ABSTRACTS

R.A. REINERS, Editor. Abstractors: N.E. Bednarcyk, J.E. Covey, J.C. Harris, Yoshio Hirano, S. Kawamura, D.A. Leo, F.A. Kummerow, E.G. Perkins, Biserka Matijasevic

• Fats and Oils

COLLABORATIVE STUDY OF THE AUTOMATIC CARBON, HYDROGEN, AND NITROGEN DETERMINATION. L.H. Scroggins (Eastern Mkt. and Nutr. Res. Div., Agr. Res. Service, USDA, 600 E. Mermaid Lane, Philadelphia, Pa. 19118). *J. Assn. Off. Anal Chems.* 55, 676–9 (1972). A method for the simultaneous determination of per cent carbon, hydrogen and nitrogen, employing automatic instrumentation, was tested by 10 collaborators. The samples analyzed were acetanilide, nicotinic acid, stearic acid, methyl palmitate and ethyl laurate. Evaluation of the statistical data and overall consideration indicate satisfactory results for all types of compounds studied. The method was adopted as official first action.

COLLABORATIVE STUDY OF THE DETERMINATION OF TOTAL LIPIDS IN FISH MEAL. G.M. Knobel, Jr. and H. Miller, Jr. (National Marine Fisheries Service, National Oceanic and Atmospheric Admin., College Park, Md. 20740). *J. Assn. Off. Anal. Chems.* 55, 654–6 (1972). A semimicro method for determining total lipids in fish meal, using a compact extraction apparatus, was subjected to collaborative study. Four fish meals were analyzed for total lipids by 8 collaborators. Per cent lipid content of meals prepared from Canadian herring, Peruvian anchovetta, Atlantic menhaden I, and Atlantic menhaden II were 14.69 ± 0.37, 15.98 ± 0.28, 14.66 ± 0.45 and 10.86 ± 0.26, respectively. The method has been adopted as official first action. It is recommended, however, that another collaborative study be conducted, using both the semimicro method and a blender technique.

CONCENTRATION AND ESTIMATION OF 14 POLYCYCLIC AROMATIC HYDROCARBONS AT LOW LEVELS IN HIGH-PROTEIN FOODS, OILS, AND FATS. G. Grimmer, and A. Hildebrandt (Biochem. Inst. of Environmental Carcinogens, Hamburg-Ahrensburg, W. Germany). *J. Assn. Off. Anal. Chems.* 55, 631–5 (1972). Fourteen polycyclic hydrocarbons in (I) meat, poultry, fish, and yeast, and (II) fats and oils have been isolated and determined. To separate group I homogeneously, 2N methanolic KOH is used. In the first step of concentration, a 200 gram sample is reduced to 0.2 gram of polycyclic fraction without any emulsions. The same effective concentration is found for group II without a saponification step by partition in N,N-dimethylformamide-water-cyclohexane (9 + 1 + 10). Further very effective concentration (100:1) of polycyclics results from filtration on Sephadex LH20. After further cleanup by filtration on silica gel, 14 polycyclic hydrocarbons are separated on an aluminum oxide column (Woelm, 5.4% water). Recoveries ranged from 75 to 92% for all polycyclics down to the 2 parts per billion level.

FATTY ACID COMPOSITION OF TOMATO SEED OIL. G.C. Tsatsaronis and D.G. Boskou (Lab. of Organic Chem. Thechnol. and Food Chem., Univ. of Thessaloniki, Thessaloniki, Greece). *J. Ass. Off. Anal. Chems.* 55, 645–7 (1972). The fatty acid composition of the oil extracted from tomato seeds was determined by GLC. A urea fractionation procedure and preparative GLC were used to detect esters present in small or trace amounts. Linoleic, oleic and palmitic acids were predominant. Odd- and even-chain length saturated acids from C_{12}–C_{28} were present. Hexadecenoic, heptadecenoic and eicosenoic acids were also detected. Minor chromatographic peaks preceding some of the saturated esters were attributed to branched acids.

DETERMINATION OF FREE MALONALDEHYDE IN VEGETABLE OILS. S.S. Arya and N. Nirmala (Defence Food Res. Lab., Mysore, India). *J. Food Sci. Technol., India* 8, 177–80 (1971). A simple method for the determination of free malonaldehyde (MA) based on its quantitative extraction from vegetable oils by 0.67% aqueous thiobarbituric acid (TBA) solution has been reported. The effects of 50% glacial acetic acid, 20% trichloroacetic acid and 0.6 N hydrochloric acid have been studied. Acids do not affect the maximum color development at lower temperatures but heating to 100C, both with and without acids, lowered the extinction coefficient (EM530) of the colored compound. Free MA indicates the termination of induction period more precisely than peroxide and TBA values. The relation between free MA, peroxide and TBA values of groundnut and safflower oils on storage at 70 ± 2C and 100 ± 5C has been discussed.

STUDIES OF THE COMPOSITION AND STRUCTURE OF PLASMA LIPOPROTEINS. SEPARATION AND QUANTIFICATION OF THE LIPOPROTEIN FAMILIES OCCURRING IN THE HIGH DENSITY LIPOPROTEINS OF HUMAN PLASMA. G. Kostner and P. Alaupovic (Lipoprotein Lab., Oklahoma Med. Res. Foundation and Dept. of Biochem., Univ. of Oklahoma Schl. of Med., Oklahoma City, Ok. 73104). *Biochemistry* 11, 3419–28 (1972). To account for the protein heterogeneity of the lipoprotein density classes of human plasma and to emphasize the essential role of apolipoproteins for the formation of lipoproteins, we have postulated that the plasma lipoprotein system consists of a mixture of lipoprotein families each of which is characterized by the presence of a single apolipoprotein or its constitutive polypeptides.

SYNTHESIS OF FATTY ACIDS FROM [1-^{14}C]ACETYL-COENZYME A IN SUBCELLULAR PARTICLES OF RAT EPIDIDYMAL ADIPOSE TISSUE. H. Kanoh and D.B. Lindsay (Dept. of Biochem., Agr. Res. Council Inst. of Animal Physiol., Babraham, Cambridge, U.K.). *Biochem. J.* 128, 847–57 (1972). Mitochondrial and microsomal fractions of rat epididymal adipose tissue incorporated [1-^{14}C] acetyl-CoA equally well into various fatty acids by a chain-elongation mechanism. C_{18} and C_{20} fatty acids were the two major products, and comprised about 80% of the total fatty acids synthesized in both particles. When incubated in air, mitochondria synthesized stearic acid, octadecenoic acid and eicosamonoenoic acid in almost equal amounts (about 20% each), whereas in microsomal fractions, the synthesis of octadecenoic acid was more than fivefold the stearic acid formation. In both fractions, major components of synthesized monoenoic fatty acids were the $\Delta^{11:12}$ isomers. Hexadecenoic acid and octadecenoic acid from whole adipose tissue contained approx. 11 and 14% of the $\Delta^{11:12}$ isomer respectively. Most of the radioactivity was found in free fatty acids (63%) and the phospholipid (26%) fraction. In phospholipids, phosphatidylcholine and phosphatidylethanolamine were the two major components. Most of the fatty acids synthesized, including those not normally found in particle lipids (arachidic acid, eicosamonoenoic acid and eicosadienoic acid) were distributed fairly evenly in the phospholipid and free fatty acid fractions. However, stearic acid was found predominantly in the phospholipid fraction.

Bill Coleman ends career at Anderson Clayton

W.T. (Bill) Coleman, who has worked as Chief Chemist for the Paymaster Oil Mill Division at Abilene, Tex., since his release from the Army after WWII, has been retired by Anderson Clayton as of December 31, 1972. His technical facilities served not only the oil mills and refineries, but were frequently used for other company operations. He has often assisted the industry with his technical advice, working particularly with the USDA in the Official Cottonseed Grade procedures. He has been active on many of the AOCS technical committees, especially in the area of methods and safety. Coleman is presently chairman of the AOCS Smalley Committee, a volunteer group that provides series of check samples in 14 different commodities to allow chemists throughout the world to compare work with their colleagues. He helped in the adaptation of statistical methods and computer processing for Smalley data presentation, and was presented with the AOCS Award of Merit in 1969. He has also been a member of the Animal Nutrition Research Council, the Inter-Society Color Council and the International Oil Mill Superintendents Association.

Coleman graduated from Texas A&M with a M.S. in chemical engineering; he was aided by a scholarship from the Texas Cottonseed Crushers Association. After a season with Traders Oil Mill, Fort Worth, he held a series of depression jobs until he joined ACCO in Matamoros, Mexico, 36 years ago. Just before WWII, he was transferred to the Egyptian subsidiary to assist in the erection of an oil mill, refinery and soap plant. Coleman remained in Egypt as an operator until called on active duty as a Chemical Officer in the U.S. Army in the Middle East. ■

CARNITINE-DEPENDENT β OXIDATION OF PROSTAGLANDINS. M. Johnson, Pamela Davidson and P.W. Ramwell (Dept. of Physiol., Stanford Univ., Stanford, Ca 94305). *J. Biol. Chem.* **247**, 5656–8 (1972). The oxygen polarograph was used to follow prostaglandin oxidation by rat liver mitochondria. This system exhibits an absolute requirement for exogenous carnitine and ATP, in contrast to the oxidation of prostanoyl carnitine which is stimulated by ADP in a very similar manner to palmityl carnitine. Prostaglandin E_1, prostaglandin E_2, prostaglandin $F_{1\alpha}$, prostaglandin $F_{2\alpha}$, prostaglandin A_2, and 15-dehydroprostaglandin E_2, exhibited ADP:O ratios in the range of 1.3 to 2.0, which is typical of normal fatty acids. Our data thus indicate that prostaglandins utilize the common carnitine-dependent system for the β-oxidation of long chain fatty acids.

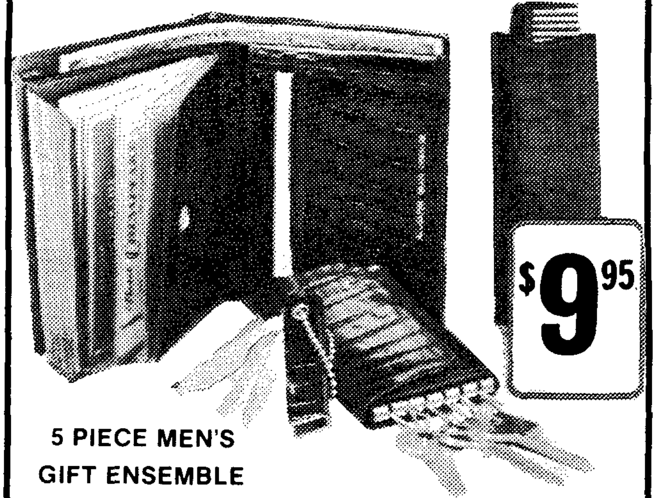
A RAPID METHOD FOR ACCURATE DETERMINATION OF LIPID IN ANIMAL TISSUES. T. Atkinson, V.R. Fowler, G.A. Garton and A.K. Lough (Rowett Res. Inst., Bucksburn, Aberdeen, AB 2 9SB, England). *Analyst* **97**, 562–68 (1972). A rapid method for the determination of lipid is described in which extraction of the lipid from the sample is carried out in a sealed tube by using a chloroform-water-methanol solvent system. The weight of lipid in a volumetric sample of the chloroform-lipid solution is determined after evaporation of the chloroform. The coefficients of variation are 0.26% for pure lipid, 0.56% for muscle samples and 0.89% for fat tissues. Comparison of fatty-acid recoveries in the extracts from the rapid method and from Soxhlet extraction with diethyl ether shows that the chloroform-water-methanol system is, in all the instances examined, equal or superior to the Soxhlet method in efficiency. The time required for one determination is about 1 hour, but several determinations can be run simultaneously. The method is recommended as a routine laboratory procedure, particularly for materials that contain a high proportion of lipid in association with protein.

TRIGLYCERIDE FATTY ACIDS OF ARIZONA GRAPEFRUIT SEED OIL. F.F. Feitose Teles (Escola Agrononmia, Univ. of Ceara, Forteleza, Ceara, Brazil), F.M. Whiting, W.H. Brown and J.W. Stull. *J. Food Sci.* **37**, 331–2 (1972). Oil from seeds of five Arizona grapefruit cultivars, *Citrus paradisi* (Macf.), was analyzed by gas-liquid chromatography for triglyceride fatty acids content. Three Maricopa (Burgher, Chandler and U. of A.) and two Yuma cultivars (Yuma Pink and Yuma Yellow) were used. Fruit were picked at approximately 2-week intervals during a 6-month period of a typical growing season including the end of the harvesting period. There was considerable similarity in the fatty acid values in all samples with respect to both sampling date and cultivar. The average fatty acid composition for all cultivars was 0.62% myristic, 30.11% palmitic, 3.51% stearic, 21.91% oleic, 37.82% linoleic and 6.02% linolenic.

QUANTITATIVE ANALYSIS OF THE FAT-SOLUBLE VITAMINS BY HIGH-SPEED LIQUID CHROMATOGRAPHY. R.C. Williams, J.A. Schmit and R.A. Henry (E. I. du Pont de Nemours & Co. (Inc.), Instrument Prod. Div., Wilmington, Delaware 19898). *J. Chromat. Sci.* **10**, 494–501 (1972). "Reversed-phase" partition-chromatography with water/alcohol solvents and Zipax column packings with nonpolar stationary phases permits a rapid and reliable method for the analysis of the fat-soluble vitamins (vitamins A, E, D, and K) and their esters. The chromatographic conditions needed to separate the vitamins are developed, and detector sensitivity, linear dynamic range and the precision of the technique in terms of retention time and peak area reproducibility are reported. Some application problems in fat-soluble vitamin analysis are discussed.

POROUS POLYMER BEAD PACKINGS AND FORMIC ACID VAPOR IN THE GLC OF VOLATILE FREE FATTY ACIDS. R.G. Ackman (Fisheries Res. Board of Canada, Halifax Lab., Halifax, Nova Scotia, Canada). *J. Chromat. Sci.* **10**, 560–5 (1972). Three types of porous polymer beads (Chromosorb 101, Porapak-QS, Porapak-N) packed in stainless steel columns were evaluated for GLC of the volatile free fatty acids under loads often encountered with flame ionization detection of analytical samples. The addition of formic acid vapor to the carrier gas suppressed peak tailing and other absorption effects to give effective quantitation, but did not seriously modify retention times or appear to affect column life. Cyclohexanone was used as an internal standard. Isobutyric acid showed a greater response than butyric acid, but isovaleric acid had the same response as valeric acid. Chromosorb 101 gave superior resolution of corresponding iso and normal acids.

ISOMER SUBFRACTIONATION EFFECTS IN THE STUDY OF LONGER



CHAIN MONOETHYLENE FATTY ACIDS IN HYDROGENATED OILS. R.G. Ackman, S.N. Hooper and J. Hingley (Fisheries Res. Board of Canada, Halifax Lab., Halifax, Nova Scotia, Canada). *J. Chromat. Sci.* 10, 430–6 (1972). Methyl esters of fatty acids from a commercial margarine based primarily on a partially hydrogenated marine oil showed four distinct bands of monoethylenic unsaturation when the methyl esters were examined by TLC on silica gel impregnated with silver nitrate. The compositions of the four bands were compared by GLC on open-tubular columns coated with Apiezon-L. It was shown that each band included part of each of the four major chain lengths of marine oils (C_{16}, C_{18}, C_{20}, C_{22}), with the longer chain lengths more concentrated in the most mobile band. Fractionation within each band was based on the *trans* isomers being more mobile than the *cis* isomers and to a further subfractionation of both *cis* and *trans* materials because of the greater mobility of isomers with unsaturation closest to the terminal methyl group of the chain.

AUTOXIDATION OF OILS AT HIGH TEMPERATURES. XV. CHANGES IN THE STRUCTURE OF THE PEROXIDES DURING THE AUTOXIDATION. J. Pokorny et al. *Sb. Vys. Sk. Chem.-Technol. Praze, Potraviny* **E** 30, 79–84 (1971). The ethyl esters of sunflower oil were oxidized at 50C. The peroxides formed were separated by paper chromatography using paraffin oil as the stationary phase and aqueous pyridine as the mobile phase, which resulted in two major peroxidic fractions and three minor peroxidic fractions. The minor fractions, with R_f values of 0.00, and 0.05–0.10 are little affected by the degree of oxidation, while the minor fraction of R_f value 0.90–0.93 appears only during the later stages of oxidation. The major fraction with R_f value 0.28–0.39 constitutes about 95% of the peroxides. The other major fraction had an R_f value of 0.62–0.77. (Rev. Franc. Corps Gras)

RAPESEED. XII. FORMATION OF ALKALI-SOLUBLE PIGMENTS DURING HEATING OF RAPESEED PRESSCAKE. J. Pokorny. *Sb. Vys. Sk. Chem.-Technol. Praze, Potraviny* **E** 30, 71–7 (1971). Rapeseed presscake is frequently heated for purposes of eliminating isothiocyanates and 2-vinyl-oxazolidinethione. This heating causes an intense browning because rapeseed presscake contains a relative high concentration of reducing sugars. Formation of the products of nonenzymatic browning can be determined by measuring the color at 430 and 500 nm of extracts obtained by boiling the meal with a 10% solution of NaOH. Since the intensity of the color is a linear function of the temperature and the duration of the heating, the extinction values of the extracts permit evaluating the intensity of the color. (Rev. Franc. Corps Gras)

DETERMINATION OF THE BENZIDINE VALUE IN OXIDIZED FATS AND OILS. J. Pojorny *et al. Sb. Vys. Sk. Chem.-Technol. Praze, Potraviny* **E** 30, 57–69 (1971). The photometric determination of the degree of rancidity of fats and oils following reaction with benzidine is simple and reproducible. Analytic error is smallest in chloroform-methanol, but the reaction is too slow. It can be accelerated by addition of organic acids; among the preferred ones are acetic, monochloroacetic and trichloroacetic. The best reaction medium is a mixture of 20% chloroform and 80% ethanol containing 0.2% trichloroacetic acid and 0.06–0.08% benzidine. The sample should be chosen in such a manner that the extinction at 430 nm in 13 mm cuvettes, following the optimum reaction time of 240 min at 60C, is between 0.1 and 0.3. Peroxides should be eliminated before the reaction is run. (Rev. Franc. Corps Gras)

EFFECT OF THE PROPERTIES OF THE SOLID PHASE IN THE LIQUID OIL ON THE QUALITY OF WHITE BREAD. L.P. Tarasova et al. *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* **1972** (2), 56–9. The rheological properties of the dough and the quality of the bread are favorably influenced by fatty mixtures, added to the dough at levels of 0.25–5% of the flour and consisting of 90–95% of sunflower oil and 5–10% of highly hydrogenated (melting point 62C; hardness 1000 g/cm) cottonseed oil. (Rev. Franc. Corps Gras)

LIBERATION OF BOUND LIPIDS IN SUNFLOWER SEEDS AS A FUNCTION OF THE EXTRACTION CONDITIONS. V.N. Brik et al. *Maslozhir. Prom.* **1972**(6), 10–12. Liberation of bound lipids during solvent extraction of sunflower seed flakes increases with the increase of the ratio between the flakes and the solvent. When the flakes are extracted with recycled miscella, as is done industrially, the quantity of bound lipids which are freed is greater than that liberated during extraction by infusion (as found in a Soxhlet apparatus). (Rev. Franc. Corps Gras)

INFLUENCE OF THE MAJOR FACTORS IN THE EXTRACTION-DISTILLATION SYSTEM ON THE REFINABILITY OF SUNFLOWER SEED OIL. V.V. Beloborodov et al. *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1972(2), 76–9. With increase in the extent of extraction, the yield of refined oil decreases more or less as a function of the method of refining. After distillation, the difference in the refinability of oils of different degrees of extraction decreases relative to the difference in yield after proper refining. The formula for calculating the refining loss should take into account not only the free fatty acid content and phosphatide content but also the amount of secondary oxidation products. (Rev. Franc. Corps Gras)

EFFECT OF HYDRATION AND THE METHOD OF NEUTRALIZATION ON THE REDUCTION OF COMPLEX RESIDUE IN SUNFLOWER SEED OIL. K.K. Ol'mezov et al. *Maslozhir. Prom.* **1972**(7), 38–9. The discontinuous hydration of the oil results in a reduction of the complex residue to 15.7–27.1% of the quantity initially in the oil. During alkaline refining, the amount is lowered to 21.4–29.1%. The neutralization processes for sunflower oil adopted by industry results in a reduction in the amount of complex residue varying from 26.2 to 53.1%, depending on the temperature conditions and other conditions in the process. (Rev. Franc. Corps Gras)

PROCESS FOR PREPARING STEROLS FROM TALL OIL PITCH. D.V. Julian (Procter & Gamble). *U.S. 3,691,211.* The process involves extraction in a water-alcohol-hydrocarbon mixture followed by saponification and subsequent recrystallization and leaching.

AOCS Northeast Section Student Award Information

The officers and directors of the AOCS Northeast Section voted in September 1972 to allocate $200 for the Student Award in the 1972-73 period.

All senior students who are engaged in the advanced studies of oils, fatty acids, lipids, or their technology, and have published a copy of their work in the form of a thesis or technical publication are eligible for the award. The students must be enrolled at universities in the states of New England, New York, New Jersey, Maryland, Delaware, District of Columbia or Pennsylvania. The relatives of AOCS members will be given preference in consideration for the award.

How to Apply

A student applying for the award must supply letters of support from two faculty members of concerned colleges, one letter from a member of the AOCS Northeast Section and a copy of the publication for review by the Student Award Committee. The application must be sent to:

Hans Kaunitz, Chairman of Student Award Committee
Columbia University
630 West 168th Street
New York, N.Y. 10032

A copy of the application should be sent to:

S. Dominik, President, AOCS Northeast Section
Baker Castor Oil Co.
40 Avenue A
Bayonne, N.J. 07002
Telephone: (201) 436-8800

Kaunitz and his committee will select the best qualified recipient of the Award.

