIALS. A. Dworzecki and B. Kobylinska (Inst. of General Chemistry, Varsovie). *Tluszcze, Srodki Piorace, Kosmet.* 13(4), 145–154 (1969). The basic requirement for the liquid raw materials is that their viscosities be low enough for adequate mixing to occur in the blast pipe. With pressure blast pipes, sufficient pulverization can occur with viscosities less than 500 cp. With pneumatic blast pipes, viscosities up to 1000 cp. can be used. The effect of temperature on viscosity was studied for individual anhydrous and hydrated raw materials and for mixtures of them. Alkylphenols and oxyethylenes exhibited similar rheological behavior. Heating to 40C permitted easy pulverization in any piece of equipment. Mixtures of an anionic compound with a nonionic one (Marlon A 375 and Marlophen 89) in ratios up to 1:1 decreased in viscosity with increasing temperature. Such mixtures could be pulverized at temperatures under 50–60C. If the content of the nonionic material was less than 50%, temperatures above 60C could be used. Hydration of anionic-nonionic mixtures did not affect their rheological properties. Hydration of the Marlon gave mixtures which could be pulverized only at temperatures exceeding 50C. (Rev. Franc. Corps Gras)

EFFECTIVENESS OF DETERGENT PREPARATIONS AS A FUNCTION OF THE AMOUNTS OF DIFFERENT COMPONENTS. E. Szmidtgal *et al. Tluszcze, Srodki Piorace, Kosmet.* 13(5), 186–191 (1969). The properties of products containing fatty alcohol sulfates and linear dodecylbenzenesulfonates depend both on the content of active material and on the pH. Lowering the content of active material to 1 g/l while maintaining good detergent characteristics is possible only if the pH of the solution is at least 11. If the pH is lowered to 10.4–10.6, the content of active material must be at least 2 g/l. Increasing the ratio of polyphosphate to active material to 1:1 does nothing and prevents decreasing the amount of active material below 1.5 g/l. (Rev. Franc. Corps Gras)

PROTEOLYTIC PROPERTIES OF THE ENZYME "E-30" IN DETERGENT PREPARATIONS. M. Grudev *et al. Maslo-Sapunema Prom., Byul.* 5(3), 11–18 (1969). The enzyme "E-30" was produced at the Institute of Microbiology of the Bulgarian Academy of Science. It easily decomposed the proteins in tissue stains. When tested for stability in combination with certain mineral salts, organic surfactants and detergent preparations, the enzyme was affected the least by soap. (Rev. Franc. Corps Gras)

SAFETY AND BIODEGRADABILITY OF DETERGENTS: THE CASE FOR SOAP. G. B. Martinenghi (Univ. of Milan, Milan, Italy). *Riv. Ital. Sostanze Grasse* 46, 239–41 (1969). The ease with which soap can be precipitated and biodegraded makes it an ideal surfactant from the standpoint of avoiding water pollution. Other properties of soap, in comparison to conventional synthetic surfactants, are discussed.

PREPARATION OF METAL SALTS OF AMPHOTERIC SURFACE ACTIVE AGENT. H. Marumo and M. Saitoh (Lion Fat & Oil Co.). *U.S. 3,448,128.* In a method for preparing a non-alkali metal salt of a betaine-type amphoteric surfactant containing polyoxyethylene radicals, an alkali metal salt of the surfactant is first dissolved in an organic solvent capable of forming an azeotropic mixture with water, then an aqueous solution of a non-alkali metal salt is added to the first solution and the resulting mixture is heated to the azeotropic boiling temperature to distill the water and solvent from the mixture, following which the solvent is separated from the water and is recycled to the reaction mixture whereby the non-alkali metal salt of the surface active agent is formed.

PROCESS FOR DECOLORIZING SULFONATE-CONTAINING DETERGENTS. H. L. Dimond and V. J. Pascarella (Gulf Res. and Dev. Corp.). *U.S. 3,461,053.* A process is provided for decolorizing a dry, solid form detergent by subjecting the dried detergent to ultraviolet radiation. The detergent is prepared by reacting a gaseous stream containing SO_3 and an inert gas with an olefin and thereafter neutralizing the sulfonation product.

DETERGENT COMPOSITIONS. L. L. Schwalley (U.S. Borax & Chemical Corp.). *U.S. 3,461,074.* Detergent compositions, useful for forming laundry tablets, are heterogeneous mixtures of a heat-dried portion, a nonionic synthetic detergent and an alkali metal polyphosphate having a high Form I content. The heat-dried portion contains additional alkali metal polyphosphate having a low Form I content and an anionic synthetic detergent or soap.