Nominations should be submitted prior to March 1, 1973. ■

CONDITIONER FOR BAKED GOODS. H. Birnbaum (Caravan Products Co.). *U.S. 3,679,430.* The conditioner can be added to the fermentation broth of continuous process bread without causing serious foaming. It consists of 50–80% of polyoxyethylene sorbitan esters of long chain fatty acids or ethoxylated monoglycerides, and a hard monoglyceride, and 20–50% of other fatty materials such as lard. The preferred form is that of a thick aqueous emulsion containing 40–50% water. While eliminating foaming in the fermentation broth, the conditioner imparts improved properties to the finished loaf. It is also useful in batch process bread making.

DETOXIFICATION OF OILSEED MEAL WITH CALCIUM HYDROXIDE. H.M. Espoy (Daylin Labs.). *U.S. 3,689,275.* The method is directed towards the detoxification of copra, cottonseed meal, peanut meal and other products from aflatoxins by adding to the meals an aqueous slurry of calcium hydroxide. With meals from which the oil has been removed it is necessary to add a binding agent such as sodium lignin sulfonate and to pelletize the material using heat and pressure. The meal must then be heated to 50C or higher for 1 to 60 minutes or longer.

REFINING OF HIGHLY ACIDIC SUNFLOWER SEED OILS. S.N. Volotovska et al. *Tr. Vses. Nauchn.-Issled. Inst. Zhirov* **28**, 230–7 (1971). Clarification of strongly acidic sunflower seed oils is attained by using an excess (up to 30% excess) of concentrated solutions of alkali (170–175 g/l). Such treatment is necessary for oils to be hydrogenated because it is not known how to lower the color of the hydrogenated oil, even with large quantities of bleaching earth (about 30%) and use of other bleaching materials. Use of 1% Czechoslovakian earth permits lowering the color index of the neutralized oil from 10 to 4–6 mg I_2. Neutralizing distillation permits removal of the fatty acids from highly acidic hydrogenated oils. (Rev. Franc. Corps Gras)

ELIMINATION OF PHOSPHORUS-CONTAINING MATERIALS FROM SUNFLOWER SEED OIL. S.N. Volotovska et al. *Tr. Vses. Nauchn.-Issled. Inst. Zhirov* **28**, 217–24 (1971). One of the factors affecting the efficiency of elimination of phosphorus-containing materials is their initial content in the oil. However, 0.1% phosphoric acid is sufficient for complete elimination of phosphorus-containing materials. The phosphoric acid treatment does not increase the peroxide value very much. However, during subsequent neutralization, the oil is more sensitive to oxidation. When treating the oil with 85% phosphoric acid, a large part of the acid remains in the oil. (Rev. Franc. Corps Gras)

EFFECT OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF SUNFLOWER SEEDS ON THE DRYING PROCESS. B.N. Kirievskij. *Tr. Vses. Nauchn.-Issled. Inst. Zhiriv* **28**, 9–11 (1971). With the increase in the amount of oil and the decrease in the proportion of hull in the seeds, the length of drying and the intensity of the heat have to be increased by about 12%. In contrast, the degree of drying does not depend on varietal peculiarities very much. However, when comparing various dryers, it is necessary to take theese varietal characteristics into consideration. (Rev. Franc. Corps Gras)

STRUCTURE AND PROPERTIES OF NICKEL-COPPER OXIDE CATALYSTS. B.N. Tjutjunnikov et al. *Tr. Vses. Nauchn.-Issled. Inst. Zhirov* **28**, 282–7 (1971). The authors have studied the phase composition of the oxides obtained by thermal decomposition at 300 and 500C of coprecipitated nickel and copper carbonates. At 300C, and up to 70% copper, there is formed a continuous series of solid solutions of copper oxide and nickel. Above 70% copper, as well as at 500C, copper oxide separates as a definite phase. Maximum activity occurs with oxides containing 60–70% copper. (Rev. Franc. Corps Gras)

ACTIVATION OF NICKEL-COPPER OXIDE CATALYST DURING HYDROGENATION IN THE LIQUID PHASE. *Ibid.*, 288–93. The binary system, nickel-copper oxide, is the active and stable form of the catalyst. During the initial phase of hydrogenation in the liquid phase, the copper oxide is reduced to the metal and at the same time saturated with hydrogen. This period can be shortened by decomposing the carbonates at 300C and reducing the copper oxide prior to the hydrogenation. (Rev. Franc. Corps Gras)

THE DENATURATION OF PROTEINS AND THE DEGREE OF INACTIVATION OF NON-NUTRITIVE MATERIALS IN SOYBEAN PRESSCAKE. L. Stefanov et al. *Maslo-Sapunema Prom., Byul.* 9(2), 5–12 (1972). There is reported a study of the denaturation of the proteins, the decrease in the content of essential amino acids and the degree of inactivation of non-nutritive materials during treatment of soybeans in a Hildebrandt extraction unit. The resulting presscake contains a considerable amount of non-nutritive material. Also, there is a recommendation to replace the helical dryers with a cooker. (Rev. Franc. Corps Gras)

FATTY ACID CONTENT AND PROXIMATE ANALYSIS OF BAY, CALICO, SEA AND WEATHERVANE SCALLOP ADDUCTOR MUSCLE. R.A. Krzeczkowski, R.D. Tenney and M.L. Hayes (USDC Natl. Oceanic and Atmospheric Admin., Natl. Marine Fisheries Service Fishery, Prod. and Technol. Lab., P.O. Box 1638, Kodiak, AK 99615). *J. Food Sci.* **37**, 300–1 (1972). The proximate analysis and fatty acid content of the lipids were determined from the adductor muscle of four species of scallops: bay, calico, sea and weathervane. A similar fatty acid pattern was found in all species of scallops, with only minor exceptions. The polyunsaturated acids were most abundant with 55.7–61.1% followed by 23.6–29.6% for saturated acids and 13.1–17.3% for monounsaturated acids. The proximate analyses ranged from 80.4–82.6% moisture; 14.4–17.1% protein; 0.7–1.1% lipid; and 1.6–1.7% ash.

INFLUENCE OF HERBICIDES AS SINGLE APPLICATION OR MIXTURES ON FATTY ACID COMPOSITION OF COTTONSEED OIL. R.E. Wilkinson and W.S. Hardcastle (Univ. of Georgia Agr. Expt. Stations, Georgia Station, Experiment, Ga. 30212). *J. Agr. Food Chem.* **20**, 996–1000 (1972). Cottonseed (*Gossypium hirsutum* L. cv Atlas 67) oil composition from crops treated with 13 herbicides representing eight families of compounds was analyzed by gas-liquid chromatography. Minor changes in cottonseed oil fatty acid composition were caused by herbicide applications. However, none of the herbicides caused changes in the composition of cottonseed oil as large as were produced by season, edaphic characteristics or location.

FORMATION OF A LONG-CHAIN ALCOHOL ESTER OF HYDROXY FATTY ACID SOPHOROSIDE BY FERMENTATION OF FATTY ALCOHOL BY A TORULOPIS SPECIES. A.P. Tulloch and J. Spencer (Prairie Regional Lab., Nat'l. Res. Council of Canada, Saskatoon, Saskatchewan). *J. Org. Chem.* **37**, 2868–70 (1972). Fermentation of oleyl alcohol by *Torulopsis bombicola* produces the oleyl alcohol ester of the sophoroside of 17-hydroxyoleic acid (40%) together with lactonic and acidic hydroxy acid sophorosides. The major product was characterized as the octadecyl derivative 3 and the structure was established by degradation and by synthesis of the α anomer of the heptaacetate. The composition of the fermentation product was obtained by gas-liquid chromatographic analysis of the trimethylsilyl ethers of the hydrogenated deacetylated products.

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY ON SMALL PARTICLE SILICA GEL. R.E. Majors (Varian Aerograph, 2700 Mitchell Drive, Walnut Creek, Calif. 94598). *Anal. Chem.* 44, 1722–26 (1972). Liquid chromatographic columns of 5- to 10-μm TLC grade silica gel have been packed by a high pressure, balanced density slurry technique. The columns have yielded HETP values of less than 0.1 mm at a linear velocity (v) of 1.18 cm/sec. For nitrobenzene ($k' = 4.3$), 15 effective plates per second were generated at 1.18 cm/sec. The HETP vs. v curve was lower than that obtained on Corasil II, a porous layer bead (PLB) adsorbent. The columns showed little loss of efficiency at high v's. The sample loading was greater than for an equal weight of PLB, but not so great as predicted by the ratio of surface areas.

APPARATUS FOR AUTOMATED GEL PERMEATION CLEANUP FOR PESTICIDE RESIDUE ANALYSIS. APPLICATIONS TO FISH LIPIDS. R.C. Tindle and D.L. Stalling (Fish-Pesticide Res. Lab., Columbia, Mo.). *Anal. Chem.* 44, 1768–73 (1972). The gel permeation cleanup procedure for fish and other tissue extracts in pesticide residue analysis, previously reported by Stalling, Tindle, and Johnson, has been automated. The automated system allows unattended operation while processing up to 23 samples with the system as described. Reproducibility of recoveries were quite good (coefficient of variation 5%) and cross-contamination was estimated at less than 1%. The chromatography system was constructed from commercially available components so that other investigators may easily duplicate the device without the necessity for fabrication of special components.

• Biochemistry and Nutrition

PHOSPHOLIPID SYNTHESIS IN HELA CELLS EXPOSED TO IMMUNOGLOBULIN G AND COMPLEMENT. F. Guttler (The Neurochem. Inst., DK-2200 Copenhagen N, Denmark). *Biochem. J.* 128, 953–60 (1972). HeLa cells were cultured in the presence of heterologous immunoglobulin G and guinea-pig serum together with [^{32}P]phosphate. Incorporation of [^{32}P]-phosphate was significantly stimulated by anti-HeLa immunoglobulin G and complement-sufficient serum compared with immunoglobulin G from unimmunized rabbits and complement. Within 2.5h heat-inactivated guinea-pig serum and anti-HeLa immunoglobulin G stimulated [^{32}P]phosphate incorporation to the same extent as heat-inactivated complement and immunoglobulin G from unimmunized rabbits. Compared with cells exposed to immunoglobulin G from unimmunized rabbits together with complement, anti-HeLa immunoglobulin G with complement increased the phospholipid content of HeLa cells twofold with 5h of incubation. The stimulation of [^{32}P]phosphate turnover occurred in cells filling up their cytoplasma with vacuoles. This supports the suggestion that the accumulation of phospholipid in these cells may be concerned with the synthesis and function of cytomembranes.

CALL FOR NOMINATIONS
AWARD OF MERIT

The Society Award of Merit is to be presented to qualified Society members at the 64th Annual Meeting, New Orleans, April 29-May 2, 1973.

The Award is given to recognize current and past achievements in serving the Society:

(a) Active productive service to AOCS committee work.

(b) Marked leadership in technical, administrative or special committee or Society activities.

(c) Outstanding activity or service that has particularly advanced the Society's prestige, standing or interest.

(d) Any distinguished service to the Society not herein otherwise specifically provided for.

Nominations shall cite the record of the nominee which qualifies him for the Award, and five copies of the nomination shall be submitted to James Lyon, Executive Director, American Oil Chemists' Society, 508 S. Sixth, Champaign, Illinois 61820 before February 2, 1973. ■

SOME FACTORS INFLUENCING THE PRODUCTION OF PROTEIN ISOLATES FROM WHOLE FISH. W.W. Meinke, M.A. Rahman and K.F. Mattil (Food Protein R&D Ctr., Texas Eng. Exp. Sta., Texas A&M Univ., College Station, Tx 77843). *J. Food Sci.* 37, 195–98 (1972). Protein solubility profiles indicate theoretical recovery of 45–55% of the protein (N × 6.25) of whole fish as an isolate by extractions at pH 3 or 10–11 and precipitation at pH 5–6. Frozen fish may produce lower isolate yields than fresh fish. The quantity of fish protein dissolved at 22C is independent of fish solids up to 40g per 100 ml of extractant; however, the actual extract volume recoverable decreases with increased fish weight. At 55C gelation occurs and the recovery of the protein extract by centrifuging is impaired at pH 3. At high and low pH, NaCl decreases the protein solubility but enhances solubility at pH of minimum protein solubility.

DIFFUSION EXTRACTION OF CHLOROGENIC ACID FROM SUNFLOWER KERNELS. F.W. Sosulski (Dept. of Crop Sci., Univ. of Saskatchewan, Saskatoon, Canada). C.W. McCleary and F.S. Soliman. *J. Food Sci.* 37, 253–6 (1972). The diffusion of phenolic and quinic acids from dehulled sunflower kernels into aqueous solvents was compared with ethanol extraction of sunflower meal. The diffusion rate was temperature dependent and, at 80C, the aqueous procedure was more effective than reflux extraction with 95% ethanol in removing chlorogenic, caffeic and quinic acids from sunflower samples. After oil extraction, the meals from diffused kernels were light in color at alkaline pH while control and ethanol-extracted meals were green. Losses of diffused solids varied between 11 and 14% but only a small percentage of nitrogen diffused from the dehulled seeds and no oil was found in the freeze-dried extracts. Oil quality and yield were not affected by the diffusion process.

MECHANISM OF DIELDRIN-INDUCED FAT ACCUMULATION IN RAT LIVER. Satish C. Bhatia and T.A. Venkitasubramanian (Dept. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi-7, India). *J. Agr. Food Chem.* 20, 993–6 (1972). Dieldrin was administered orally to male albino rats at a dose level of 30 mg/kg and the effects on hepatic lipid metabolism were determined. Liver total lipid content was increased ($p < 0.05$) and this change was confined only to the triglyceride fraction; phospholipid and cholesterol levels remained unaltered. This was paralleled by an increase in incorporation of glucose-^{14}C into glyceride-glycerol. The incorporation of the isotope into fatty acids and the activity of hepatic fatty acid synthetase were significantly reduced in insecticide-administered rats, indicating an inhibition of lipogenesis by dieldrin. The secretion of triglycerides into plasma is unaffected. Hence, the accumulation of fat in the liver during dieldrin toxicity is ascribed to enhanced hepatic synthesis of triglycerides, due to increased availability of free fatty acids and α-glycerophosphate.

SPECIFIC INHIBITION OF MITOCHONDRIAL FATTY ACID OXIDATION BY 2-BROMOPALMITATE AND ITS COENZYME A AND CARNITINE ESTERS. J.F.A. Chase and P.K. Tubbs (Dept. of Biochem., Univ. of Cambridge, Cambridge CB2 1QW, U.K.). *Biochem. J.* 129, 55–65 (1972). The CoA and carnitine esters of 2-bromopalmitate are extremely powerful and specific inhibitors of mitochondrial fatty acid oxidation. 2-Bromopalmitoyl-CoA, added as such or formed from 2-bromopalmitate, inhibits the carnitine-dependent oxidation of palmitate or palmitoyl-CoA, but not the oxidation of palmitoylcarnitine, by intact liver mitochondria. 2-Bromopalmitoylcarnitine inhibits the oxidation of palmitoylcarnitine as well as that of palmitate or palmitoyl-CoA. It has no effect on succinate oxidation, but inhibits that of pyruvate, 2-oxoglutarate or hexanoate; however, the oxidation of these substrates (but not of palmitate, palmitoyl-CoA or palmitoyl-carnitine) is restored by carnitine.

STUDIES ON CALCIFEROL METABOLISM. IV. SUBCELLULAR LOCALIZATION OF 1,25-DIHYDROXY-VITAMIN D_3 IN INTESTINAL MUCOSA AND CORRELATION WITH INCREASED CALCIUM TRANSPORT. Huan C. Tsai, R.G. Wong, and A.W. Norman (Dept. of Biochem., Univ. of Cal., Riverside, Ca. 92502). *J. Biol. Chem.* **247**, 5511–9 (1972). It has been previously established that vitamin D_3 (cholecalciferol) must undergo an obligatory two step metabolism to first 25-hydroxycholecalciferol and then 1,25, dihydroxycholecalciferol prior to the initiation in the intestine of increased calcium transport. These steps are mediated successively by the liver and the kidney. The present report compares the time course of appearance of vitamin D metabolites in various subcellular fractions of the intestinal mucosa with the onset of increased intestinal calcium transport after physiological doses of radioactive 25-hydroxycholecalciferol or 1,25-dihydroxycholecalciferol. With both steroids, the intestinal nucleus and its chromatin fraction, but not that of the liver or kidney, preferentially accumulated 65 to 75% of the radioactivity present in the tissue. These results collectively support the concept that the nuclear localization of 1,25-dihydroxycholecalciferol in the intestinal mucosa is an integral step in the development of the physiological response to vitamin D by this tissue.

CONTROL OF GLUCONEOGENESIS IN LIVER. V. EFFECTS OF FASTING, DIABETES AND GLUCAGON ON LACTATE AND ENDOGENOUS METABOLISM IN THE PERFUSED RAT LIVER. J.H. Exton, J.G. Corbin and Sandra C. Harper (Dept. of Physiol., Vanderbilt Univ. Schl. of Med., Nashville, Tenn. 37232). *J. Biol. Chem.* **247**, 4996–5003 (1972). The isolated perfused rat liver preparation was employed to study the effects of glucagon, fasting and diabetes on the flow of exogenous lactate or endogenous substrates into the pathways of gluconeogenesis, glycogenesis, ketogenesis, lipogenesis and the Krebs cycle in the liver. Measurements were made of the utilization of substrates and oxygen, the formation of glucose, glycogen, ketone bodies and urea, and the incorporation of isotope from [^{14}C]lactate into glucose, glycogen, protein, CO_2, ketone bodies, cholesterol and other lipids. Ketone body production was increased about 10-fold in livers from fasted or diabetic rats perfused without lactate. It is concluded that changes in the disposition of substrate (pyruvate or fatty acid) within the liver may be as important as changes in substrate supply in the alterations in gluconeogenesis and ketogenesis during fasting and diabetes.

EFFECTS OF HYPERTENSION ON THE LIPID COMPOSITION OF RAT AORTIC INTIMA-MEDIA. Marie D. Daly (Dept. of Biochem. and Med. and Unit for Res. in Aging, Albert Einstein College of Med., Bronx, N.Y. 10461). *Circulation Res.* 31, 410–6 (1972). Since hypertension intensifies the development of atherosclerosis, effects of hypertension on the lipid composition of aortic intima-media of male rats were studied. Concentrations of cholesterol, both esterified and unesterified, and of phospholipid were increased, and the concentration of triglyceride was decreased in aortas of hypertensive rats maintained on a stock diet. Changes in free cholesterol, phospholipid and triglyceride are believed to be concomitants of medial hypertrophy, which was pronounced in aortas of hypertensive rats. Changes in esterified cholesterol, however, may be attributed to an influence of plasma lipids on aortic lipids. Cholesteryl ester, quantitatively a minor lipid component of the aorta, shows a larger increase with hypertension than other lipid classes. The resemblance between fatty acid compositions of aortic and plasma cholesteryl esters was strong, and persisted when the composition of plasma cholesteryl esters was altered by diet. These results suggest that most of the aortic esters originated in the plasma, and support the concept that hypertension intensifies the development of atherosclerosis by increasing the net transfer of lipid from plasma to vessel.

THE STRUCTURE OF A GLYCERYLPHOSPHORYLDIGLUCOSYL DIGLYCERIDE FROM THE LIPIDS OF ACHOLEPLASMA LAIDLAWII STRAIN B. N. Shaw, P.F. Smith and H.M. Verheij (Microbiol. Chem. Res. Lab., Dept. of Org. Chem., Univ. of Newcastle upon Tyne NE1 7RU, U.K.). *Biochem. J.* **129**, 167–73 (1972). The phosphatidylglucose structure proposed previously for the glucose-containing phospholipid from *Acholeplasma laidlawii* is incorrect. The structure now proposed is 3-(*sn*-glycerol-3-phosphoryl-6′-[0-α-D-glucopyranosyl-(1 → 2)-0-α-D-glucopyranosyl])-*sn*-1,2-diglyceride, a new type of bacterial lipid. Deacylation of the lipid gave a single water-soluble phosphate ester which could be distinguished on chromatography from synthetic samples of glucosylphosphorylglycerols. Hydrolysis of the lipid with alkali gave a mixture of fatty acids, glycerol 2-phosphate, *sn*-glycerol 3-phosphate and 0-α-D-glucopyranosyl-(1 → 2)-0-α-D-glucopyranosyl-(1 → 1)-D-glycerol. The lipid was unaffected on incubation with phospholipases A, C and D. Diglucosyl diglyceride was isolated after treatment of the lipid with 60% HF, establishing the location of the fatty acid residues. Periodate oxidation studies showed that the *sn*-glycerol 3-phosphate was esterified to the 6-hydroxyl group of one of the glucose residues in diglucosyl diglyceride.

SUPPORT-BONDED POLYAROMATIC COPOLYMER STATIONARY PHASES FOR USE IN GAS CHROMATOGRAPHY. E.N. Fuller (Applied Automation, Inc.-Systems Res. Dept., Bartlesville, Ok. 74004). *Anal. Chem.* **44**, 1747–52 (1972). The preparation of porous polyaromatic copolymers of divinylbenzene, ethylvinylbenzene and styrene physically bonded to a solid support is described together with initial results illustrating the utility of these materials as GC column packings. While similar in nature to the widely used porous polymer beads, the support-bonded phases provide more rapid separations and greater column efficiency. Experiments showing the effects of cross-linking and of initial dilution with inert solvent on the resulting copolymer product are also discussed.

INFLUENCE OF COLUMN CONFIGURATION ON PERFORMANCE IN HIGH EFFICIENCY LIQUID CHROMATOGRAPHY. H. Barth, E. Dallmeier and B. Karger (Dept. of Chem., Northeastern Univ., Boston, Mass. 02115). *Anal. Chem.* **44**, 1726–32 (1972). The influence of coiling on HETP in high performance liquid chromatography has been shown to depend upon column (r_o) and coil radii (R_o). Aluminum columns (r_o = 0.95 mm), packed with Corasil I (27–35 μm) and coated *in situ* with 3,3′-oxydipropionitrile (ODPN), showed significant efficiency losses when coiled to a radius smaller than 13 cm; e.g., when coiled to R_o = 1 cm, a sixfold increase in HETP was obtained. No efficiency loss occurred when columns of smaller tube radii (r_o = 0.38 mm) were coiled down to R_o = 1 cm. Larger diameter columns (r_o = 2.4 mm), when coiled (R_o = 2.4 cm), gave a fourteenfold increase in HETP. Also column geometries in which the direction of coiling was alternated (figure "8" and "S" configurations) gave no efficiency loss when compared to straight columns. Experiments have shown that peak broadening due to coiling in figure "8" columns depends on the extent of lateral mass transfer.