STABILIZING AGENT FOR A HALOGEN-CONTAINING SYNTHETIC RESIN CONSISTING OF A BASIC INORGANIC ACID SALT OF LEAD COATED WITH A FATTY ACID SOAP OF LEAD, CALCIUM OR CADMIUM. Y. Sugahara, T. Yamada, Y. Noshi and S. Matsuo (Mizusawa Kagaku). *U.S. 3,461,081.* A stabilizer for halogen-containing synthetic resins is prepared by adding a finely divided, metallic salt stabilizing agent to a molten metallic soap in such a way that all particles of the stabilizing agent are coated with the continuous phase of metallic soap and converting the mixture to particulate form.

COMPOSITION AND METHOD FOR DETERGENCY OF ASPHALT SOIL. A. Mankowich (U.S. Sec'y of the Army). *U.S. 3,462,369.* A dry detergent composition for removing asphalt soil consists of a mixture of about 88 to 92% of alkaline salts to provide a pH of about 12 in solution and about 8 to 12% of a surfactant combination consisting of a 1:1 to a 1:10 ratio of a nonionic silicone surfactant (silane or siloxane) and an anionic surfactant, such as sodium lauryl sulfate or sodium dodecylbenzene sulfonate.

BUILDERS FOR SYNTHETIC DETERGENTS. R. P. Carter, Jr. and R. R. Irani (Monsanto Co.). *U.S. 3,463,734.* Washing compositions containing surface active compounds, water soluble salts of polyitaconic acid as builders and supplemental builders are effective as detergents in an aqueous solution.

GLASS CLEANING COMPOSITION. M. E. Stonebraker and S. P. Wise (Drackett Co.). *U.S. 3,463,735.* The effectiveness of a glass cleaning composition consisting of a surfactant and a mixture of a low-boiling and a moderately high-boiling solvent is improved by addition of an alkali-metal polyphosphate and, preferably, also of ammonia.

AQUEOUS SLURRIES OF TRIETHANOLAMINE SALTS OF LINEAR ALKYLBENZENE SULFONIC ACIDS. J. C. Reid, R. B. Doan and R. C. Taylor (Atlantic Richfield Co.). *U.S. 3,463,736.* Aqueous detergent slurries are described, comprising the triethanolamine salts of an alkylbenzene sulfonic acid having a C_8–C_{16} linear alkyl radical and having a pH in the 2.0–6.0 range when measured at a 10% total solids concentration. These controlled pH slurries have improved color and color stability without adverse corrosion characteristics.

HIGHLY ALKALINE AND NON-FOAMING BOTTLE CLEANING AGENTS. H. Kasperl, G. Tischbirek and K. H. Worms (Henkel & Cie. G.m.b.H.). *U.S. 3,463,737.* Granular bottle cleansing agents consist essentially of 50–95% finely grained, caustic alkali with a grain size of less than 3 mm, and of a reaction product of propylene oxide with an aliphatic amine having at least 3 reactive hydrogens in its molecule. The reaction product must have a cloud point in the 10–60C range. These cleansing agents are substantially non-foaming when used and do not deteriorate on storage.

DISHWASHING COMPOSITIONS. K. W. Knapp and J. S. Thompson (FMC Corp.). *U.S. 3,463,803.* Germicidally active dishwashing compositions containing chlorinated trisodium phosphate, a low-foaming nonionic surfactant and sodium silicate are rendered non-corrosive to silverware by incorporation of cyanuric acid and/or alkali metal and alkaline earth metal salts of cyanuric acid.

METHOD OF PREPARING CALCIUM SOAP-CALCIUM SALT GREASES. C. M. Peck (Gulf Res. & Dev. Corp.). *U.S. 3,466,245.* A method for the preparation of calcium soap-calcium salt greases is claimed, involving the use of high molecular weight carboxylic acids, e.g., stearic acid and medium molecular weight carboxylic acids, e.g., caprylic acid, and acetic acid.

INSECTICIDAL WASHING COMPOSITION. U. J. Fregeau, *U.S. 3,466,246.* An insect repelling cleansing composition consists of a mixture of 50–55% borax, 35–40% trisodium phosphate, 2–10% soda ash, 2–10% sodium sulfate and 2–10% sodium dodecylbenzene sulfonate.