BAKERY FAT PRODUCT WITH IMPROVED ANTI-STALING PROPERTIES. U. Riiner (AB Karlshamns Oljefabriker). *U.S. 3,697,294.* A process is disclosed for producing a bakery fat emulsion with the capability of retarding the staling of bread. The process comprises the steps of (1) preparing a dispersion of 1-monoglycerides in water and (2) emulsifying the dispersion into an edible fat which forms the continuous phase of the emulsion.

PROCESS AND APPARATUS FOR DESLIMING VEGETABLE OILS. H.O. Schumacher. *U.S. 3,696,030.* The process is designed for desliming vegetable oils which are obtained by extraction and miscella distillation, particularly for desliming soybean oil, in which the oil is reacted with water in swelling or desliming containers. The oil is then separated from the water soluble phosphatides. Gas-free oil and gas-free water are used and the desliming operation and subsequent separation of the oil and phosphatides are carried out in a gas-free medium.

TRIGLYCERIDE REFINING. A.S. Zambone (Pennwalt Corp.). *U.S. 3,700,704.* A new use for a centrifuge having an axial screw conveyor is proposed for liquid-liquid separation in the refining of triglycerides.

METHOD OF REFINING TRIGLYCERIDES. A.S. Zambone (Pennwalt Corp.) *U.S. 3,700,705.* The mixture resulting from the introduction of an alkaline reagent is separated by introducing it to a zone of centrifugation formed about an axis. The soapstock occupies the outer portion of the zone and the refined triglyceride the inner. The separated soapstock is uniquely withdrawn from the zone by advancing it axially and inwardly toward the axis away from the refined triglyceride, and then discharging the soapstock.

ACYL CARRIER PROTEIN. XVI. INTERMEDIATE REACTIONS OF UNSATURATED FATTY ACID SYNTHESIS IN ESCHERICHIA COLI AND STUDIES OF FAB B MUTANTS. Claire H. Birge and P.R. Vagelos (Wash. Univ. Schl. of Med., Dept. of Biol. Chem., St. Louis, Mo. 63110). *J. Biol. Chem.* **247**, 4921–9 (1972). Synthesis of *cis*-5-β-hydroxy-[2-^{14}C]dodecenoyl-acyl carrier protein (ACP), a postulated intermediate in unsaturated fatty acid synthesis in *Escherichia coli*, was achieved from *cis*-3-decenoyl-ACP and [2-^{14}C]malonyl-ACP through the combined action of two enzymes, β-ketoacyl-ACP synthetase and β-keto-acyl-ACP reductase. The conversion of *cis*-5-β-hydroxy[2-^{14}C]dodecenoyl-ACP to *cis*-5-*trans*-2-[2-^{14}C]-dodecadienoyl-ACP and to *cis*-5-[2-^{14}C]-dodecenoyl-ACP was shown utilizing a crude fatty acid synthetase preparation of wild type *E. coli.* Elongation of *cis*-5-β-hydroxy[2-^{14}C]dodecenoyl-ACP to long chain unsaturated fatty acids was also shown with this fatty acid synthetase preparation. These studies indicate that *cis*-5-β-hydroxydodecenoyl-ACP, *cis*-5-*trans*-2-dodecadienoyl-ACP, and *cis*-5-dodecenoyl-ACP are intermediates in the synthesis of long chain unsaturated fatty acids. It is concluded that fab B mutants contain a mutation in an enzyme which catalyzes a reaction unique to the unsaturated fatty acid pathway which is yet unknown.

THE REGULATION OF GLYCERIDE SYNTHESIS IN ISOLATED WHITE-FAT CELLS. THE EFFECTS OF ACETATE, PYRUVATE, LACTATE, PALMITATE, ELECTRON-ACCEPTORS, UNCOUPLING AGENTS AND OLIGOMYCIN. *Ibid.*, 1069–78. The incorporation of 5 mM-[U-^{14}C]glucose into glyceride fatty acids by fat cells from normal rats incubated in the presence of 20 m units of insulin/ml was increased by acetate, pyruvate, palmitate, NNN'N'-tetramethyl-*p*-phenylenediamine, phenazine methosulphate, dinitrophenol, tetrachlorotrifluoromethyl benzimidazole and oligomycin. Lactate did not stimulate glucose incorporation into fatty acids. The effects of these agents were concentration-dependent. In the presence of 5 mM-glucose + insulin, [U-^{14}C] acetate, [U-^{14}C]pyruvate and [U-^{14}C]lactate were incorporated into fatty acids in a concentration-dependent manner, thereby further increasing the total rate of fatty acid synthesis. It was found that total fatty acid synthesis in the presence of glucose was most effectively increased by raising the concentration of pyruvate in the incubation system. The significance of these results in supporting the proposal that fatty acid synthesis from glucose in adipose tissue is a 'self-limiting process' is discussed.

INTERRELATIONSHIP AND CONTROL OF GLUCOSE METABOLISM AND LIPOGENESIS IN ISOLATED FAT-CELLS. EFFECT OF THE AMOUNT OF GLUCOSE UPTAKE ON THE RATES OF THE PENTOSE PHOSPHATE CYCLE AND OF FATTY ACID SYNTHESIS. H. Kather, M. Rivera and K. Brand (Max-Planck-Inst. fur Ernahrungsphysiologie, Dortmund, Germany). *Biochem J.* 128, 1089–96 (1972). In order to study the quantitative relationship between fatty acid synthesis and pentose phosphate-cycle activity under different hormonal and dietary conditions affecting the extent of glucose uptake, cells isolated from rat epididymal adipose tissue were incubated in bicarbonate buffer containing [U-^{14}C]-, [1-^{14}C]- or [6-^{14}C]-glucose. From the amount of glucose taken up, the production of lactate and pyruvate, and the incorporation of ^{14}C from differently labelled [^{14}C]glucose into CO_2, fatty acids and glyceride glycerol, the rates of glucose metabolism via different pathways and the extent of lipogenesis under various experimental conditions were determined. The contribution of the pentose phosphate-cycle to glucose metabolism under normal conditions was calculated to be 8%. Starvation and re-feeding, and the presence of insulin, caused an enhancement of glucose uptake, pentose phosphate-cycle activity and fatty acid synthesis. Except in cells from starved animals, the pentose phosphate cycle was found to provide only about 60% of the NADPH required for fatty acid synthesis.

INTERRELATIONSHIP AND CONTROL OF GLUCOSE METABOLISM AND LIPOGENESIS IN ISOLATED FAT-CELLS. CONTROL OF PENTOSE PHOSPHATE-CYCLE ACTIVITY BY CELLULAR REQUIREMENT FOR REDUCED NICOTINAMIDE ADENINE DINUCLEOTIDE PHOSPHATE. *Ibid.*, 1097–1102. By using inhibitors and stimulators of different metabolic pathways the interdependence of the pentose phosphate cycle and lipogenesis in isolated fat-cells was studied. Rotenone, which is known to inhibit electron transport in the respiratory chain, blocked glucose breakdown at the site of pyruvate dehydrogenase. Consequently, because of the lack of acetyl-CoA, fatty acid synthesis was almost abolished. A concomitant decrease in pentose phosphate-cycle activity was observed. Since even in cells from starved animals, in which the pentose phosphate-cycle activity is extremely low, no accumulation of 6-phosphogluconate was observed, it is concluded that the control of this pathway is achieved by the rate of regeneration of NADP at the site of glucose 6-phosphate dehydrogenase.

CONFORMATIONAL CHANGES, INACTIVATION AND DISSOCIATION OF PIGEON LIVER FATTY ACID SYNTHETASE COMPLEX. EFFECTS OF IONIC STRENGTH, PH AND TEMPERATURE. S. Kumar, R.A. Muesing and J.W. Porter (Lipid Metabolism Lab., Vet. Admin. Hosp., and Dept. of Physiological Chem., Univ. of Wisc., Madison, Wisc. 53706). *J. Biol. Chem.* **247**, 4749–62 (1972).

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The pigeon liver fatty acid synthetase complex ($s_{20,w}$ = 14.0 S) is inactivated and dissociated into half-molecular weight sub-

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units ($s_{20,w}$ = 9.0 S) in the presence of low ionic strength buffers. The rates of inactivation and dissociation of the complex are dependent upon the ionic strength, pH and temperature of the medium. The results presented in this paper suggest that hydrophobic forces and a diminution of electrostatic repulsions are factors which contribute to the stability of the complex in high ionic strength buffers at neutral pH. A lowering of the temperature weakens the hydrophobic interactions and a decrease in the ionic strength increases the electrostatic repulsion between the subunits. These cumulative effects lead ultimately to dissociation of the complex to two subunits.

THE EFFECT OF FASTING ON SYNTHESIS AND 4′-PHOSPHOPANTETHEINE EXCHANGE IN RAT LIVER FATTY ACID SYNTHETASE. J. Tweto and A.R. Larrabee (Dept. of Chem., Univ. of Oregon, Eugene, Ore. 97403). *J. Biol. Chem.* **247**, 4900–4 (1972). The level of rat liver fatty acid synthetase is greatly decreased upon fasting. This report presents several additional observations of the effect of fasting on that enzyme. The rate of synthesis is reduced during 48 hours of fasting and is 20% of the steady state rate after 12 hours. The apparent half-life of the enzyme is decreased from about 70 hours to about 20 hours. The exchange of the prosthetic group, 4′-phosphopantetheine, is largely eliminated, perhaps by effects on the mechanism of attachment or hydrolysis. Feeding a protein-free diet mimics the effect of starvation on the enzyme levels.

KINETIC STUDIES ON THE SPECIFICITY OF LONG CHAIN ACYL COENZYME A SYNTHETASE FROM RAT LIVER MICROSOMES. Y.L. Marcel and G. Suzue (Lab. of Lipid Metabolism and Atherosclerosis Res., Clin. Res. Inst. of Montreal, Montreal 130, Quebec, Canada). *J. Biol. Chem.* **247**, 4433–6 (1972). The kinetics of activation of unsaturated and saturated fatty acids by long chain acyl-CoA synthetase from rat liver microsomes has been studied with a method of selective extraction of free fatty acids based on the insolubility of acyl-CoA in diethyl ether. All unsaturated fatty acids with a double bond in Δ_9 position (palmitoleate, oleate, linoleate, linolenate) have values of K_m in the same range (1.39 to 2.22 μM) and values of V_{max} which vary from 9.09 to 18.52 μmoles per hour per mg of protein. These results lead to the theoretical conclusion that there is probably only one long chain acyl-CoA synthetase which contains several active sites: a main site which may bind the carboxyl group, and therefore would be the same for all substrates, and secondary sites (or spatial configuration) to accommodate the different types of fatty acid molecules.

SUBCELLULAR DISTRIBUTION OF AND EPINEPHRINE-INDUCED CHANGES IN HORMONE-SENSITIVE LIPASE, PHOSPHORYLASE AND PHOSPHORYLASE KINASE IN RAT ADIPOCYTES. J.C. Khoo, L. Jarett, S.E. Mayer and D. Steinberg (Div. of Metabolic Disease and Div. of Pharmacol., Dept. of Med., School of Med., Univ. of Cal. at San Diego, La Jolla, Cal. 92037). *J. Biol. Chem.* **247**, 4812–8 (1972). A systematic study was carried out of the subcellular distribution of hormone-sensitive lipase, glycogen phosphorylase and phosphorylase kinase in rat adipocytes and the changes in these enzymes when the cells were incubated with epinephrine. Under the conditions of homogenization used, approximately one-third of the total hormone-sensitive lipase activity was associated with the fat cake floated to the top of a homogenate by low speed centrifugation, although as discussed in detail, this value remains uncertain in view of technical problems faced in assaying lipase tightly bound to fat. Further characterization of the phosphorylase and phosphorylase kinase systems in adipose tissue is needed to assess the regulatory role of phosphorylase kinase in this tissue.

IN VIVO DEMONSTRATION OF THE CIRCADIAN RHYTHM OF CHOLESTEROL BIOSYNTHESIS IN THE LIVER AND INTESTINE OF THE RAT. P.A. Edwards, H. Muroya, and R.G. Gould (Dept. of Med., Stanford Univ. Schl. of Med., Stanford, Cal. 94305). *J. Lipid Res.* **13**, 396–401 (1972). The existence of a circadian rhythm in the rate of hepatic cholesterol synthesis in the rat has been demonstrated in vivo by measuring the conversion of both [1-^{14}C]acetate and $^{3}H_2O$ to cholesterol. By both methods there was observed a similar increase in the rate of hepatic cholesterol synthesis between the nadir at noon and the peak at midnight. Circadian changes in the rate of hepatic cholesterol synthesis measured in vivo with [1-^{14}C]acetate were very similar to changes in the activity of hepatic microsomal HMG CoA reductase. Cholesterol synthesis in the jejunum and in the distal ileum was also shown to exhibit the same circadian in vivo but with smaller amplitude (1.6- and 1.3-fold, respectively). Rats trained to eat during a 4-hr period (9 am-1 pm) while housed under normal illumination showed changes in the timing of the circadian rhythm of cholesterol synthesis; in the liver the maximum rate of cholesterol synthesis occurred at 6 pm, 9 hr after the presentation of food, while the two sections of the intestine investigated exhibited a maximum synthetic response between noon and 6 pm. Results obtained in this study support the hypothesis that the major portion of the rise in HMG CoA reductase activity and the increase in overall rate of cholesterol synthesis in liver and intestine during the circadian rhythm are due to the ingestion of food.

MASS SPECTRA OF METHYL-BRANCHED HYDROCARBONS FROM EGGS OF THE TOBACCO HORNWORM. D.R. Nelson, D.R. Sukkestad and R.G. Zaylskie (Metabolism and Radiation Res. Lab., ARS, USDA, Fargo, N.D. 58102). *J. Lipid Res.* **13**, 413–21 (1972). Hydrocarbons from three homologous series of branched alkanes from the eggs of the tobacco hornworm, ***Manduca sexta*** (L.), were identified by mass spectrometry. Gas-liquid chromatography (GLC) peaks 37-A (equivalent chain length of 37.2) and 39-A (equivalent chain length of 39.2) were mixtures of 13-, 15-, 17- and 19-methylheptatriacontane and 13-, 15-, 17- and 19-methylnonatriacontane, respectively. GLC peaks 33-B, 37-B and 39-B with equivalent chain lengths of 33.4, 37.4 and 39.4, respectively, were mixtures of 13,17- and 15,19-dimethyltritriacontane, 13,17-, 15,19- and 17,21-dimethylheptatriacontane, and 13,17-, 15,19- and 17,21-dimethylnonatriacontane, respectively. GLC peak 37-C (equivalent chain length of 37.6) was a mixture of 11,15,19-, 13,17,21- and 15,19,23-trimethylheptatriacontane.

PHYSIOLOGICAL FATTY LIVER AND HYPERLIPEMIA IN THE FETAL GUINEA PIG: CHEMICAL AND ULTRASTRUCTURAL CHARACTERIZATION. T. Bøhmer, R.J. Havel, and J.A. Long (Cardiovascular Res. Inst. and the Depts. of Med. and Anatomy, Univ. of Cal. Schl. of Med., San Francisco, Cal. 94122). *J. Lipid Res.* **13**, 371–82 (1972). During its prolonged period of gestation, the fetal guinea pig gradually develops a striking hyperlipemia (plasma triglycerides 500–1500 mg/dl) and fatty liver (hepatic triglycerides ca. 25% of wet weight). The parenchymal cells of the liver contain not only many fat droplets in the cytoplasm, but also large numbers of osmiophilic particles, interpreted as precursors of plasma lipoproteins, within profiles of the cisternae and secretory vesicles of the Golgi apparatus. Similar particles are found in intercellular spaces, in the space

Notice

Edgar O. Johnston, Superintendence Co., Inc., P.O. Box 9132, Houston, Tex. 77011, has applied for a Referee Certificate on Oil Cake and Meal, Protein Concentrates, Soybean Oil and Tallow and Grease.

Larry Lee Kennon, K-Testing Laboratory, Inc., P.O. Box 2081, Memphis, Tenn. 38102, has applied for a Referee Certificate on Cottonseed, Oil Cake and Meal, Protein Concentrates, Cottonseed Oil, Soybean Oil and Other Fatty Oils.

Deropha J. Porter, Porter Testing Laboratory, 6 S.E. Fourth St., P.O. Box 25303, Oklahoma City, Okla. 73125, has applied for a Referee Certificate on Cottonseed, Peanuts, Oil Cake and Meal and Protein Concentrates.

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of Disse, and in the hepatic sinusoids. Near the end of gestation, these particles enlarge to the size range characteristic of chylomicrons secreted from the intestinal mucosa after ingestion of fat. At the same time, the hyperlipemia increases and is characterized by the accumulation of particles resembling chylomicrons morphologically and chemically. The results are interpreted as evidence of intense hepatic synthesis and secretion of very low density lipoproteins which may be related to the extensive transplacental transport of free fatty acids known to occur in this species. After birth, the hyperlipemia subsides rapidly and the hepatic steatosis more gradually.

EFFECT OF VITAMIN K DEPLETION AND RESTORATION OF SPHINGOLIPID METABOLISM IN BACTEROIDES MELANINOGENICUS. M. Lev and A.F. Milford (Dept. of Microbiol. and Immunology and Dept. of Surgery, Albert Einstein College of Med., Bronx, N.Y. 10461). *J. Lipid Res.* 13, 364–70 (1972). *Bacteroides melaninogenicus* requires vitamin K for normal growth. Cells incubated in a vitamin K-free medium form defective cell envelopes. Studies with vitamin K-grown "K(+)" and vitamin K-depleted "K(−)" cells showed that [^{14}C]choline and [^{14}C] glycerol were not taken up, but several amino acids and acetate were incorporated to the same degree by both types of cultures. However, K(−) cells incorporated succinate to a greater degree than did K(+) cultures. The relative incorporation of succinate into ceramide phosphorylethanolamine and ceramide phosphorylglycerol was depressed compared with incorporation into phosphatidylethanolamine in K(−) cultures. *B. melaninogenicus* can be grown in serial subculture in the absence of vitamin K in the presence of 2.5 mg/ml of succinate. Under these conditions the relative incorporation of [2,3-^{14}C]succinate and ^{32}P into ceramide phosphorylethanolamine and ceramide phosphorylglycerol is markedly depressed.

HMG CoA REDUCTASE OF INTESTINAL MUCOSA AND LIVER OF THE RAT. S. Shefer, S. Hauser, V. Lapar and E.H. Mosbach (Dept. of Lab. Diagnosis, Public Health Res. Inst. of the City of N.Y., Inc., and the Bureau of Lab. of the N.Y. City Dept. of Health, N.Y. 10016). *J. Lipid Res.* 13, 402–12 (1972). Methods were developed for the determination of HMG CoA (3-hydroxy-3-methylglutaryl CoA) reductase activity in subcellular fractions of intestinal mucosa and liver of Wistar strain rats. In the liver, reductase activity was located exclusively in the microsomal fraction. In the intestinal mucosa, activity was found in both mitochondrial and microsomal fractions of crypt cells but not of villi. The microsomal HMG CoA reductases of liver and intestinal mucosa had similar kinetic characteristics and pH optima. However, the activity of the hepatic enzyme differed with age and sex of the experimental animals while that of the intestinal crypt cells did not. Cholestyramine treatment enhanced the activity of the microsomal HMG CoA reductase in both liver and intestinal mucosa. Reductase activity of the intestinal crypt cells was elevated in both jejunum and ileum. The greatest stimulation, both relatively and absolutely, was observed in the distal half of the jejunum.

INFLUENCE OF DIETARY FAT ON THE CONCENTRATION OF LONG-CHAIN UNSATURATED FATTY ACID FAMILIES IN RAT TISSUES. P.O. Egwim and F.A. Kummerow (Burnsides Res. Lab., Univ. of Ill., Urbana, Ill. 61801). *J. Lipid Res.* 13, 500–10 (1972). The relative concentration of long-chain unsaturated fatty acids (chain length C_{20} and greater) of the (n-6), (n-7), and (n-9) families in the cholesteryl esters and phospholipids of rat adrenals, liver, heart and plasma lipoproteins was measured after the feeding of hydrogenated fat, milk fat, beef tallow, corn oil and fat-free diets. Barely optimal levels of dietary linoleate were found to result in the same order of concentration of the (n-6) series of fatty acids as was obtained with excess dietary linoleate. The linoleate-poor or deficient diets—hydrogenated fat and fat-free diets—gave almost identical levels and trends with respect to the concentration of the (n-9) and (n-7) series of acids. With these two diets, the concentrations of the total (n-9) long-chain acids were several times greater than the amounts obtained by feeding either the linoleate-rich diet or the barely linoleate-adequate diets. It is concluded from the results that the linoleate-deficient nature of the hydrogenated fat, rather than its high content of *trans* acids, would explain the high tendency of this fat to induce the accumulation of long-chain (n-9) fatty acids in the cholesteryl esters and phospholipids of the tissues studied.

NATURAL OCCURRENCE OF FREE FATTY ALDEHYDES IN BOVINE CARDIAC MUSCLE. J.R. Gilbertson, R.C. Johnson, Rose A. Gelman and Carol Buffenmyer (Dept. of Pharmacol. and Physiol., Schl. of Dental Med., Univ. of Pittsburgh, Pittsburgh, Pa. 15213). *J. Lipid Res.* 13, 491–9 (1972). Free fatty acids, aldehydes, alcohols and 1-0-alkyl and alk-1-enyl glycerols were identified and quantified in lipid extracts from bovine cardiac muscle. Although a number of components present in the free fatty aldehydes were also noted in the fatty chains in the 1-0-alk-1-enyl glycerols, a direct qualitative similarity did not exist as would be expected if the free fatty aldehydes were artifactual in origin. Also, a qualitative similarity did not exist between the fatty chains of the 1-0-alkyl and alk-1-enyl glycerols. This latter observation would suggest a mechanism other than biodehydrogenation of the alkyl ethers for the origin of the alk-1-enyl glycerols. Free fatty aldehydes were distributed evenly between the 105,000 g supernatant and particulate fractions of cardiac muscle, while the 1-0-alk-1-enyl glycerols were associated primarily with the particulate fraction. Free fatty alcohols were noted only in the supernatant fraction, while the 1-0-alkyl glycerols were present in both fractions.

STUDIES OF THE DEVELOPMENT OF DIABETIC KETOSIS IN THE RAT. J.M. Meier, J.D. McGarry, G.R. Faloona, R.H. Unger and D.W. Foster (Dept. of Internal Med. and Biochem., Univ. of Texas Southwestern Med. Schl. and the Vet. Admin. Hosp., Dallas, Tx. 75235). *J. Lipid Res.* 13, 228–33 (1972). Plasma glucose, free fatty acid, ketone and triglyceride concentrations were measured at frequent intervals after the administration of alloxan to rats. Hepatic triglyceride levels were determined in the same animals. During the second 24-hr period after alloxan administration, severe ketoacidosis developed and triglyceride concentrations in the liver became markedly elevated.

Call for Nominations 1973 Honored Student Awards

Nominations are being solicited for the 1973 AOCS Honored Student Awards. Graduate students at any North American institution of higher learning, in any area of science dealing with fats and lipids, who are doing research toward an advanced degree and who are interested in the areas of science and technology fostered by this Society, are eligible. The student must be a registered graduate student at the time of application. To receive the award he must remain a registered graduate student, and must not have received his degree or begun career employment, prior to the AOCS meeting he is to attend. Selection of awardees is on the basis of educational qualifications and performance.

The awards provide funds equal to travel costs plus $75.00 to permit attendance at a national meeting of the AOCS. In 1973 these meetings will be held April 29-May 2 in New Orleans and September 16-20 in Chicago. Students will be awarded travel to the nearer meeting to allow as many awards as possible from the available funds.

Nomination forms may be obtained from AOCS headquarters (508 S. Sixth, Champaign, Ill. 61820) or from the chairman of the Honored Student Award Committee. Completed nominations should be returned to: Ralph T. Holman, HSA Committee Chairman, The Hormel Institute, University of Minnesota, Austin, Minn. 55912. ■

This finding was incompatible with the thesis that enhanced ketogenesis under circumstances of increased free fatty acid delivery to the liver requires diminished triglyceride synthesis. Plasma insulin and glucagon concentrations were determined at each time point. Initial changes in plasma glucose, ketones, free fatty acids and triglycerides were accompanied by a fall in insulin concentrations, but no changes occurred in glucagon levels. However, concentrations of the latter hormone increased dramatically in the second 24 hr after alloxan treatment and probably contributed to the development of the extreme hyperglycemia observed during this time period.

FAT MOBILIZATION IN VITRO AND IN VIVO IN THE GENETICALLY OBESE ZUCKER RAT "FATTY." Lois M. Zucker (Harriet G. Bird Memorial Lab., Stow, Mass. 01775). *J. Lipid Res.* 13, 234-43 (1972). Fat mobilization was studied in vitro with epididymal fat pad tissue and also with cell suspensions from epididymal, retroperitoneal and subcutaneous fat from the obese mutant "fatty" (*fafa*) and control rats of four different ages. Fat mobilization per cell in response to epinephrine was well above normal in young "fatties"; in older "fatties" the output per cell fell to near normal, but the much greater number of fat cells per rat indicated that the fat mobilizing capacity of the older "fatty" is well above normal. The "fatty" showed normal reactions to epinephrine in vivo: hyperglycemia, glycogenolysis, lipolysis with elevated free fatty acids and glycerol, and increased entry of free fatty acids into muscle and liver. Response was at least as great in "fatty" as in control animals. Metabolic indices—levels of circulating free fatty acids, glycerol, and in some cases glucose and lipid—determined at various ages in fed "fatties" and controls, and at intervals during prolonged fasting (70 days), were consistent with a picture of excessive adipose tissue, fat mobilization in excess of need and return of the excess to the adipose tissue via lipoproteins.

AUTOXIDATION OF CHOLESTEROL IN AQUEOUS DISPERSIONS AND IN MONOMOLECULAR FILMS. N.D. Weiner, P. Noomnont and A. Felmeister (College of Pharmaceutical Sci., Columbia Univ., N.Y. 10023). *J. Lipid Res.* 13, 253-5 (1972). The autoxidative formation of 7-ketocholesterol and diols from aqueous cholesterol dispersions and from cholesterol monomolecular films has been studied as a function of time. The rate of oxidation of cholesterol is much faster at the surface than in the bulk. Whereas more than one-half of the cholesterol is oxidized at the surface within 8 hr at room temperature, no noticeable reaction was observed for the oxidation of cholesterol from aqueous dispersions at room temperature during this time period. However, similar rates of oxidation were observed when the dispersions were maintained at 85C.

DIGESTION OF THE MONO- AND DIESTERS OF HEXANE-1,6-DIOL BY PANCREATIC LIPASE. F.H. Mattson and R.A. Volpenhein (Procter & Gamble Co., Miami Valley Lab., Cincinnati, Ohio 45239). *J. Lipid Res.* 13, 256-62 (1972). The digestion in vitro by pancreatic lipase (EC 3.1.1.3) of the mono- and dioleate esters of hexane-1,6-diol has been studied. Under the conditions employed, the pathways for the lysis of these materials are proposed to be a hydrolysis step diester → monoester + free fatty acid and a transesterification step 2 monoesters → diester + free alcohol. If only the diester is present initially, it is hydrolyzed at a continuously decreasing rate with an accumulation of monoester. When the ratio of bulk concentration of diester to monoester is approximately 2.5 to 1, the diester and monoester are lysed at the same rate. As digestion continues, the amount of diester decreases but the amount of monoester remains constant. This behavior is attributed to the greater surface activity of the monoester, which causes the accumulation of this species at the oil-water interface.

INTRACELLULAR SITES OF LIPID SYNTHESIS AND THE BIOGENESIS OF MITOCHONDRIA. E.A. Dennis and E.P. Kennedy (Dept. of Biol. Chem., Harvard Med. Schl., Boston, Mass. 02115). *J. Lipid Res.* 13, 263-7 (1972). Experimental data are presented on the intracellular localization in rat liver of three enzymes which are involved in the biosynthesis of phosphatidylethanolamine and diphosphatidylglycerol. These enzymes are phosphatidylserine decarboxylase, CDP-diglyceride-L-α-glycerophosphate phosphatidyl transferase and phosphatidylethanolamine-L-serine phosphatidyl transferase. It was found that the first two enzymes are primarily mitochondrial while the

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Call for Nominations Award in Lipid Chemistry

Sponsored by Applied Science Laboratories

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

The award consists of $2500 accompanied by an appropriate certificate. It is now planned that the 10th award will be presented at the AOCS Fall Meeting in Chicago, September 16-19, 1973.

Canvassing Committee Appointees

Policies and Procedures governing the selection of award winners have been set by the AOCS Governing Board. An Award Nomination canvassing Committee has been appointed. Members are: T.J. Weiss, Chairman; C.D. Evans; D. Firestone; G. Fuller; and T.H. Smouse. The function of this committee is to solicit nominations for the 10th 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 T.J. Weiss, Hunt-Wesson Foods, Inc., 1645 W. Valencia Dr., Fullerton, Calif. 92634 before the deadline of April 15, 1973. The supporting documents shall consist of professional biographical data, including a summary of the nominee's research accomplishments, a list of his publications, the degrees he holds, together with the names of the granting institutions, and the positions held during his professional career. There is no requirement that either the nominator or the nominee be a member of the American Oil Chemists' Society. In addition, letters from at least three other scientists supporting the nomination must be submitted in octuplicate.

Remember the DEADLINE, April 15, 1973

latter enzyme is primarily microsomal. The intracellular sites for the biosynthesis of phosphatidylcholine, phosphatidylethanolamine and diphosphatidylglycerol are discussed, and the implications of their sites of biosynthesis on the assembly processes involved in the biogenesis of mitochondria are considered.

Very low density lipoproteins and lipoprotein lipase in serum of rats deficient in essential fatty acids. G.G. de Pury and F.D. Collins (Russell Grimwade Schl. of Biochem., Univ. of Melbourne, Parkville, Victoria 3052, Australia). *J. Lipid Res.* 13, 268–75 (1972). Rats fed a diet deficient in essential fatty acids have a low level of serum very low density lipoproteins (VLDL). It was found that after intraperitoneal injection of heparin, deficient rats had a higher level of lipoprotein lipase activity in their plasma than did normal rats. VLDL isolated from serum of normal and deficient rats were compared as substrates for postheparin lipase of rat plasma. There was no significant difference in V_{max} between the two preparations of lipoproteins, but the apparent K_m for lipoproteins from deficient animals was significantly less than that for normal animals. These observations suggest that the low concentration of VLDL in deficient rats may be explained (a) by an increased activity of lipoprotein lipase in the tissues of these animals and (b) by the VLDL of deficient rats being more rapidly hydrolyzed at low concentrations by lipoprotein lipase than VLDL from normal rats.

Effects of starvation, refeeding and fat feeding on adipocyte ghost adenyl cyclase activity. R.R. Gorman, Helen M. Tepperman and J. Tepperman (Dept. of Parmacol., State Univ. of New York, Upstate Med. Center, Syracuse, N.Y. 13210). *J. Lipid Res.* 13, 276–80 (1972). Basal adenyl cyclase activity and its response to epinephrine and glucagon were studied in isolated adipocyte ghosts obtained from fed, starved, refed and fat-diet-adapted rats. Epinephrine stimulation of adenyl cyclase was significantly increased in fasted rats, but the glucagon response did not change. Rats fasted for 48 hr and refed a high carbohydrate, low fat diet for 48 or 96 hr showed no differences from chow-fed animals in either basal or hormone-stimulated adenyl cyclase activity. Rats adapted to a high fat, low carbohydrate diet showed an initial and transitory increase in basal activity but a progressive loss of epinephrine- and glucagon-stimulated enzyme activities. The loss in hormone responsiveness correlated well with a decrease in hormone-stimulated lipolysis of fat pads and was associated with a significant increase in fat cell diameter.

Estradiol 17β-hemisuccinate: an improved procedure. T.O. Yellin (Dept. of Chem. Pharmacol., Abbott Labs., North Chicago, Ill. 60064). *J. Lipid Res.* 13, 554–5 (1972). A simple, rapid, high-yield and relatively inexpensive procedure for the preparation of estradiol 17β-hemisuccinate is described. The synthesis can be done conveniently in the ordinary biological laboratory.

Determination of acetyl coenzyme A. Interference by a contaminant in malate dehydrogenase. I. Mulder (Lab. of Vet. Biochem., Univ. of Utrecht, Utrecht, The Netherlands). *J. Lipid Res.* 13, 552–4 (1972). Spectrophotometric determinations of acetyl CoA with malate dehydrogenase and citrate synthase are likely to overestimate the amount of acetyl CoA in solutions containing acetoacetyl CoA, since commercial preparations of malate dehydrogenase may contain thiolase.

Identification and quantitation of free ceramides in human platelets. W. Krivit and S. Hammarstrom (Dept. of Pediatrics, Univ. of Minn., Minneapolis, Minn. 55455). *J. Lipid Res.* 13, 525–30 (1972). Free ceramides were isolated from human platelets. Their structures were unequivocally determined by gas-liquid chromatography-mass spectrometry of the trimethylsilyl ether derivatives. The major components were N-(palmitoyl) sphingosine, N-(stearoyl) sphingosine, N-(eicosanoyl) sphingosine, N-(docosanoyl) sphingosine, N-(tetracosanoyl) sphingosine and N-(tetracosenoyl) sphingosine. Sphinganine and sphingadienine-containing ceramides as well as ceramides containing other unsaturated acids were also present. The amount of ceramides was determined by quantitative gas-liquid chromatography, using radioactive ceramide as internal standard and synthetic crystalline ceramides for comparison of peak areas. The concentration of ceramides was found to be 1.31 μg/mg of platelet protein.

On the structure of cytolipin R, a ceramide tetrahexoside hapten from rat lymphosarcoma. R. Lain, C.C. Sweeley, Y.-T. Li, A. Kisic and M.M. Rapport (Dept. of Biochem., Michigan State Univ., East Lansing, Mich. 48823). *J. Lipid Res.* 13, 519–24 (1972). Cytolipin R, a ceramide tetrahexoside isolated from rat lymphosarcoma, was studied by sequential hydrolysis with specific glycosidases which revealed the anomeric configurations of the glycosidic bonds. Sugar linkages were established by combined gas-liquid chromatography and mass spectrometry of the partially methylated alditol acetates prepared after permethylation and hydrolysis of the intact lipid. Results indicated the structure of cytolipin R to be N-acetylgalactosaminyl(β1 → 3)galactosyl(α1 → 3)galactosyl (β1 → 4)glucosyl ceramide. Cytolipin K (glaboside I) differs in having a galactosyl(α1 → 4)galactosyl internal linkage, and this difference must account for the immunological differences between cytolipin K and cytolipin R.

15-Hydroxy-9-oxoprosta-11,13-dienoic acid as the product of a prostaglandin isomerase. R.L. Jones (Dept. of Pharmacol., Univ. of Edinburgh, Edinburgh EH8 9JZ, Scotland). *J. Lipid Res.* 13, 511–8 (1972). The initial product of the interaction between prostaglandin A_1 and the prostaglandin isomerase of cat blood plasma has been isolated. By ultraviolet spectroscopy and mass spectrometry and from stability and chromatographic studies, the structure of the compound has been established as 15-hydroxy-9-oxoprosta-11,13-dienoic acid, an allylic isomer of prostaglandin A_1. The compound is unstable under mild alkaline conditions, isomerizing to prostaglandin B_1. The biological significance of the enzymatic isomerization of prostaglandin A_1 is discussed.

Hydrolysis of fully esterified alcohols containing from one to eight hydroxyl groups by the lipolytic enzymes of rat pancreatic juice. F.H. Mattson and R.A. Volpenhein (Procter & Gamble Company, Miami Valley Lab., Cincinnati, Ohio 45239). *J. Lipid Res.* 13, 325–8 (1972). The enzymatic hydrolysis in vitro of the esters of methanol, ethylene glycol, glycerol, erythritol, pentaerythritol, adonitol, sorbitol and sucrose in which all alcohol groups were esterified with oleic acid was studied. Various preparations of rat pancreatic juice, including pure lipase, were used as the sources of enzymes. Lipase (EC 3.1.1.3) did not hydrolyze compounds that contained more than three ester groups. Compounds containing four and five ester groups were hydrolyzed by certain preparations of pancreatic juice; this activity is attributed to the enzyme, nonspecific lipase. This enzyme also hydrolyzed esters of primary alcohols. The compounds containing six (sorbitol)

CALL FOR PAPERS

AOCS 64TH ANNUAL SPRING MEETING

The Technical Program Committee has issued a call for papers to be presented at the AOCS Spring Meeting, April 29-May 2, 1973, in the Jung Hotel, New Orleans, La. Papers on lipids, fats and oils, and all related areas are welcome.

Submit three copies of a 100-300 word abstract with title, authors and speaker to Robert L. Ory and Harold P. Dupuy, Southern Regional Research Lab., P.O. Box 19687, New Orleans, La. 70179. ■

and eight (sucrose) ester groups were not hydrolyzed.

RAPID ACTIVATION AND INACTIVATION OF FATTY ACID SYNTHESIS FROM GLUCOSE IN VIVO. N. Baker and R.J. Huebotter (Research, Vet. Admin. Hosp. (Wadsworth), Los Angeles, Cal. 90073). *J. Lipid Res.* 13, 329–37 (1972). The flux of glucose carbon to total body fatty acids was measured in unanesthetized mice either after fasting or 50–80 min after they nibbled a small test meal containing 120 mg of glucose (fasted-refed). Flux was calculated from plasma (^{14}C)glucose specific activity curves and from total body ^{14}C-labeled fatty acid 30 min after intravenous injection of tracer (^{14}C)glucose. Mobilization of liver glycogen, changes in the body glucose pool size, and total flux of carbon through the glucose pool during periods of fasting and refeeding were defined. Liver glycogen was almost completely depleted 8 hr after food removal. Body glucose pool size fell during fasting and increased after refeeding the test meal. Irreversible disposal rate of glucose C varied directly with body glucose pool size; but flux of glucose C into fatty acids increased exponentially as body glucose concentration increased. Within an hour after nibbling a small test meal, the flux of glucose C into total body fatty acids increased 700% in mice previously starved for 24 hr. However, flux of glucose C into fatty acids in postabsorptive mice (food removed for 2 hr; livers rich in glycogen) was only about 2% of the value calculated from published studies in which the incorporation of an intubated (^{14}C)glucose load into total body fatty acid was measured in mice. A possible explanation for this phenomenon is presented.

ISOLATION AND IDENTIFICATION OF AN ALKYLDIACYLGLYCEROL CONTAINING ISOVALERIC ACID. M.L. Blank, K. Kasama and F. Snyder (Med. Div., Oak Ridge Assoc. Univ., Oak Ridge, Tenn. 37830) *J. Lipid Res.* 13, 390–5 (1972). We have isolated and identified a unique subclass of alkyldiacylglycerols from the pink portion of the harderian gland of the New Zealand white rabbit. Using chemical, enzymic, chromatographic and physical procedures, the lipid class has been identified as 1-alkyldiacylglycerol containing 1 mole of isovaleric acid. More than 50% of the 0-alkyl moieties consist of 16:0 and 18:0 carbon chains, whereas the other major 0-alkyl moieties are 15:0 and 17:0 branched chains ($\simeq$30%). The long-chain acyl groups of the alkyldiacylglycerol subclass consist primarily of saturated fatty acids (60% 16:0 and 30% 18:0) and a small amount of branched-chain fatty acids ($\simeq$5%), whereas the 3-position appears to be occupied by isovaleric acid.

OXALATE-SILICA GEL THIN-LAYER SYSTEM FOR FREE 2-HYDROXY FATTY ACIDS AND FOR FATTY ACYL COENZYME A. M.D. Ullman and N.S. Radin (Mental Health Res. Inst., Univ. of Michigan, Ann Arbor, Mich. 48104). *J. Lipid Res.* 13, 422–3 (1972). The 2-hydroxy fatty acids tend to yield streaks in thin-layer chromatography on silica gel plates. If potassium oxalate is included with binder-free silica gel, good spots are obtained. Similar difficulties are found in paper chromatography of the fatty acid derivatives of coenzyme A, especially with long-chain acids. The same thin-layer systems gives good spots with these compounds.

RAPID ASSAY FOR HORMONE-SENSITIVE LIPASE ACTIVITY OF ADIPOSE TISSUE. H. Tornqvist, L. Krabisch and P. Belfrage (Div. of Physiolog. Chem., Chem. Center, Univ. Lund, Lund, Sweden). *J. Lipid Res.* 13, 424–6 (1972). A highly specific and rapid assay for hormone-sensitive lipase activity of rat adipose tissue is described. The method employs emulsified 2,3-di-O-oleyl-oleoyl-9,10-^{3}H$_2$ glycerol as a substrate; it is very sensitive and is suitable for serial sampling.

DETERMINATION OF UNIDIRECTIONAL UPTAKE RATES FOR LIPIDS ACROSS THE INTESTINAL BRUSH BORDER. V.L. Sallee, F.A. Wilson and J.M. Dietschy (Gastrointestinal-Liver Unit, Dept. Internal Med., Univ. of Texas Southwestern Med. School at Dallas, Dallas, Tx. 75235). *J. Lipid Res.* 13, 184–92 (1972). An in vitro method is presented which measures valid, unidirectional uptake rates for lipids across the intestinal brush border. This method combines analysis by a newly devised, double isotope counting system for solubilized tissue with the use of a nonabsorbable marker to correct gross uptake determinations for contamination by adherent mucosal fluid. Of seven markers, only [^{3}H]insulin measured adherent mucosal fluid volumes as much as 20% greater than the other markers. Diffusion of the nonabsorable marker, as well as of the compound being studied, into the unstirred layer made the time course of uptake critically important. The time lag for diffusion of marker invalidates the use of 1-min incubation periods; however, a linear time course of uptake that intercepts essentially at zero was found for taurocholate and octanoate for periods of from 2 to 5 min. Working within this critical time period with jejunum, it was shown that tissue dry weight was an appropriate measure of the amount of tissue and that uptake rates for taurocholic, octanoic and lauric acids were linear with respect to concentration. Tissue binding of compounds was not significant. The results demonstrate that careful use of the described method yields accurate measurement of unidirectional uptake rates of lipids across the brush border that are of critical importance in defining the characteristics of membrane penetration and the rate-limiting steps in fat and sterol absorption.

ORIGIN OF HEPATIC TRIGLYCERIDE FATTY ACIDS: QUANTITATIVE ESTIMATION OF THE RELATIVE CONTRIBUTIONS OF LINOLEIC ACID BY DIET AND ADIPOSE TISSUE IN NORMAL AND ETHANOL-FED RATS. C.L. Mendenhall (Hepatic Res. Lab. and Dept. Med. and Biochem., Indiana Univ. School of Med., and Veterans Admin. Hosp., Indianapolis, Ind. 46202). *J. Lipid Res.* 13, 177–83 (1972). The present study demonstrates that the rat liver obtains most of its triglyceride fatty acids from dietary sources. The dietary and adipose tissue contributions of linoleic acid for hepatic triglyceride esterification were shown to be 50.42 and 13.85 μmoles, respectively, during a 4-day period. When ethanol provides 40% of the caloric intake, fatty liver developed and hepatic triglyceride content increased threefold. Under these conditions, the dietary and adipose tissue contributions of linoleic acid were estimated at 192.85 and 10.73 μmoles, respectively. This increase in dietary fatty acid utilization was sufficient to account for the entire increase in esterified hepatic linoleic acid. Any explanation of these observations must include the high dietary fatty acid utilization in both control and ethanol-treated animals. One possibility is that most dietary lipids first enter a rapidly turning over pool in adipose tissue from which most hepatic triglyceride fatty acids are derived. Another is that dietary fatty acids, incorporated into chylomicrons, are stored separately and used preferentially by the liver as compared with lipids derived from adipose tissue and bound to albumin. The pros and cons of these possibilities are discussed.