METHOD OF TREATING TEXTILE ARTICLES WHICH ARE USUALLY LAUNDERED. R. T. Hunter (Colgate-Palmolive Co.). *U.S. 3,468,697.* A method is described for laundering and treating articles with a mixture comprising a quaternary ammonium compound and a fluorocarbon compound. The mixture is used in laundering operations for imparting water and oil repellency and resistance to soiling to the laundered textile articles.

DETERGENT COMPOSITION. R. A. Grifo, J. M. Walts and L. M. Schenck (GAF Corp.). *U.S. 3,468,805.* A biodegradable detergent composition contains a mixture of soluble half-esters of acyclic secondary alcohols and soluble sulfate half-esters of acyclic secondary alcohol alkylene oxide adducts.

DETERGENT COMPOSITION. K. L. Heinz (Lever Bros. Co.). *U.S. 3,470,102.* A low-foaming detergent composition having controlled sudsing capacity contains, as essential components, a tertiary amine oxide and a foam stabilizing agent.

NONIONIC DETERGENT COMPOSITION. W. B. Smillie. *U.S. 3,472,783.* A nonionic, substantially non-aqueous, hydrolytic detergent composition includes a nonionic detergent, a non-aqueous carrier, and a minor amount of at least one hydrolytic enzyme.

DETERGENT PROCESS. R. W. Poe (Monsanto Co.). *U.S. 3,472,784.* A free-flowing particulate detergent composition is prepared by mixing a liquid acid form of an anionic surfactant with a water soluble alkaline material; adding enough water to provide a mixture containing 0.5 to 4.0% free water; and thereafter adding hydratable sodium tripolyphosphate to the mixture.

STABILIZATION OF ORGANIC BLEACHING COMPOSITIONS. H. A. Goldsmith (U.S. Borax & Chem. Corp.). *U.S. 3,474,037.* A stabilizer composition is described, for use with such bleaching and stain removing compositions as trichlorocyanuric acid, dichlorocyanuric acid and alkali metal hydrosulfites. The stabilizer composition comprises a mixture of boric oxide and an alkali metal carbonate or bicarbonate.

DETERGENT COMPOSITIONS CONTAINING N-(2-HYDROXYALKYL)-ω-METHYLTAURINE. R. R. Sepulveda and F. V. Cieri (Lever Bros. Co.). *U.S. 3,474,038.* A novel liquid detergent is disclosed in which N-(2-hydroxyalkyl)-N-methyl taurines are employed as hydrotroping agents. Organic sulfates, sulfonates, nonionic and cationic detergents can be prepared in homogeneous liquid formulations using the C_8-C_{12} N-(2-hydroxyalkyl)-N-methyl taurines.

PROCESS OF CLEANING SOILED POULTRY FEATHERS. K. Mahall (Henkel & Cie., G.m.b.H.). *U.S. 3,475,112.* A process for cleaning soiled poultry feathers to obtain an odorless and easily gradable feather product comprises washing, rinsing and steaming, the rinsing liquor containing a synergistic mixture of a pyridine base and a surface-active quaternary ammonium compound.

EMULSIFYING AND TEXTILE SOFTENING PHOSPHONIUM COMPOUNDS, PROCESSES FOR PREPARING THE SAME. T. W. Rave (Procter & Gamble Co.). *U.S. 3,475,490.* Novel phosphonium compounds and processes for their preparation are disclosed. These compounds are useful as textile softening agents, emulsifying agents and anti-bacterial agents.

• Drying Oils and Paints

WATER DISPERSIBLE ALKYD RESINS COMPRISING ESTERIFIED UNITS OF AN ALKOXYPOLYETHYLENE GLYCOL. F. I. Tonner (A. E. Staley Mfg. Co.). *U.S. 3,457,206.* A film-forming water-soluble alkyd comprises esterified units of (a) polyhydric alcohol free of carboxylic acid groups, (b) polyhydric alcohol containing one free carboxylic acid group, (c) ethylenically unsaturated fatty acid of at least 10 carbon atoms, (d) polycarboxylic acid comprising an adduct of alpha-, beta-ethylenically unsaturated dicarboxylic acid and ethylenically unsaturated fatty acid of at least ten carbon atoms, and (e) an alkoxypolyoxyethylene glycol having a molecular weight of from about 120 to 750.