CHARACTERIZATION OF GLYCEROPHOSPHORYLCHOLINE, -ETHANOLAMINE, -SERINE, -INOSITOL AND -GLYCEROL HYDROLYTIC ACTIVITY IN HOUSEFLY LARVAE. G.R. Hildenbrandt and L.L. Bieber (Dept. of Biochem., Michigan State Univ., East Lansing, Mich. 48823). *J. Lipid Res.* 13, 348–55 (1972). Homogenates of *Musca domestica* (housefly) larvae contain glycerophosphodiesterase activity, which is found in the supernatant fluid after centrifugation at 88,000 g. The phosphodiesterase is inhibited by EDTA and is stimulated by Mg^{2+}, Ni^{2+}, Co^{2+} and Mn^{+}. The pH optimum is 7.2. The enzyme is stable to heating at 50C for 15 min and is insensitive to sulfhydryl inhibitors. Glycerophosphoryl diesters of choline, ethanolamine, inositol, serine, glycerol and β-methylcholine are hydrolyzed to the common product, L-α-glycerophosphate, and the appropriate free alcohol. The rate of glycerophosphorylcholine hydrolysis is 70% greater than the rate of hydrolysis of the other glycerophosphodiesters. Apparent K$_m$ values for glycerophosphorylcholine, glycerophosphoryl-ethanolamine and glycerophosphoryl-β-methylcholine are 2–4 $\times$ 10^{-4} M, and for glycerophosphorylinositol, 2 $\times$ 10^{-3} M. Competitive studies using various pairs of substrates, as well as the exchange of free choline into both glycerophosphorylcholine and glycerophosphorylinositol, suggest that a single enzyme cleaves all substrates. Product inhibition and reversal of the reaction were not detected. Choline, but not L-α-glycerophosphate, exchanges into glycerophosphorylcholine and glycerophosphorylinositol.

COMPARISON OF THE TRIGLYCERIDE LIPASE OF LIVER, ADIPOSE TISSUE AND POSTHEPARIN PLASMA. J.C. LaRosa, R.I. Levy, H.G. Windmueller and D.S. Fredrickson (Molecular Disease Branch, Natl. Heart and Lung Inst., Bethesda, Md. 20014). *J. Lipid Res.* 13, 356–63 (1972). Heparin-released triglyceride lipase from three sources, adipose tissue, liver and postheparin plasma, was compared. Heparin-released triglyceride lipase from liver differed in several major respects from that in adipose tissue. These differences included response to inhibitors and to high density lipoprotein in the incubation media. Heparin-released triglyceride lipase from liver, when compared with that from adipose tissue, was relatively inactive against lipoprotein substrates. The triglyceride lipase from postheparin plasma exhibited properties more like those of liver. These studies raise the possibility that triglyceride lipase in postheparin plasma may be heterogeneous, and that levels of the enzyme in postheparin plasma may not accurately reflect the capacity for clearance of triglyceride from the plasma.

HYPERLIPOPROTEINEMIA IN FASTING PONIES. M.D. Morris, D.B. Zilversmit and H.F. Hintz (Grad. School of Nutr. and Sect. of Biochem., and Molecular Biol., Div. of Biol. Sci., and Equine Res. Program, Cornell Univ., Ithaca, N.Y. 14850). *J. Lipid Res.* 13, 383-9 (1972). Ponies fasted for up to 8 days showed, both by agarose electrophoresis and preparative ultracentrifugation, the appearance of a pre-β-migrating, very low density lipoprotein fraction in plasma. This lipoprotein differs from the very low density lipoprotein found in humans and rats in that it contains a relatively smaller amount of total cholesterol, 85% of which is present in the unesterified form. By the 8th day of fasting, plasma triglyceride concentrations had increased from a prefasting level of 20 mg/dl to as high as 1000 mg/dl. The increase in plasma lipid concentrations as a result of fasting was highly variable. Accumulation of plasma cholesterol and triglyceride after injection of Triton WR 1339 was not related to the degree of fasting hyperlipidemia. This suggests that the hyperlipoproteinemia of fasting may result from an impaired utilization of very low density lipoproteins.

ISCHEMIC HEART DISEASE. INSULIN, CARBOHYDRATE AND LIPID INTERRELATIONSHIPS. M.M. Gertler, H.E. Leetma, E. Saluste, J.L. Rosenberger and R.G. Guthrie (Dept. of Cardiovascular Res., Dept. of Rehabilitation Med., N.Y. Univ. Med. Center, New York, N.Y.). *Circulation* 46, 103-11 (1972). This study evaluates interrelationships between carbohydrate and lipid metabolism during oral glucose tolerance tests (GTT) in 65 ischemic heart disease (IHD) males and 69 age-matched healthy controls (age range 45 to 69 years). The frequency of abnormal GTT, usually accompanied by type IV hyperlipoproteinemia, was significantly higher in IHD (37%) than in controls (19%). The mean immunoreactive insulin (IRI) response curve of IHD patients with abnormal GTT showed an elevated and delayed peak at 2 hours. The mean free fatty acid response curve of IHD patients had a significantly lower rebound at 3 hours. IHD patients and controls with abnormal GTT showed significantly higher and lagging lactate levels at 2 and 3 hours. Incidence of abnormal GTT was neither related to relative weight nor to elapsed time from onset of IHD to time of examination. Canonical correlations

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revealed that IRI is the common denominator in both carbohydrate and lipid abnormalities in IHD.

Fat supplemented grain rations for veal production. R.W. Gardner and M.V. Wallentine (Dept. of Animal Sci., Brigham Young Univ., Provo, Utah 84601). *J. Dairy Sci.* 55, 989–94 (1972). Two studies were used to compare growth responses and carcass qualities of 36 Holstein bull calves fed a) whole milk; b) calf starters with 5% animal fat; c) calf starters without supplemental fat; and d) digestible energy (DE) to digestible protein (DP) ratios of 22.9, 24.4, 24.6, 26.1, 28.3, 34.6 and 40.4 kcal DE per gram DP in the calf starters. Average daily gains (kg) and feed efficiency (kg dry matter per kg gain) of milk-fed calves were: 0.77, 1.24 (Study I) and 1.11, 1.38 (Study II). Comparative responses from calf starters containing 5% fat and different DE:DP ratios were: 1.04, 2.27 (ratio 34.6:1); 0.87, 2.60 (ratio 40.4:1) in Study I, and 1.14, 2.47 (ratio 26.1:1); 1.12, 2.39 (ratio 24.6:1) in Study II.

Diethylstilbestrol: observations on its use in Duchenne's muscular dystrophy (DMD). L. Cohen, Juliet Morgan and S. Schulman (Dept. of Med., Univ. of Chicago, Chicago, Ill. 60637). *Proc. Soc. Exp. Biol. Med.* 140, 830–5 (1972). Three boys with Duchenne's muscular dystrophy were treated with diethylstilbestrol for 0.5 to 3 years. The administration of this medication resulted in each instance in a considerable reduction in the serum enzymes, lactate dehydrogenase and creatine phosphokinase, which are characteristically elevated in this disease. The reduction was reversible when DIES was discontinued and reproducible when it was restarted. Tests of muscle function indicated that during administration of DIES there was no deterioration in muscle strength. These findings suggest that diethylstilbestrol may have a beneficial effect on Duchenne's muscular dystrophy, but a long-term, controlled trial will be required to establish this.

Concentration gradient electrophoresis of plasma from patients with hyperbetalipoproteinemia. J.S. Melish and Christine Waterhouse (Dept. Med., Univ. Rochester School of Med. and Dentistry, Rochester, N.Y. 14642). *J. Lipid Res.* 13, 193–200 (1972). A modification of the Pratt and Dangerfield technique of acrylamide gel concentration gradient electrophoresis has been used to study low density lipoproteins from fasting human beings. Prestained plasma from normal subjects and from patients with Fredrickson's type II hyperbetalipoproteinemia was electrophoresed in continuous gradient gel columns (approximately 3.5–8%). Reproducible low density lipoprotein patterns were obtained, and two major bands of low density lipoproteins as well as trace amounts of two to five other low density lipoproteins were seen in normal plasma. Plasmas from patients with hyperbetalipoproteinemia were more heterogeneous. Abnormal plasmas showed as many as six major low density lipoprotein bands and six minor bands. Patterns were constant for an individual but varied between patients. The major bands frequently had obviously different mobilities from those in normal plasma. Extensive experiments, using a large number and variety of mixed plasmas (normal, type II, and others) or plasmas run separately in divided gel columns, led to a numbering system of the low density lipoproteins comprised of 15 discrete bands. In addition to the changes seen in the low density lipoproteins in patients with hyperbetalipoproteinemia, reduced amounts of high density lipoproteins were consistently found.

Metabolism of lipid in the human fatty streak lesion. A.V. Chobanian and F. Manzur (Dept. Med., Boston Univ. School of Med., and Boston City Hosp., Boston, Mass. 02118). *J. Lipid Res.* 13, 201–6 (1972). The composition and synthesis of lipid have been examined in normal intima and adjacent fatty streak lesions of human arterial segments which were incubated with acetate-2-^{14}C. The incorporation of acetate into lipid was greater in fatty streaks than in normal intima. There was increased acetate incorporation into all major lipid groups in the fatty streak, with the greatest relative increase in the cholesteryl ester fraction. The major radiolabeled arterial fatty acid was a long-chain polyenoic fatty acid with chromatographic properties of a C22:4 acid. The content of fatty acid in the fatty streaks differed from that in normal intima, with substantial increases in the C18:1 acid and decreases in C16:0, C18:0 and C18:2 acids of the fatty streak. It is concluded that lipid synthesis is increased in the human fatty streak lesion and that the local metabolism of lipid contributes to its accumulation within the fatty streak.

Glycosphingolipid levels in an unusual neurovisceral storage disease characterized by lactosylceramide galactosyl hydrolase deficiency: lactosylceramidosis. G. Dawson (Dept. of Pediatrics and Biochem., J.P. Kennedy, Jr. Mental Retardation Res. Center, Univ. Chicago, Chicago, Ill. 60637). *J. Lipid Res.* 13, 207–19 (1972). The glycosphingolipid composition of brain and visceral tissue from a patient with an unusual neurovisceral lipid storage disease, characterized by a lactosylceramide galactosyl hydrolase deficiency, was determined. Analyses of erythrocytes, plasma, bone marrow cells, urine sediment and liver biopsy from the patient were compared with those of normal infantile controls. Abnormally high levels of lactosylceramide (GL-2a) were found in these samples. Subsequent studies on spleen, liver, kidney, lymph nodes and adrenal gland confirmed this finding and clearly showed that the metabolism of hematoside (G_{M3}) and glucosylceramide (GL-1a) was also affected. The accumulation of GL-1a and G_{M3} was most pronounced in spleen, but it was not of the order seen in the spleens of patients with Gaucher's disease that were studied for comparison. Since the disease was primarily neurological in nature, fresh-frozen brain was also studied. The level of GL-2a in gray matter was equal to that of galactosylceramide (GL-1b), and elevated amounts of GL-1a, asialo-G_{M2}, G_{M2}, and G_{M3} were also found; the only major abnormality in white matter was the accumulation of GL-2a and lesser amounts of the gangliosides G_{M3}, and G_{M2}. Chemical and enzymic evidence suggests the use of the term "lactosylceramidosis" for this disease.

Exchange of phospholipids between low and high density lipoproteins of squirrel monkeys. D.R. Illingworth and O.W. Portman (Dept. of Primate Nutr., Oregon Reg. Primate Res. Center, Beaverton, Oregon 97005). *J. Lipid Res.* 13, 220–7 (1972). Ultracentrifugal analysis of the plasma of squirrel monkeys at various times after the injection of (Me-^{14}C)choline revealed the specific activities of lecithin in both high (HDL) and low (LDL) density lipoproteins to be similar. This was also true for sphingomyelin. The exchange of phospholipids in vitro was studied by incubating unlabeled plasma with labeled LDL and HDL isolated 40 hr after the injection of (Me-^{14}C)choline. Recentrifugation of plasma immediately after the addition of either ^{14}C-labeled LDL or HDL demonstrated that significant exchanges of both lecithin and sphingomyelin had occurred. In further studies, ^{14}C-labeled LDL or HDL were incubated with plasma and the low density lipoproteins were rapidly isolated by precipitation with heparin-Mn^{2+}. Complete equilibration of lecithin and sphingomyelin between LDL and HDL was attained after 4 and 5 hr, respectively. The fractional exchange rates for lecithin and sphingomyelin of LDL to HDL were 0.60 hr^{-1} and 0.45 hr^{-1}. Corresponding values for HDL to LDL were 0.51 hr^{-1} and 0.53 hr^{-1}. Inhibition of plasma lecithin: cholesterol acyltransferase reduced the exchange of sphingomyelin but had no effect on lecithin exchange. The rates of exchange of four lecithin subfractions of different unsaturation between LDL and HDL were the same.

Preventing and alleviating milk fat depression by feeding 1,3-butanediol to cows. G.S. Hess and J.W. Young (Dept. of Animal Sci., Iowa State Univ., Ames, Ia. 50010). *J. Dairy Sci.* 55, 1097–105 (1972). Two trials determined effects on milk compositions of feeding 5% 1,3-butanediol (BD) diets to lactating cows. The first trial with seven cows tested whether BD would alleviate milk fat depression. The second trial with 12 cows was designed to determine if BD would prevent fat depression. Comparisons were between a preliminary period on a normal diet and an experimental period on a fat-depressing diet with and without BD. In both trials, milk fat percentage and total fat production were higher for the cows fed BD than for the controls but were slightly lower than during the preliminary period when a normal ration was fed. Fat-depression diets increased milk protein percentage compared with the preliminary period in Trial 1, but there was no difference in either trial caused by BD feeding. Cows fed BD maintained milk production at the preliminary period average, but controls declined slightly. 1,3-Butanediol feeding had no consistent effect on rumen pH or rumen volatile fatty acid concentrations. Blood ketone concentrations were higher for the cows fed BD, but BD feeding had little effect on blood glucose. 1,3-Butanediol seems to have strong possibilities as a feed additive to prevent or alleviate milk fat depression in lactating cows.

A possible role for transhydrogenation in side-chain cleavage of cholesterol. P.F. Hall (Russell Grimwade Schl. of Biochem., Univ. of Melbourne, Parkville, Victoria 3052, Australia). *Biochemistry* 11, 2891–97 (1972). Three lines of evidence are presented in favor of a role for transhydrogenation in providing reducing equivalents for the side-chain cleavage of cholesterol by mitochondria from bovine adrenal cortex. Firstly, rotenone, an inhibitor of oxidation of DPNH, stimulates side-chain cleavage whether this is supported by endogenous substrates or by DPN^+-linked substrates (malate and other Krebs cycle intermediates). Secondly, a positive correlation ($r = 0.82$) was observed between levels of mitochondrial $DPNH:DPN^+$ and the rate of side-chain cleavage. Thirdly, DPNH supports side-chain cleavage when this nucleotide is permitted to enter mitochondria by ageing, freezing or addition of Ca^{2+} to cause swelling; this action of DPNH is enhanced by concomitant addition of TPN^+. Evidently DPNH can provide reducing equivalents for side-chain cleavage, although the purified enzyme responds more readily to TPNH by one order of magnitude. Unlike 11β-hydroxylation, side-chain cleavage is stimulated by cyanide whether this reaction is supported by endogenous substrates, by succinate or by malate. Reasons are given for believing that 11β-hydroxylation and side-chain cleavage do not necessarily derive reducing equivalents by the same mechanism. The evidence is believed to support the view that TPNH for side-chain cleavage may be generated from DPNH by transhydrogenation.

Studies on the regulation of plasma cholesterol levels in squirrel monkeys of two genotypes. H.B. Lofland, Jr., T.B. Clarkson, R.W. St. Clair and N.D.M. Lehner (Arteriosclerosis Res. Center, Bowman Gray Schl. of Med., Winston-Salem, N.C. 27103). *J. Lipid Res.* 13, 39–47 (1972). Certain individual squirrel monkeys ("hypo-responders") are able to remain normocholesterolemic when fed diets containing cholesterol (0.5 mg/kcal). Other squirrel monkeys ("hyper-responders") when fed the same diet become hypercholesterolemic. The purpose of these studies was to identify the mechanisms which allow hyporesponders to compensate for dietary cholesterol. Using formula diets and sterol balance techniques, we have compared cholesterol absorption, synthesis, excretion and turnover in hypo- and hyperresponding monkeys. Cholesterol absorption was essentially identical in the two groups (about 55 mg/day). Cholesterol synthesis was likewise similar in the two groups (about 35 mg/day) and there was no evidence of feedback inhibition at the level of cholesterol fed. Hyporesponders had faster turnover rates and smaller body cholesterol pools than did hyperresponders. Excretion of neutral steroids was similar for hypo- and hyperresponders and did not change with cholesterol feeding. In contrast, hyporesponders increased bile acid excretion shortly after cholesterol feeding was begun. Hyperresponders responded more slowly and to a lesser degree. It is concluded that, in this species, the mechanism of control of plasma cholesterol levels is related to the rate of conversion of cholesterol to bile acids.

Fate of intravenously administered particulate and lipoprotein cholesterol in the rat. A. Nilsson and D.B. Zilversmit (Grad. Schl. of Nutr., and Sect. of Biochem. and Molecular Biol., Div. of Biol. Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Lipid Res.* 13, 32–38 (1972). Unesterified radioactive cholesterol, both bound to serum lipoproteins and dispersed in ethanol-saline, was injected into bile fistula and intact rats. Due to phagocytosis, mainly by the liver macrophages, intravenously injected cholesterol in ethanol-saline disappears from the bloodstream significantly faster than lipoprotein-bound cholesterol. Soon after the initial phagocytosis, the particulate isotopic cholesterol started to reappear in blood, reaching a maximal radioactivity in blood 10–24 hr after injection. Although the radioactive cholesterol reappears in serum in both esterified and unesterified form, it is likely that cholesterol is released from the phagocytic cells as unesterified cholesterol which is then esterified intravascularly or at other sites. In the bile fistula rats, somewhat more of the lipoprotein cholesterol than of the particulate cholesterol appeared in bile early after injection. However, cholesterol turnover calculated from a two-pool model was the same for rats injected with lipoprotein-bound or particulate cholesterol.

Biosynthesis and metabolic degradation of sphingolipids not containing sialic acid. P. Morell and P. Braun (S.R. Korey Dept. of Neurology, and the Dept. of Biochem., Albert Einstein College of Med., Bronx, N.Y. 10461). *J. Lipid Res.* 13, 293–310 (1972). Interest in sphingolipid metabolism has increased rapidly during the past decade, and many of the steps involved in the biosynthesis and metabolic degradation of sphingolipids are now known. In this review these studies are critically examined. Emphasis has been placed on the in vitro studies with cell-free systems, since these represent the groundwork for further purification and characterization of the enzyme systems involved. Experimental problems specific to this field of study, and the manner in which these may affect interpretation of experimental results, are discussed.

$\Delta^{8(9),22}$-Ergostadiene-3β-ol, an ergosterol precursor accumulated in wild-type and mutants of yeast. L.W. Parks, F.T. Bond, E.D. Thompson and P.R. Starr (Dept. of Microbiol., Oregon State Univ., Corvallis, Or. 97331). *J. Lipid Res.* 13, 311–6 (1972). Whereas wild-type strains of *Saccharomyces cerevisiae* can synthesize up to 7% dry weight of ergosterol, a polyene-resistant mutant has been obtained which produces no ergosterol. Instead, a C-28 methyl sterol is produced, and it has been identified as $\Delta^{8(9),22}$-ergostadiene-3β-ol. This sterol is converted to ergosterol by wild-type yeasts and is observed transiently in cells during aerobic adaption of anaerobically grown wild-type yeasts. The new sterol is proposed as an intermediate in ergosterol biosynthesis.

Interrelationship between rat serum very low density and high density lipoproteins. B. Rubenstein and D. Rubinstein (Dept. of Biochem., McGill Univ., Montreal, Quebec). *J. Lipid Res.* 13, 317–24 (1972). An exchange of phospholipids and certain peptides among various classes of rat serum lipoproteins has been demonstrated and its nature has been investigated. (^{32}P)-Phospholipid from isolated VLDL, prepared in vivo, was transferred to HDL, and to a much lesser extent to LDL, in vivo and in vitro. This difference between HDL and LDL can be abolished by ultracentrifugation of the serum at d 1.21. Unlabeled VLDL acquired (^{32}P)-phospholipid from HDL of serum. Phospholipid associated with the α-lipoprotein component of VLDL exchanged more readily than that associated with the β-lipoprotein component of VLDL. Generally the phospholipid species exchange in proportion to their distribution in the lipoproteins. Radioactivity from ^{3}H-labeled protein of VLDL was transferred to HDL while HDL ^{3}H-labeled protein in serum was transferred to VLDL during a 20-min incubation. LDL was not involved in the transfer of protein. Protein associated with the α-lipoprotein component of VLDL exchanged more readily than that associated with β-lipoprotein component. Analysis of tritiated apoproteins of VLDL and HDL by polyacrylamide gel electrophoresis revealed that three of the six peptide bands of apo-VLDL exchanged between VLDL and HDL. The data raise the possibility that intact subunits of the VLDL and HDL are being exchanged.

Effect of photoperiodicity on the circulating levels of estrogens, corticosterone, calcium and free fatty acids in female domestic turkeys (Meleagris gallopavo). D.P. Bajpayee and K.I. Brown (Dept. Poultry Sci., Ohio Agr. Res. and Dev. Center, Wooster, Ohio 44691). *Poultry Sci.* 51, 1157–63 (1972). One hundred and twenty-eight turkey hens reared in a restricted light regime were distributed in eight pens (16 birds/pen) and then lighted for production (14L, 10D) at thirty weeks of age. Blood concentration of estrogens (estrone, estradiol-17B and estriol), corticosterone, calcium and total free fatty acids were determined in birds on Day 0 and on Day 3, 6, 9, 12, 15, 18 and 21 of the extended light regime. In the period of 21 days before start of lay, there was a highly significant ($P < 0.01$) increase in estrone, corticosterone, calcium and free fatty acids. In the same period, however, blood concentration of estriol showed a highly significant ($P < 0.01$) decrease. The ratio of estrone:estradiol-17B:estriol changed from 1.0:2.3:3.4 at Day 0 to that of 1.0:0.6:0.4 on Day 21. A highly significant ($P < 0.01$) positive correlation was found between estrone and estradiol-

17B (r = 0.33); estrone and calcium (r = 0.40); estrone and plasma free fatty ocid (r = 0.40) and calcium and plasma free fatty acids (r = 0.45). 'Correlation between corticosterone and free fatty acids (r = 0.20) was also significant ($P < 0.05$).

THE ROLE OF CYTOCHROME P-450 IN CHOLESTEROL BIOGENESIS AND CATABOLISM. Sandra D. Atkin, Eileen D. Palmer, P.D. English, B. Morgan, M.A. Cawthorne and J. Green (Beecham Res. Labs., Nutr. Res. Centre, Walton Oaks, Tadworth, Surrey, U.K.). *Biochem. J.* 128, 237–42 (1972). Adjuvant-induced arthritis in rats is accompanied by a loss of activity of the drug-metabolizing enzyme system and a decrease in hepatic cytochrome P-450. Arthritic rats have normal serum and liver cholesterol concentrations. The rate of biogenesis of cholesterol in vivo and in vitro from either [^{14}C]acetate or [^{14}C]mevalonate in arthritic rats was the same as or greater than that found in control rats. Treatment of rats with carbon disulphide (1 ml/kg) resulted in a loss of drug-metabolizing-enzyme activity and increased cholesterol biogenesis. The activity of cholesterol 7α-hydroxylase in adjuvant-induced arthritic rats did not differ significantly from that in control rats. Rats fed with cholestyramine had an elevated hepatic cholesterol 7α-hydroxylase activity, but neither the concentration of cytochrome P-450 nor the activity of the drug-hydroxylating enzyme, aminopyrine demethylase, was affected. The relationships between drug hydroxylation and cholesterol metabolism are discussed.

BINDING OF IRON AND COPPER TO BOVINE HEART MITOCHONDRIA. III. ROLE OF MITOCHONDRIAL PHOSPHOLIPIDS AND THIOLS. A.I. Cederbaum and W.W. Wainio (Dept. of Biochem., Rutgers College, Rutgers—State Univ. of N.J., New Brunswick, N.J. 08903). *J. Biol. Chem.* 247, 4615–20 (1972). Extraction of phospholipids with 10% H_2O-90% acetone did not affect Cu^{2+} binding by bovine heart mitochondria when the external concentration of added Cu^{2+} was 0.5 to 1 mM. At 2.5 mM Cu^{2+}, there was a decrease in Cu^{2+} binding upon removal of the phospholipids. Readdition of phospholipids restored Cu^{2+} binding. Local anesthetics which interact with phospholipids had an inhibitory affect on Cu^{2+} binding only at high Cu^{2+} concentrations. Therefore, Cu^{2+} binding does not apparently involve phospholipids except at high Cu^{2+} concentrations. Disulfide-generating agents, external thiols and *p*-chloromercuribenzoate inhibited Cu^{2+} binding. A $Cu^{2+} + e^- \leftrightarrows Cu^+$ transformation probably occurs during Cu^{2+} binding. It is concluded that copper may be bound to the same proteins that bind Zn^{2+}. Fe^{3+} binding was not affected by the removal of the phospholipids nor by the presence of the local anesthetic procaine-HCl. Mitochondrial thiols did not seem to be involved in the binding to intact mitochondria. Fe^{3+} and copper appear to bind to different loci on mitochondrial proteins. Maximal binding of Fe^{2+} required the presence of cardiolipin in the mitochondria. Removal of phosphatidylcholine and phosphatidylethanolamine with 10% H_2O-90% acetone, or interaction of phospholipids with local anesthetics caused an increase in Fe^{2+} binding. Thiols were shown to play a role in Fe^{2+} binding.

FETAL RAT LUNG DEVELOPMENT: LIPIDS AND SURFACE TENSION PROPERTIES AFTER DECAPITATION IN UTERO. W.R. Blackburn, D.M. Potter, H. Travers, L.L. Gassenheimer and R.A. Rhoades (Dept. of Pathol. and Lab. for Human Performance Res. and Center for Air Environment Studies, Penn. State Univ., Hershey, Pa. 17033). *Proc. Soc. Exp. Biol. Med.* 140, 885–9 (1972). Decapitation in utero produces hormonal deficiencies which do not influence lung organogenesis but retards pneumocyte differentiation at the organelle and molecular levels. Such lungs contain decreased quantities of phospholipid and functionally are impaired in their ability to reduce surface tension to normal levels. The mechanisms by which these alterations are produced are most likely related to hormonal deficiencies during fetal development. These deficiencies may specifically alter lung phospholipid metabolism. Retardation of phospholipid metabolism may, however, be secondary to a more generalized retardation of pneumocyte differentiation. We favor the latter hypothesis in so far as pituitary failure occurring in man and animals with fully mature lungs does not lead to clinical respiratory distress. Further inquiry into the manner in which hormones influence lung metabolism will require evaluation of the effect of specific hormonal replacements on in utero decapitated or hypophysectomized fetuses and on lung explants differentiating in vitro.

A COMPARISON OF MAGNESIUM DEFICIENCY, COLD ACCLIMATION AND THYROXINE ADMINISTRATION ON MITOCHONDRIAL FATTY ACID COMPOSITION. W.S. Platner, B.C. Patnayak and R.R.J. Chaffee (Dept. of Physiol., Univ. of Mo., Schl. of Med., Columbia, Mo. 65201). *Proc. Soc. Exp. Biol. Med.* 140, 857–61 (1972). A study was made to compare the effects of dietary magnesium deficiency, cold acclimation and thyroxine administration on liver mitochondrial fatty acid composition. Groups of singly caged rats were fed synthetic diets containing either a control level (61 mg%) or a low level (4 mg%) of magnesium, and of these some were kept in the cold (5 ± 2C) and others at normal colony room temperature (23 ± 2C). A selected number of these rats were made hyperthyroid by ip injection of 2 mg/100 g body weight of L-thyroxine sodium daily for 8 days before sacrifice. The fatty acid composition of the mitochondrial lipids was determined by gas chromatography. Cold acclimation alone significantly decreased the percentages of palmitic and arachidonic acids and increased the percentages of myristoleic, stearic, and linoleic acids. Thyroxine treatment increased the percentage of stearic acid and decreased linoleic and arachidonic acids. Magnesium deficiency, on the other hand, had little effect on the major components of the mitochondrial fatty acids and no effect on the total unsaturated fatty acids. It is concluded that mitochondrial swelling and uncoupling produced by magnesium deficiency does not seem to be related to changes in the total unsaturation of mitochondrial fatty acids.

EFFECTS OF THIAMINE DEFICIENCY AND OCTANOATE ADMINISTRATION, IN VIVO, ON GLUCONEOGENESIS IN RAT KIDNEY SLICES AND ON AMINO ACID PROFILE IN RAT LIVER. R.J. Paquet, C.R. Mackerer and M.A. Mehlman (Dept. of Biochem., Univ. of Nebraska, College of Med., Omaha, Neb. 68105). *Proc. Soc. Exp. Biol. Med.* 140, 934–6 (1972). The effects of a single dose of octanoate (3.7 mmoles/kg, ip) on gluconeogenesis in kidney slices and on amino acid profile in liver were determined in thiamine-deficient and pair-fed control rats. Kidney slices from the deficient rats produced glucose, from lactate or pyruvate, at greatly reduced rates. Octanoate, in vivo, increased the rates of glucose synthesis in slices from both control and deficient rats. Thiamine deficiency caused increased levels of threonine and decreased levels of aspartate but glutamate, glutamine, serine, glycine and alanine were unchanged. Octanoate administration, in vivo, to both control and diabetic rats, reduced the concentrations of all liver amino acids, except glycine. It was concluded that thiamine-deficiency inhibited gluconeogenesis indirectly, possibly via a primary lesion at pyruvate dehydrogenase, but that the inhibition could be circumvented by providing a fatty acid (e.g. octanoate).

OBSERVATIONS ON HYPERVITAMINOSIS *A* AND HYDROPERICARDIUM IN CHICKS. L.W. McCuaig, H.C. Carlson and I. Motzok (Univ. of Guelph, Guelph, Ontario, Canada). *Poultry Sci.* 51, 1206–10 (1972). Male chicks developed severe hydropericardium when fed a 20% tallow diet for the first four weeks of life followed by a tallow-free ration containing 3,250,000

I.U. of vitamin A per kilogram. A small incidence of moderate hydropericardium was found in chicks fed a tallow-free ration for the first four weeks, followed by a 33% tallow diet containing excessive vitamin A. Neither excessive vitamin A nor tallow (20% for the first or 33% for the second four weeks of life) produced the cardiac abnormality, when fed separately. Histopathological studies on the chicks with severe hydropericardium showed various lesions in the myocardium, brain and kidneys. All of these organs were edematous with diffuse cellular degeneration and infiltration with inflammatory cells. The lesions in the cerebellum were characteristic of a vitamin E deficiency.

NA 1-^{14}C STEARATE AND NA 2-^{14}C ACETATE METABOLISM AND MORPHOLOGICAL ANALYSIS OF LATE PREPARTUM BOVINE MAMMARY TISSUE. J.E. Kinsella and C.W. Heald (Dept. of Food Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Dairy Sci.* **55**, 1085–92 (1972). Nonlactating mammary tissue from two cows, approximately 1 to 2 weeks (A) and 2 days (B) prepartum, actively utilized Na 1-^{14}C stearate and Na 2-^{14}C acetate for lipid synthesis. Tissue B incorporated significantly more of the radioactive substrates into triglycerides than tissue A. Tissue B possessed stearyl desaturase which was not detected in tissue A. Tissue B utilized about six times more acetate for fatty acid synthesis than did tissue A, and this was preponderantly acylated into triglycerides. Fatty acid synthetase from tissue B synthesized short chain fatty acids. Microscopic analyses revealed that the alveoli of tissue B were distended, had a low epithelium and abundant lumenal protein and lipid whereas A showed little alveolar distention and a taller epithelium. Tissue B had 30% more lumenal area than A whereas the reverse was true for connective tissue. Epithelial, adipose and vascular tissue areas were similar in both cows. Cellular lipid inclusions were more abundant and larger in B than in A. In some instances secreted lipid had coalesced to form a single droplet filling an alveolar lumen. Protein secretion was evident in B but not as apparent in A. From the biochemical data and fatty acid analyses it was apparent that tissue B synthesized lipids typical of functional secretory tissue whereas A synthesized lipids similar to dedifferentiated or nonfunctional mammary tissue.

EFFECT OF LOCAL ANESTHETICS ON PHOSPHOLIPASES FROM MITOCHONDRIA AND LYSOSOMES. A PROBE INTO THE ROLE OF THE CALCIUM ION IN PHOSPHOLIPID HYDROLYSIS. M. Waite and Patricia Sisson (Dept. of Biochem., Bowman Gray Schl. of Med. of Wake Forest Univ., Winston-Salem, N.C. 27103). *Biochemistry* **11**, 3098–105 (1972). Local anesthetics which contain a tertiary amine have marked effects on solubilized and membrane bound phospholipase A_2 of rat liver mitochondria. The compounds with greatest influence, dibucaine and butacaine, had opposite effects; at 10–50 μM dibucaine stimulated whereas butacaine inhibited. At higher concentrations (200–300 μM) dibucaine inhibited whereas butacaine stimulated which indicates that local anesthetics might have more than one mechanism of action. Studies on the mechanism of inhibition by dibucaine led to the following conclusions. The substrate phosphatidylethanolamine does not bind dibucaine tightly enough to account for the inhibition. The inhibition is uncompetitive, with respect to substrate. The inhibition is greatest during the initial part of the reaction which suggests that the availability of the active site of the enzyme to the 2-acyl ester of phosphatidylethanolamine is reduced.

THE EFFECTS OF HORMONES ON MILK-FAT SYNTHESIS IN MAMMARY EXPLANTS FROM PSEUDOPREGNANT RABBITS. C.R. Strong, Isabel Forsyth and R. Dils (Dept. of Biochem., The Med. Schl., Univ. of Nottingham, Nottingham NG7 2RD, U.K.). *Biochem. J.* **128**, 509–19 (1972). When freshly prepared explants from pseudopregnant-rabbit mammary gland were incubated with sodium [1-^{14}C]acetate plus glucose, they synthesized triglyceride and phospholipid containing long-chain fatty acids. Explants cultured with insulin and corticosterone also synthesized these products. The addition of prolactin to this culture medium increased the rate of fatty acid synthesis up to 40-fold and the explants synthesized predominantly triglyceride enriched with C-8:0 and C-10:0 fatty acids characteristic of rabbit milk. The maximum rates of fatty acid synthesis obtained by explants from pseudopregnant-rabbit mammary gland after culture with insulin, corticosterone and prolactin were similar to those observed with freshly prepared explants from lactating-rabbit mammary gland. The time in culture required to attain these maximum rates varied between animals, and did not appear to be connected with the time required (6–7 days) to synthesize the maximum proportions of C-8:0 and C-10:0 acids. As the pattern of short- and medium-chain milk fatty acids is characteristic for many species, the techniques described to determine the time-course for the development of this pattern can be used to investigate hormonal response.

EFFECT OF ADRENALINE OF ^{32}P INCORPORATION INTO RAT FAT-CELL PHOSPHOLIPIDS. Janet M. Stein and C.N. Hales (Dept. of Biochem., Univ. of Cambridge, Cambridge CB2 1QW, U.K.). *Biochem. J.* **128**, 531–41 (1972). The phospholipid composition of fat-cells prepared from rat epididymal fat-pad was determined. The incorporation of [^{32}P]P$_i$ into the phospholipids of fat-cells incubated in glucose-free medium, and the effect of adrenaline and of α- and β-adrenergic blocking agents, were studied. Incorporation of [^{32}P]P$_i$ into fat-cell phospholipid increased with time; incubation with adrenaline resulted in increased incorporation that was related to the concentration of adrenaline. The pattern of incorporation of [^{32}P]P$_i$ into the individual phospholipids of fat-cells after incubation for 1 h was determined; adrenaline (5.4 μM) resulted in increased incorporation into phosphatidylcholine. Incubation of fat-cells with propranolol (34 μM) and adrenaline (5.4 μM) resulted in abolition of adrenaline-stimulated lipolysis; there was a decrease in the specific radioactivity of phosphatidylcholine and an increase in the specific radioactivity of phosphatidylethanolamine, phosphatidic acid, phosphatidylinositol and cardiolipin compared with cells incubated with adrenaline alone. Incubation of fat-cells with phenoxybenzamine (0.1 mM) and adrenaline (5.4 μM) resulted in stimulation of lipolysis, and in diminished specific radioactivities of phosphatidylcholine, phosphatidic acid, phosphotidylinositol, phosphatidylglycerol and choline plasmalogen compared with cells stimulated with adrenaline alone.

REGULATION OF BLOOD FATTY ACIDS AND GLYCEROL IN LACTATING COWS. K.S. Sidhu and R.S. Emery (Dept. of Dairy Sci., Michigan State Univ., East Lansing, Mich. 48823). *J. Dairy Sci.* **55**, 926–30 (1972). Responses of blood plasma glycerol and free fatty acids (FFA) to 2.5 to 5.0 mg L-norepinephrine (NE) in nine lactating (3 to 5 weeks) and nine nonlactating (3 to 5 weeks prepartum) cows were compared at 0, 15, 30, 45, and 60 min after intravenous injection. Mean control values (μM) for nonlactating and lactating cows were: glycerol, 98 and 118; FFA, 379 and 420. Post NE injection means (μM) for nonlactating and lactating cows were: glycerol, 119 and 120; FFA, 430 and 557. Response to NE was apparently higher ($P \sim 0.12$) for FFA and lower ($P < 0.09$) for glycerol in lactating cows than in nonlactating cows. Average hormone-sensitive lipase activities (micromoles fatty acids released per hour per milligram protein) in adipose tissue homogenates from four nonlactating and five lactating cows were 1.6 and 2.6. Lactation increases plasma FFA and glycerol concentrations by inhibiting reesterification of fatty acids and by increasing the active form of the lipase in adipose tissue.

STUDIES ON THE GLYCOSPHINGOLIPIDS OF NORMAL AND VIRALLY TRANSFORMED 3T3 MOUSE FIBROBLASTS. G. Yogeeswaran, Rose Sheinin, J.R. Wherrett and R.K. Murray (Depts. of Biochem., Med. Biophysics, Med., and Pathology, Univ. of Toronto, Toronto, Ontario, Canada). *J. Biol. Chem.* **247**, 5146–58 (1972). The neutral glycosphingolipids and the gangliosides of normal 3T3 mouse fibroblasts, one polyoma-transformed, and three SV40-transformed clonal isolates have been examined. The normal 3T3 cells contained mono- and di-hexosylceramides and a complex pattern of gangliosides. The carbohydrate and fatty acid compositions of these neutral glycosphingolipids and of the principal gangliosides were determined and partial

ANNOUNCEMENT

The AOCS Governing Board has approved a revision to the price of AOCS Official and Tentative Methods. Effective immediately, a complete set will still cost $50, but a complete set will include all revisions through 1969. The 1970 and 1971 sets will continue to sell for $6 each.

structures for these compounds are proposed. No correlation was detected between the complexity of the glycosphingolipid pattern and the saturation density obtained with the cells studied.

Oxygenation of polyunsaturated fatty acids during prostaglandin biosynthesis by sheep vesicular gland. W.L. Smith and W.E.M. Lands (Dept. of Biol. Chem. Univ. of Mich., Ann Arbor, Mich. 48104). *Biochemistry* 11, 3276–85 (1972). We found that two types of fatty acid dioxygenase activity are present in acetone powder preparations of sheep vesicular gland. One activity (Eg) when stimulated by phenol may be suppressed by the functioning of glutathione peroxidase. Therefore, Eg seems to require hydroperoxide as an obligatory intermediate. The oxygenation of fatty acids catalyzed by freshly prepared homogenates of sheep vesicular gland was also inhibited by glutathione peroxidase in the presence of glutathione. The slower oxygenase activity (E_b) found in untreated vesicular gland acetone powder preparation was not affected by glutathione peroxidase and therefore did not seem to require hydroperoxide in its mechanism of action. E_b activity was inactivated in the presence of both substrates, fatty acid and oxygen, by a process which appeared to be first order with respect of enzyme concentration. Eg was inactivated by a kinetically similar process, and in addition also lost activity at a significant rate in the presence of hydroperoxide alone, apparently by a substrate-independent process. The kinetic formulation of Eg action resembles that for soybean lipoxygenase in being product activated and self-destructive.

The formation of ω-cyclohexyl-fatty acids from shikimate in an acidophilic thermophilic bacillus. A new biosynthetic pathway. M.D. Rosa, A. Gambacorta, L. Minale and J.D. Bu'lock (Laboratorio per la Chimica e Fisica di Molecole id Interesse Biologico, Via Toiano 2, Arco Felice, Napoli, Italy). *Biochem. J.* 128, 751–4 (1972). Labelled acetate, phenylalanine and shikimic acid were fed to *Bacillus acidocaldarius*. A high proportion of the ^{14}C incorporated from acetate and shikimate was recovered in methyl esters from the cell lipids, but such recovery of ^{14}C from phenylalanine was low. Only the ^{14}C from shikimate was selectively incorporated into 11-cyclohexylundecanoate and 13-cyclohexyltridecanoate. Degradation of these cyclohexyl-fatty acids showed that shikimate was incorporated as an intact C_7 unit.

Acetyl coenzyme A carboxylase. III. Further studies on the relation of catalytic activity to polymeric state. J. Moss and M.D. Lane (Dept. of Physiological Chem., Johns Hopkins Univ. Schl. of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 247, 4944–51 (1972). Catalytic activity of the filamentous polymeric form of avian liver aceytl-CoA carboxylase, ($s_{20,w}$ = 45 to 47 S) undergoes first-order decay in assay reaction mixture ($t_{1/2}$ ~ 10 min at 2C), which is rapidly reversed (>10 s) by addition of tricarboxylic acid activator, *i.e.* citrate or isocitrate. Citrate addition results in the rapid restoration of carboxylase activity and an abrupt rise in viscosity, equivalent to the percentage of reactivation.

Serum lipoprotein levels in patients with cancer. Urs E. Nydegger and René E. Butler (Central Lab. of the Swiss Red Cross, Blood Transfusion Service, 3000 Berne 22, Switzerland). *Cancer Res.* 32, 1756–60 (1972). Serum lipoproteins were quantitated in 122 patients with malignant tumors and in 186 normal subjects. The various serum components measured included α_1-lipoproteins, β-lipoproteins, total lipids, phospholipids, triglycerides, cholesterol and esterified fatty acids. α_1-Lipoproteins, phospholipids, and cholesterol were markedly decreased in cancer patients when compared with age- and sex-matched normal subjects. α_1-Lipoproteins were decreased in cancer patients regardless of whether treatment was surgery, irradiation or cytotoxic chemotherapy. Estrogen treatment, however, did cause an elevation of lipoproteins.

• Edible Proteins

Amino acid analysis of soybean meal: interlaboratory study. J.F. Cavins, W.F. Kwolek, G.E. Inglett and J.C. Cowan (Northern Mkt. and Nutr. Res. Div., Agr. Res. Service, USDA, Peoria, Ill. 61604). *J. Assn. Off. Anal. Chems.* 55, 686–91 (1972). Amino acid analysis of soybean meal was studied by 5 laboratories. Between- and within-laboratory variations were significant for most amino acids, whereas variations due to hydrolysis procedure and sample mesh size in the under 30 to under 270 mesh range were significant at the 0.05 level for only 2 amino acids. The relative standard deviation was different for each amino acid with cystine, methionine, and ammonia having the highest values. Normalization of results to 95% nitrogen recovery had only a small effect on statistical analysis of the data. Values from special analytical procedures for cystine did not agree, whereas those for tryptophan agreed very well.

Studies on lipid binding in groundnut protein and Bengalgram flour. E.R. Suresh, M. Kantharaj Urs. and K.R. Kausalya (Central Food Technological Res. Inst., Mysore, India). *J. Food Sci. Technol. India* 8, 131–3 (1971). Free and bound lipids in groundnut protein isolate, edible groundnut flour and Bengalgram flour were estimated quantitatively. For extraction of bound lipids, the solvents used were (a) chloroform-methanol mixture (2:1 by volume), (b) water saturated normal butanol and (c) acetone. Of these chloroform-methanol mixture was found to give the maximum extraction. Increased lipid protein binding was observed in neutral to alkaline pH. The presence of carbohydrate material had no significant effect. Bound lipids lowered the solubility of groundnut protein in 0.5 molar sodium chloride solution.

Cottonseed proteins enter new era. J.V. Ziemba (Food Engineering, 120 S. Riverside Plaza, Chicago, Ill. 60606). *Food Eng.* 44(6), 70–2 (1972). The first commercial-scale plant for food-grade cottonseed protein is under construction. These new products offer exciting potential for texturizing, for use as a stable protein for beverages, etc.

Water soluble antioxidant activity in soybeans. D.E. Pratt (Dept. of Foods and Nutr., Purdue Univ., Lafayette, In. 47907). *J. Food Sci.* **37**, 322–3 (1972). Fresh and dried soybeans possess both prooxidant and antioxidant activity. Upon heat inactivation of lipoxidase the beans possess considerable antioxidant activity. Commercial preparations of soy protein concentrate and defatted soy flour also contained potent antioxidant activity in lipid-aqueous systems. Soy Protein Concentrate and defatted soy flour possessed greater antioxidant activity than either fresh or dried soybeans even when extracted in the same manner.

Rapid improvement in nutritional quality of soybeans by dielectric heating. R. Borchers (Dept. of Biochem. and Nutr., Univ. of Nebr., Lincoln, Ne. 68503) L.D. Manage, S.O. Nelson and L.E Stetson. *J. Food Sci.* **37**, 333–4 (1972). Treatment of raw, air dried whole soybeans in a radiofrequency dielectric heater developed full nutritive value of the soybeans in less than 2 minutes of treatment. The nutritive value was assayed by rat feeding tests. The indices of heat treatment of soybeans showed the usual decrease in protein solubility, inactivation of urease and inactivation of trypsin inhibitor activity. Browning developed during dielectric treatment but to a lesser extent than in steam autoclaving of soybeans.

Lipoprotein particles from the Golgi apparatus of guinea-pig liver. M. Chapman, G. Mills, and C. Taylaur (Courtland Inst. of Biochem., Middlesex Hosp. Medical Schl., London W1P 5PR, U.K.). *Biochem. J.* 128, 779–87 (1972). A cell fraction has been isolated from guinea-pig liver and shown to be rich in Golgi apparatus by electron microscopy. The activity of UDP-D-galactose-N-acetylglucosamine galactosyltransferase was over 100-fold greater in this cell fraction than in the liver homogenate. These data support the conclusion that the fraction was enriched in Golgi apparatus. The Golgi LD particles were rich in phospholipid, containing 48.1% by weight. The chemical composition of these particles was quite distinct from that of the serum LD lipoproteins, but did, however, show some similarity to that of the serum VLD lipoproteins. On the basis of similarities in gross chemical composition and in the antigenic determinant of the Golgi LD and VLD particles, we conclude that the LD particles are probably the precursors of the VLD particles. In view of the marked differences in gross chemical composition of the Golgi LD particles and serum LD lipoproteins, it appears unlikely that the LD particles are directly secreted into the serum pool.

16-Unsaturated C_{19}-3-oxo steroids as metabolic intermediates in boar testis. P.J. Brophy and D.B. Gower (Dept. of Biochem., Guy's Hosp. Med. Schl., London SE1 9RT, U.K.). *Biochem. J.* 128, 945–52 (1972). The formation of the two 16-unsaturated alcohols 5α-androst-16-en-3α-ol and 5α-androst-16-en-3β-ol from [5α′-^3H]5α-androst-16-en-3-one has been demonstrated in boar testis homogenates. The optimum yield (23%) of the 3α-alcohol was obtained in the presence of NADPH, whereas that for the 3β-alcohol (74%) was obtained

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when NADH was the added cofactor. The two alcohols were not interconvertible. Prolonged storage of boar testis tissue at −20C abolished the ability to form all androst-16-enes except adrosta-4,16-dien-3-one from [4-^{14}C] progesterone. The production of 5α-androst-16-en-3-one and the two alcohols from [7α-^{3}H] androsta-4,16-dien-3-one only occurred when fresh tissue was used, whereas reduction of [5α-^{3}H]5α-androst-16-en-3-one was unaffected by storage of testis at −20C. NADPH was the preferred cofactor for the reduction of androsta-4,16-dien-3-one. The previously established conversion of androsta-5,16-dien-3β-ol into androsta-4,16-dien-3-one was shown to be reversible, NADH and NADPH being equally effective cofactors. Pathways of biosynthesis of 5α-androst-16-en-3α and 3β-ols, with the C_{19} 3-oxo steroids as intermediates, are presented.

• Drying Oils and Paints

Composition of dehydrated castor oil alkyds prepared by different routes. N.A. Ghanem, M.A. El-Azmirly and Z.H. Abd El-Latif (Lab. of Polymers and Pigments, Natl. Res. Ctr., Dokki, Cairo, U.A.R.). *J. Oil Colour Chemists' Assoc.* **55**, 227–47 (1972). Drying alkyds were prepared by different routes, including the use of the monoglycerides of castor oil and dehydrated castor oil. The hardest alkyd films were obtained when castor oil was first dehydrated separately. Harder films were also produced when the monoglycerides were prepared initially, either by glycerolysis in case of oil or by partial esterification in case of fatty acids. Alkyds prepared by the fatty acid process were softer than those prepared from the oil. The lower the reaction temperature and the longer the time of heating, the harder were the films. A combination of the turbidimetric data for the polydispersity of the resins and the physico-mechanical data for their heat treated films makes it possible to infer that resins of high polydispersity, free from unreacted and partially reacted small molecules, produce films of generally superior properties.

The glycerolysis step in the production of oil-modified alkyd resins. Part V. Glycerolysis of castor oil and dehydrated castor oil. N.A. Ghanem, M.A. El-Azmirly and Z.H. Abd El-Latif (Lab. of Polymers and Pigments, National Res. Ctr., Dokki, Cairo, UAR). *J. Oil Colour Chemists' Assoc.* **55**, 114–27 (1972). Castor oil and dehydrated castor oil were subjected to glycerolysis under normal pressure in the manner usually employed in alkyd resin production. The reaction proceeded at a higher rate and produced a higher equilibrium content in the order LiOH > CaO > PbO when these compounds were used as catalysts. At the same catalyst concentration and with similar time/temperature schedules, the amount of α-monoglycerides formed was increased when the glycerol: oil ratio was raised from 2:1 to 3:1. Traces of water decrease the rate and extent of monoglyceride formation from castor oil triglycerides.

Mixture of fatty oil and polybutadiene. M. Nagahisa, Y. Kusaka, K. Iino, and Z. Yamamoto (Nippon Soda Co.). *U.S. 3,681,276.* A mixture of natural drying or semi-drying oil and polybutadiene of molecular weight 200–10,000 and with more than 50% of 1,2 configuration of the butadiene unit in its polymeric chain gives a coating having excellent properties when treated by a boiling treatment, a bodying treatment and an addition treatment. At least two of these three treatments must be used. The boiling treatment is performed by contacting the oil with air or oxygen at 60–150C; the bodying operation is performed by a thermal treatment at 100–300C in an inert atmosphere; and the addition or esterification operation is performed by reacting with mono or polycarboxylic compounds, their anhydrides, or cycloaliphatic dienes in an inert atmosphere.

Water soak expansion of free paint films. D.M. Gans (Coatings Res. Group, Inc.). *J. Paint Technol.* **44**(572), 97–100 (1972). When free films of oil-based and latex-based paints swell on immersion in water, they generally do so asymmetrically. The least expansion occurs in the direction of application of the film. Linear swellings of up to 30% are common. Examples are presented of expansions and subsequent recoveries on drying. An explanation of the phenomenon is offered.

Investigation of possible reaction between benzoic acid and soya fatty acid during alkyd preparation. J.T. Geoghegan (Arizona Chem. Co.) and W.E. Bamerick (American Cyanamid Co.). *J. Paint Technol.* **44**(572), 84–86 (1972). A previously proposed coupling reaction between benzoic and soya fatty acids during alkyd preparation was found not to occur. Fatty acid isolated from a benzoic acid modified alkyd did not contain any detectable amount of carboxylphenyl substituted oleic or stearic acids; these acids would have been formed had the coupling occurred. It was also found that the soya fatty acid did not polymerize to any significant extent during the alkyd preparation.

• Detergents

Fatty acid monoesters of polyvalent alcohols. T. Kunzmann. *Seifen-Ole-Fette-Wachse,* **98**(18/1), 563–5 (1972). Various fatty acid esters of glycol and glycerine are frequently used as cosmetic emulsifiers. Their properties and constants are cited. Also discussed are esters of sorbitol and saccharose.

Dishwashing compositions. F.W. Gray (Colgate-Palmolive). *U.S. 3,696,041.* A cleaning composition particularly adapted for washing dishes, glasses and silverware in mechanical devices is claimed. The composition is capable of inhibiting overglaze attack because it contains as an essential ingredient aluminum chlorhydroxide.

Ternary foam control systems and detergents containing them. J.T. Inamorato (Colgate-Palmolive). *U.S. 3,696,056.* A detergent composition having excellent foam control at low and high temperatures is disclosed, as well as a ternary composition for accomplishing this result when added to the detergent system. The controlled suds are provided by a synergistic mixture of a fatty acid, a polyethoxylated linear alcohol and a higher molecular weight amide or a primary, secondary or tertiary amine.

Anti-foaming compositions and cleaning compositions containing them. H.-J. Schussler and R. Scharf (Henkel & Cie). *U.S. 3,696,057.* There is claimed a synergistic anti-foaming composition consisting of a mixture of (a) a reaction product of ethylenediamine with ethylene oxide and propylene oxide in any sequence and (b) fatty alcohols of 12–18 carbon atoms and their water-insoluble reaction products with ethylene oxide. Aqueous cleaning compositions containing 0.1–1 g/l of the anti-foaming compositions are also claimed.

Detergent active materials. V.N. Malhotra (Lever Bros.). *U.S. 3,696,143.* The inorganic salt content of alkane sulfonates, alcohol sulfates and olefin sulfonates can be reduced by treating the detergent active material with a mixture of water and isopropanol and/or isobutanol with the conversion of bisulfite ions to sulfite ions. The treatment is performed under reflux at a temperature between boiling and 20C below boiling. A proportion of the inorganic material precipitates and is separated from the liquor which contains the active material.

1,3,5-trihydroxy-2,4,6-benzene tricarboxylic acid and its water soluble salts. D.S. Connor and H.K. Krummel (Procter & Gamble). *U.S. 3,699,159.* These compounds are useful sequestering agents.

Detergent compositions. W.G. Spangler and H.D. Cross III. *U.S. 3,700,401.* A built detergent for heavy duty washing of clothing in the presence of added hypochlorite is claimed. The composition contains an organic detergent, a builder salt, a small amount of sodium bromide or other alkali metal bromide and an enzyme.

Composition for mechanically cleaning hard surfaces. W.G. Mizuno, J.L. Copeland and A.E. Scholze (Economics Laboratory, Inc.). *U.S. 3,700,599.* Detergent compositions for mechanically cleaning hard surfaces (e.g., dishes) contain a mixture of sodium citrate and water soluble polymeric, organic polyelectrolyte (e.g., hydrolyzed maleic anhydride polymers). This mixture permits the reduction or elimination of condensed phosphate salts commonly used in detergent compositions of this type.

Preparation of perborate containing washing compositions. H. Nagel, M. Berg, A. Lohr and W. Adler (Henkel & Cie). *U.S. 3,700,600.* The pulverulent to granular compositions comprise 5–40% of surface active compounds, 7.5–50% of a perborate, 15–80% of builder salts, 0–10% of nonactive compounds such as neutral inorganic compounds and water and 0–10% of other customary additives for washing compositions.

Color-stable liquid detergent containing disinfectants. H. Bloching (Henkel & Cie). *U.S. 3,700,601.* The detergent comprises 5–40% of a surfactant, 0.1–5% of a substituted diphenyl ether, 0.01–5% of a water soluble reducing agent and 0.001–2% of an optical brightener. The optical brightening action is not impaired by the presence of the substituted diphenyl ether disinfectant.

Detergent compositions containing N-oxide-aminocarboxylates. B. Sundby, E.J. Kenney and H.E. Wixon (Colgate-Palmolive). *U.S. 3,700,607.* The aminocarboxylate may comprise 3–30% of the composition. In some cases, it may be used without inorganic builder salts in which cases it functions primarily as a softening agent.

Dynamical aspects of solubilization disclosed by analysing ESR spectra of solubilized radicals. T. Nakagawa and H. Jizomoto (Research Lab., Shionogi & Co., Ltd., Osaka (Japan). *Koll.-Z. u. Z. Polymere,* **250**, 594–601 (1972). A stable radical t-butyl-(1,1-dimethylpentyl)-nitroxide was synthesized and solubilized to saturation into a series of sodium dodecyl sulfate (SDS) solutions of increasing concentration. Any solution whose concentration was below the critical micelle concentration (CMC) showed an ESR spectrum composed of a triplet signal, each branch of which formed a narrow Lorentzian curve. Above the CMC, the signal shape varied with the change of concentration in a complicated manner, and finally merged into a broader Lorentzian singlet at an extremely high concentration. The spectral change was interpreted in terms of the incessant exchange of radical molecules between the micelles and the bulk water phase surrounding micelles. The average stay-time of a radical molecule in a micelle and the mole fraction of micellar radical were determined by comparing experimental spectra with computer-generated theoretical spectra. As expected, the mole fraction of micellar radical increased monotonically with an increase in SDS concentration. The fact that a definite stay-time ($3.3 \cdot 10^{-6}$ sec) was obtained at all concentrations exceeding the CMC suggests that an increase in surfactant concentration causes the number of micelles to increase without a notable change in micelle structures.

On the gelling of sodium metasilicate solutions. H.K. Henisch and R.R. Neurgonakar (Materials Res. Lab., Pennsylvania State U.). *Koll.-Z. u. Z. Polymere* **250**, 617–9 (1972). Experiments are described which suggest strongly that the gelling of sodium metasilicate solutions is dependent on foreign trace additives. Gelling can be inhibited by their removal, achieved by a simple process which has been called "gel gettering."

The membrane potentials of sodium dodecyl sulfate solutions at 25C. K. Shirahama (Dept. of Chem., Saga U. (Japan). *Koll.-Z. u. Z. Polymere* **250**, 620–1 (1972). The concentration potentials of sodium dodecyl sulfate solutions produced by an anion- as well as cation-exchange membranes were measured and the results interpreted in the light of the current theory of micellar solution.

Polarographic determination of surfactants in water and waste water as well as the determination of their degradation. K. Linhart (Bayer AG Leverkusen, Farbenforschung). *Tenside* 9(5), 241–59 (1972). A method for determining surfactants in water, effluent and other aqueous media was developed. A combined method was used for this purpose which, according to results obtained so far, is applicable to all surface active substances. An important finding was that in a 0.001 molar solution of KCl, it is not the molar but the percentage content by weight of surface active substance which is proportional to oxygen damping. This applies equally to anionic, cationic and non-ionic surfactants up to ethoxylation degrees of about 90 mol, as well as to polyethylene glycols from 400 mol upwards. The calibrating substances chosen were dodecyl dimethylbenzyl ammonium chloride, sodium dodecylbenzene sulfonate, i-nonylphenol-20 ethylene oxide and polyethylene glycol 1500 mol, the determination following a linear course from 0 to 100 mg/liter if the correct ratio of base electrolyte to specimen is adhered to.

Decomposable starch derivatives in washing agents. A. Böck (München) and H. Stache (Marl). *Tenside* 9(5), 279–282 (1972). Tests carried out on a carboxymethylated starch with a degree of substitution of 0.1 showed no disadvantages compared with ordinary carboxymethyl cellulose when used on cotton. Interesting results were obtained when using cotton/synthetic fiber fabrics as well as 100% synthetic fiber fabrics. In contrast to carboxymethyl cellulose, carboxymethylated starch is biologically attacked.

Adsorption kinetics of surface active substances. G. Kretzschmar (Deutsche Academie der Wissenschaften zu Berlin, Zentralinst. fur Organische Chemie, Bereich Grenzflaschenaktive Stoffe, 1199 Berlin-Adlershof DDR). *Tenside* 9(5), 267–271 (1972). The rate of adsorption of pure ethoxylated fatty alcohols and of sodium-n-dodecyl sulfate at the water/air interface is determined from the dynamic electrical surface potential. The diffusion stream of the surfactant towards the interface results in time dependent area coverages whose calculation and comparison with an adsorption theory leads to the result of increasing deviation from a diffusion kinetic as the adsorption period becomes shorter. This behavior is most marked in the case of the ethylene oxide products. Micelle formation additionally has a limiting influence on the adsorption rate.

Phosphorus-free cleaning formulations. R.D. Katstra (Continental Oil Co.). *Defensive Publication T903,009* (October 3, 1972). Phosphorus-free cleaning formulations containing only surface active materials are claimed. The surface active materials used include a major proportion of a nonionic surfactant and a lesser amount of an alkyl aryl sulfonate salt.

Phosphorus-free cleaning formulations. R.D. Katstra (Continental Oil Co.). *Defensive Publication T903,010* (October 3, 1972). There is claimed a liquid, phosphorus-free cleaning formulation comprising a nonionic surface active agent in combination with an alkali cleaning compound or in combination with an amino polycarboxylic acid salt as a sequestering agent. Alternatively, a high level (40–70%) of the nonionic surfactant in an aqueous alcohol diluent may be employed without the inclusion of detergency builder compounds, sequestering agents or hydrotropes.

Bleaching and washing composition. L.L. Maddox (Clorox Co.). *U.S. 3,697,217.* A solid bleaching mixture of a peroxygen compound such as sodium perborate tetrahydrate and an alkalinity booster such as sodium carbonate removes stains from household laundry when the mixture is added to the wash water in amounts which provide 50–150 ppm available oxygen and a pH of 10–12. A surfactant, an anti-deposition agent and a sequestering agent for softening water increase the effectiveness of the composition.

Wash cycle softener. B. Sundby and H.E. Wixon (Colgate-Palmolive). *U.S. 3,697,423.* An N-2-hydroxy higher alkyl amine is included with the detergent for the washing and softening of fabrics.

Stable enzyme-containing liquid detergent. M.L. Mausner and A. Wiesenfeld (Witco Chem. Corp.). *U.S. 3,697,451.* Stable, liquid, concentrated detergent compositions contain 0.001–5% of active proteolytic, amylolytic or lipolytic enzyme, or mixtures of these, and 88% or more of a polyfunctional, stable liquid detergent. The detergent is composed of a combination of (1) an ethanolamine salt of alkylbenzene and/or alkyl toluene sulfonic acid, (2) an ethoxylated or propoxylated ether of an aliphatic alcohol and/or an alkyl phenol, and (3) a fatty acid alkanolamide.

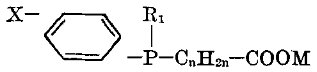
Shampoo. F.W. Olson, Jr. and K.H. Roberts (Colgate-Palmolive) *U.S. 3,697,452.* A conditioning shampoo suitable for cleaning hair which has previously been treated with hair-spray is disclosed. The shampoo, which has a pH of 8.8–9.6 comprises an aqueous mixture of (a) a higher alkyl amine oxide surfactant, (b) a water soluble, foaming amphoteric surfactant, and (c) a higher alkyl quaternary ammonium salt surfactant. The total weight of the surfactants is 12–30% of the shampoo.

Iminodisuccinic acid salts as detergent builders. B.E. Tate and R.G. Berg (Pfizer, Inc.). *U.S. 3,697,453.* The water soluble salts of iminodisuccinic acid are used as detergent builders in cleansing and laundering compositions with an organic, water soluble detergent surfactant.

Phosphate-free detergent additives. M. Danzik and R. House (Chevron Res. Co.). *U.S. 3,697,573.* Detergent active materials capable of heavy duty washing performance in the absence of phosphate builders are provided. The materials comprise alkylphenol sulfate-sulfonate compounds in which the alkyl groups are linear with 16–24 carbon atoms.

Textile softening agents impregnated into absorbent materials. D.R. Morton (Procter & Gamble). *U.S. 3,686,025.* Softening agents can be impregnated into absorbent materials, especially paper and non-woven cloth. Such compositions are useful and effective for softening textile fabrics in a standard, automatic, clothes dryer, as well as in an automatic washer.

Alkali metal soaps from phosphine oxides. H.M. Priestley (Lever Bros.). *U.S. 3,697,587.* A group of novel alkali metal and ammonium soaps formed from intermediate phosphine oxides is disclosed. The group has the following generic formula:



wherein R_1 is an acyclic aliphatic hydrocarbon radical having 8–18 carbon atoms, n is an integer from 0–2, X is a member of the group consisting of H and alkyl having 1–14 carbon atoms, and M is a water-solubilizing cation.

Emulsifier system for substitute dairy products. P.F. Ingerson (Avoset Food Corp.). *U.S. 3,695,889.* There is claimed an emulsifier system for use in non-whipping type substitute food and dairy products which contain a higher ratio of polyunsaturated fats to saturates. The system comprises in combination polysorbate 60, propylene glycol monostearate, and a fatty acid lactylate alkali metal salt.

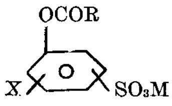
Novel detergent composition. I. Weil (Lever Bros.). *U.S. 3,686,098.* A phosphate-free detergent composition is described. The composition is built with a water-soluble salt of Ca, Mg, Sr, Ba or Al and is based on a dianionic detergent compound.

Detergent. N.A. Gerchenova and others. *U.S. 3,686,099.* A method for cleaning cargo tanks of sea tankers from the remains of oil products, fats and the like is described. The detergent used consists of 65–75% of an alkylsulfonate, 20–30% of an alkylbenzenesulfonate, and 3–7% of a polyethylene glycol ether of di-*tert*-butylphenol. The detergent is preferably used as a 0.05–0.2% solution of sea water at a temperature of 60–80C.

Carboxymethylated derivatives of di- and trisaccharide compounds and detergent compositions containing them. W.I. Lyness and J.E. Thompson (Procter & Gamble). *U.S. 3,686,124.* Carboxymethylated derivatives of disaccharide compounds such as sucrose and lactose and trisaccharide compounds such as raffinose are provided. These compounds are useful as sequestering agents, e.g., water softeners, and also as detergency builders in detergent compositions.

Bleaching and softening agent. A. Smeets (Citrex, S.A.). *U.S. 3,686,126.* The agent is in the form of a homogeneous liquid comprising an aqueous solution containing sodium tripolyphosphate, hydrogen peroxide, an organic sequestering agent, and water.

Detergent bleach. J. Boldingh, L. Heslinga, E. Schmidl and R. Syrovataka (Lever Bros.). *U.S. 3,686,127.* Compounds of the formula



where X is C_{6-17} alkyl or acyl; R is H or C_{1-7} alkyl; M is alkali metal, ammonium, or substituted ammonium. The compounds undergo perhydrolysis with aqueous hydrogen peroxide to give percarboxylic acids which are good low-temperature bleaching agents. The compounds also have detergent properties.

Washing, bleaching, and cleansing agents containing poly-(N-tricarballylic acid)-alkyleneimines. A. Werdehausen and P. Krings (Henkel & Cie). *U.S. 3,686,128.* A washing, bleaching, and cleansing agent having a content of 50–99.9% of customary components and 0.1–50% of salts of poly-(N-alkylcarboxylic acid)-alkyleneimines having an average molecular weight of 430–500,000 is described. Certain proportions of the alkyleneimine groups have specific configurations.

Granulation process. R. Natali and G. Giombini (Colgate-Palmolive). *U.S. 3,687,853.* A granular product containing enzyme, a water-soluble, hydratable builder salt, such as sodium tripolyphosphate, and a water-soluble nonionic surface active agent, is described. It is made by a process comprising granulating the enzyme in particulate form and the builder salt in particulate form with an aqueous solution of the surface active agent. The water is present in an amount sufficient to hydrate the builder salt.

Detergent compositions. T.M. Muzyczko, S. Shore, and J.A. Loboda (Richardson Co.). *U.S. 3,687,870.* The compositions contain arylsulfonamidoamines and/or their salts, such as the hydroxyethyl chloride salt of N-dodecylbenzenesulfonamidopropyl-N,N-dimethylamine. These compounds exhibit properties of cationic detergents and are compatible with alkylaryl sulfonates and other anionic detergents.

Detergent compositions. V. Lamberti, M.D. Konort and I. Weil (Lever Bros.). *U.S. 3,692,685.* The compositions contain a water soluble organic detergent and a builder consisting of the normal alkali metal, ammonium, or alkanol amine salts of carboxymethyloxysuccinic acid.

Method of laundering fabrics. J.K. Stamm, E.R. Loder, C.A. Brungs and H. Kerst (Chemed Corp.). *U.S. 3,692,704.* A method is described for improving the brightness of fabrics. It comprises forming a solution of a built detergent in water having a hardness of 0–5 grains per gallon, and then laundering the fabrics in it. The builder contains 50% of a mixture of 30% sodium polyacrylate having a weight average molecular weight of 100,000 and 20% of poly(N,N-dicarboxymethyl acrylamide) having a weight average molecular weight of 50,000.

Detergent compositions. E.W. Thompson and M.C. Marshall (Imperial Chemical Industries, Ltd.). *U.S. 3,691,081.* A detergent composition primarily used as an industrial surfactant, comprises a liquid biodegradable mixture or blend of an ethoxylated detergent range alcohol and an ethoxylated plasticizer range alcohol. The ethoxylates are derived from the hydroformylation of mixed olefins.

Low-foaming rinsing, washing, and cleaning compositions. H.-J. Stimberg, J. Galinke, and E. Schmadel. *U.S. 3,691,082.* The compositions comprise 90–99.9% of at least one compound having a cleaning or complexing action and 10–0.1% of a foam-inhibiting isocyanurate.

Novel detergent compositions. N.Z. Erdy (Stauffer Chem. Co.). *U.S. 3,691,106.* The compositions comprise a mixture of one or more surfactants with a unique builder. The builder comprises a cross-linked, water-insoluble copolymer of at least one C_2-C_3 olefin and at least one polycarboxyl vinyl monomer. The cross-linked, water-insoluble copolymer is a water-swellable, gel-forming material.

Novel detergent compositions. N.Z. Erdy (Stauffer Chem. Co.). *U.S. 3,691,107.* In this disclosure, a C_4-C_{10} olefin is used to form the cross-linked, water-insoluble copolymer.

Combinations of detergents with controlled foaming properties. M. Berg, W. Fries, and A. Kirstahler (Henkel & Cie). *U.S. 3,676,340.* There is disclosed a combination of anionic and/or non-ionic surface-active compounds together with a foam inhibitor which is active above 60C.

Textile softening compositions. J.F. Gerecht and H.E. Wixon (Colgate-Palmolive). *U.S. 3,676,341.* The compositions simultaneously clean and soften textiles without yellowing. They contain effective amounts of an alkylated polyethyleneimine polymer. The ratio of detergent to polymer ranges from 20:1 to 1:5, and preferably 10:1 to 2:1.

Synthesis of novel guanidino fatty acid esters. S. Fujii. *U.S. 3,652,651.* The esters are formed by reacting an amino fatty acid ester of the formula: $H_2N(CH_2)_nCOOR$, where n and R are defined as above, with S-methyl thiourea or cyanamide.

Hydrogenated olefin sulfonate detergent bars. W.A. Sweeney and G.L. Woo (Chevron Res. Co.). *U.S. 3,652,662.* The bars are prepared from a solution of a complex mixture of hydrogenated olefin sulfonates containing 10–24 carbon atoms by cooling the solution to 0–35C and then filtering the solution to recover the precipitate.

Surface cleaning and defatting composition. H. Augustin, S. Klussendorf and K. Kofer (Lever Bros.). *U.S. 3,663,445.* Liquid storable concentrates comprise a nonionic surfactant, an alkanolamine salt of a fatty acid and an alkanolamine. The concentrates are diluted with water and are especially useful for metal surfaces.

Detergent compositions with controlled foaming capacity. H. Barth, W. Griess, M. Knausenberger, H.-U. Menz and A. Segredos (Lever Bros.). *U.S. 3,663,446.* Foaming at low washing temperatures is obtained without overfoaming at higher temperatures. The thermo-controller is a substance of the general formula: HR_1–R–R_2COOZ where R represents a 6-carbon ring with one or more double bonds, R_1 and R_2 are hydrocarbon chains. Z is a hydrogen atom or a salt-forming element or a salt-forming group.

Detergent compositions. S.C. Paviak (Gulf Res. & Dev. Co.). *U.S. 3,676,373.* The compositions comprise as a builder a water soluble salt of a copolymer consisting of ethyl benzene and succinic acid groups in a 1:1 ratio and having a molecular weight of at least 3000 and, optionally, a polyphosphate.

Enzyme-containing liquid detergent compositions. W.N. Zaki and D.G.J. Biard (Procter & Gamble). *U.S. 3,676,374.* The compositions comprise a mixture of 2–35% of an alkane sulfonate, alpha-olefin sulfonate, or mixtures thereof: 2–30% of an ethoxylated alcohol or alkyl phenol or sulfate thereof; and 0.001–5% of enzyme. The compositions retain the enzyme activity upon storage and exhibit desirable levels of soil-removal performance.

Soap bars having marble-like decoration. C.B. Patterson (Purex Corp.). *U.S. 3,676,538.* A method is disclosed for producing a marble-like appearance in a soap bar in which a saponaceous dye solution having color contrast with the soap is injected through a screw end opening in a plodder screw. The dye is distributed throughout the soap mass in a manner producing contrasting color streaks which are subdued at their boundaries for indistinct mergence with the extruded mass.

Washing polymers. H.S. Akrongold and R. Akrongold. *U.S. 3,654,167.* A hydrophylic gel of a polymeric fatty acid polyamide and a diethanolamide of a normal or branched chain fatty acid for use as a detergent and in detergent-type soaps is described.

Detergent composition containing amorphous sodium silicate. C.J. Gaiser. *U.S. 3,654,168.* The silicate has a burr-like particle structure which provides a highly colloidal dispersion in water for effective soil suspension. A water-softening chelating agent and a surfactant to loosen soil from fabric are included.

Emulsifier composition. J.T. Foley (Witco Chem. Co.). *U.S. 3,654,177.* The compositions comprise admixtures of (a) an imidazoline or oxazoline salt of a long chain fatty acid and (b) a salt of a long chain aliphatic amido amine and a long chain aliphatic carboxylic acid. The emulsifier compositions are particularly effective for preparing water-in-oil emulsions which exhibit excellent heat stability and metal coating properties for corrosion inhibition.

Bleaching and detergent compositions. F.W. Gray (Colgate-Palmolive). *U.S. 3,655,567.* The compositions contain a water-soluble peroxide and a water-soluble imide, e.g., N-m-chlorobenzoylsuccinimide and N-m-chlorobenzoyl-5,5-dimethylhydantoin.

Adsorption parameters for two bilar salts at the oil/water interface. J.F. Baret, A.G. Bois and G. Benzonana (Lab. of Physics of Liquids and the Inst. of Biol. Chem., Faculty of Science, Marseille, France). *Koll.-Z. u. Z. Polymere* 250, 352–5 (1972). The biological importance of bilar salts is linked to their interfacial behavior. Studied were the static and kinetic parameters of the adsorption process of these salts at water/oil interfaces. Obtained were molecular cumbersomeness areas and adsorption enthalpies. Experiments were by means of the pendent-drop tensiometer.

Micellar behavior in solutions of bile-acid salts. V. Solubilization of p-xylene and n-decanol. K. Fontell (Swedish Inst. for Surface Chem., Stockholm, Sweden). *Koll.-Z. u. Z. Polymere* 250, 333–43 (1972). The solubilities of p-xylene and n-decanol were determined in solutions of bile-acid salts at 20 and 40C. The study of the solubilization of xylene bears out the concept of a step-wise association process in aqueous solutions of sodium cholate, desoxycholate and dehydrocholate. The solubilization of decanol began at the same bile-acid salt concentrations as the xylene solubilization but the subsequent stages in the solubilization process did not coincide with those for xylene. In systems of bile-acid salt, decanol and water there was a continuous region of clear, optically isotropic and thermodynamically stable solutions extending from pure water to pure decanol. Values for the micellar size in aqueous solutions based upon solubilization data were in agreement with those obtained independently by other methods.

Association of soaps. V. Synthesis and polymerization of soaps of N-methacrylol-11-alkylamino-undecane acid types. U. Kammer and H.-G. Elias (Tech.-Chem. Labs., Allied Tech. Inst., Zurich, Switzerland). *Koll.-Z. u. Z. Polymere* 250, 344–51 (1972). Compounds of the type $CH_2 = C(CH_3)-CO-N(R)-(CH_2)_{10}-CO-X$ with R = methyl, ethyl, propyl or isopropyl and X = OH, ONa and $(OCH_2CH_2)_xOCH_3$ have been synthesized. Their critical micelle concentrations (CMC) were determined either by the Benzopurpurin 4B method or by measurements of the electrical conductivity. The CMC's are independent of the nature of the substituent R for a given X. Association numbers N and equilibrium constants $^{n}K_{1,N}$ of association have been determined by light scattering or equilibrium ultracentrifugation. A linear relationship has been found between log $^{n}K_{1,N}$ and N at 40C for X = ONa or X = $(OCH_2CH_2)_xOCH_3$ and different Rs. The compounds could be polymerized in dilute water or xylene solutions. High initiator concentrations were however necessary for the polymerization in bulk. No clear-cut results have been obtained from electron microscopic pictures of micelles polymerized in dilute water solutions above the CMC.

Enzyme-containing detergent composition. W.N. Zaki, J.M.L. Coulomb and P. Lovgren. *U.S. 3,655,568.* The composition has improved physical and stability characteristics and is comprised of a water-soluble inorganic alkali metal salt, ester, or C_{1-2} alkyl- or alkylolamide of a copolymer of maleic anhydride and a vinyl compound of the formula RCH—HCR. One R represents a hydrogen atom while the other R represents a C_{1-4} alkyl ether radical or a hydrogen atom.

Detergent compositions containing a sequestrant. M. Hellsten and J. Emanuelsson (Mo Och Domsjo Aktiebolag, Ornskoldsvik, Sweden). *U.S. 3,655,569.* The compositions are formulated with a sequestrant for use in hard water and optionally a bleaching agent. They also contain a corrosion inhibitor which lessens the tendency of the compositions to attack copper, zinc, and aluminum.

Detergent containing alkali protease. M. Isono, K. Tomodo, K. Miyata, K. Maejima and K. Tsubaki (Takeda Chem. Ind., Ltd.). *U.S. 3,655,570.* Alkaline protease is produced by cultivating a microorganism from the genus *Fusarium* or *Giberella* in a proper medium and recovering the enzyme from the medium. . The alkaline protease degrades protein under conditions of high pH and is useful in the formulation of detergents.

Oil and water-base lubricant. D.W. Sawyer (Aluminum Co. of America). *U.S. 3,657,126.* Use of glycol, tallow and tall oil esters in a mineral oil base which can be emulsified is disclosed. Following emulsification, the water-base lubricant can be used in metal drawing and ironing operations.

Soap production. C.W. Fransen and D.M. van Kampen (Lever Bros.). *U.S. 3,657,146.* A process for direct production of a soap of water content not in excess of 25% for household and toilet uses is disclosed. The process involves saponification at 120–180C under 2–10 atmospheres pressure of a natural or synthetic fatty acid using an aqueous alkali solution of controlled water content.

Oligomeric optical brightening compounds. G.E. Booth (Procter and Gamble). *U.S. 3,657,231.* The compounds, of molecular weight in the range of 200–24,000, contain 2–24 fluorescent moieties separated by inorganic or organic chemical linkages derived from the condensation reaction. They are prepared by a reaction between a difunctional fluorescent compound and a difunctional linking compound. The optical brighteners are useful in admixture with detergent compositions.

Detergent compositions. H.-W. Eckert and A. Heins (Henkel & Cie). *U.S. 3,654,166.* The compositions comprise from 20 to 90% of an anionic, zwitterionic, or nonionic surfactant and from 10 to 80% of an N-alkyl-N-acyl-N-polyhydroxyalkyl compound as a fabric softener.

Cationic emulsifier system. J.M. Clumpner. *U.S. 3,658,718.* There is disclosed an emulsifier system suitable for forming a stable oil and water emulsion which contains mixtures of difatty ethoxylated quaternized amidoamines in which the fatty acid residues are derived from soya and cocount oils.

Enzyme-containing detergent compositions for neutral washing. R.C. Mast (Procter and Gamble). *U.S. 3,658,727.* The detergents are especially adapted to use under conditions of neutral pH. The composition consists of a detergent with at least 0.05% water solubility at 80–130F and resistance to precipitation in hard water; 0.001–5% of a proteolytic enzyme which is active up to 130F in the pH range of 6–8.5; and a phosphorus-containing compound having sufficient calcium sequestration properties to reduce the calcium ion concentration from 1.2×10^{-3} M to 1.7×10^{-4} M when used in an amount up to 0.1% of the solution. The compositions have a pH of 6–8.5 in aqueous solution at a concentration of 0.12%.

Transparent soaps. H. Goldschmeidt. *Soap/Cosmetics/Chemical Specialties* 48(6), 36–8 (1972). A brief discussion of formulation and processing of these soaps is presented. Representative formulas are given for soaps based on neutral oils and for soaps containing a high percentage of rosin. Formulas for three perfumes which may be used in transparent soaps are also given.

Consumption of laundry powders and toilet soaps in some European countries. Anon. *Rev. Franc. Corps Gras* 19, 247–8 (1972). Bar graphs illustrate consumption levels of toilet soaps and both synthetic and soap-based laundry powders in each of the years 1965–1970 for eleven European countries. The data were provided by the A.I.S. (International Association of Soap and Detergent Manufacturers).

Relationships between chemical structure and surface activity. M. Vanlerberghe (Societe L'Oreal, Aulnay-sous Bois). *Rev. Franc. Corps Gras* 19, 215–23 (1972). Qualitative and quantitative aspects of surface activity are examined. The influence of different functional groups on surface activity is discussed in detail. Prediction of properties based on functional groups aids in development of new products.

Fabric softening. J. Rudy (Lever Bros.). *U.S. 3,681,241.* A high concentration fabric softening emulsion is obtained by combining a quaternary ammonium fabric softener and an amidoimidazolinium sulfate fabric softener, the latter being derived from C_{14}-C_{18} fatty acids containing at least 80% saturated C_{16} and C_{18} acids. Low temperature stability is provided by the addition of an amidoimidazolinium sulfate derived from C_{14}-C_{18} fatty acids containing at least 10% oleic acid.

Secondary alkyl sulfate detergent process. H.S. Bloch, G.E. Illingworth and G.W. Lester (Universal Oil Products Co.). *U.S. 3,681,424.* Secondary alkyl sulfates are prepared by sulfating a C_9-C_{18} compound such as a monohalogenated paraffin, monohydroxyalcohol, or mono-olefin in admixture with a C_9-C_{18} linear paraffin and neutralizing the acid alkylsulfate in admixture with the same paraffin to form a colorless *sec*-alkylsulfate. This process is particularly adaptable where a C_9-C_{18} *n*-paraffin stream is partially converted to a sulfatable compound and the unreacted *n*-paraffin is not readily separable from the resultant compound. Thus, the sulfation and neutralization are performed in admixture with the unreacted *n*-paraffin whereby the paraffin is readily separated from the neutralization product and recycled.

Alkylaromatic sulfonate detergent process. H.S. Bloch, G.E. Illingworth, and G.W. Lester (Universal Oil Products Co.). *U.S. 3,681,442.* Alkylaromatic sulfonates, containing a C_9-C_{18} linear alkyl group, are prepared by sulfonating the corresponding alkylbenzene in admixture with a C_9-C_{18} n-paraffin and neutralizing the resultant alkylbenzene sulfonic acid, in admixture with the same paraffin, to produce a colorless ABS. The process is similar to that described in *U.S. 3,681,424.*

Retardation of the formation of color-forming bodies in alkylaryl sulfonic acids. A. Benson and M. Mausner (Witco Chemical Corp.). *U.S. 3,681,443.* Alkylaryl sulfonic acids, e.g., C_9-C_{15} alkyl benzene sulfonic acids, containing small proportions of α,β-unsaturated carboxylic acids, such as maleic anhydride, which function to inhibit formation of color-forming bodies during processing, aging and/or heating are disclosed. The sulfonation of the alkylaryl hydrocarbons is carried out with SO_3, particularly in a liquid SO_2 medium. The α,β-unsaturated carboxylaic acids are advantageously added after the completion of the sulfonation reaction.

Production of low silica content, dry granular automatic dishwashing detergent. R.S. Cooper and D.C. Wood (De Soto, Inc.). *U.S. 3,682,829.* The dry, granular detergent is produced by slowly spraying an aqueous alkali metal silicate solution of relatively high silica content onto agitated particles of anhydrous granular alkali metal tripolyphosphate to provide a dry powder having a silica content of 8.5–10%. The particles have a core of alkali metal tripolyphosphate with a coating of the silicate. From 0.5 to 3% of a chlorinated isocyanurate is added to provide active chlorine in a stable composition.

Alcohol ethoxylates. G. Smith, W.M. Sawyer, Jr., and R.C. Morris (Shell Oil Co.). *U.S. 3,682,849.* Certain mixtures of ethylene oxide derivatives of primary alcohols of 11–15 carbon atoms, substantially free from alcohol and lower ethoxylates, are surfactants exhibiting superior physical properties.

Method of preparing alkylbenzenes. M. Ghirga and L. Di Fiore. *U.S. 3,683,043.* In the production of linear alkylbenzenes by continuous alkylation of benzene with chloroparaffins C_9-C_{13} in the presence of aluminum trichloride, the spent catalytic complex is added to aluminum trichloride to provide a total amount of 30–35% bound and unbound $AlCl_3$ therein, and is activated by adding thereto a specific amount of hydrogen chloride and heating for one hour at 30–60C. The complex activated in this manner is used as catalyst in the alkylation stage. Odorless, high-grade linear alkylbenzenes are obtained.

Thickened alkali metal hypochlorite bleaching and cleaning composition. B.N. Hynan, J.L. Wilby, and J.R. Young (Lever Bros.). *U.S. 3,684,722.* Aqueous alkali metal hypochlorite solutions incorporating mixtures of C_8-C_{18} alkali metal soaps and hydrotropes, generally amine oxides and betaines, and thereby having increased viscosities, are disclosed. The thickened solutions possess enhanced cleansing and disinfecting properties. The perfuming of these thickened solutions is also disclosed.

Detergent composition. P. Best and O.F. Schweigl (Lever Bros.). *U.S. 3,684,723.* A low-foaming detergent composition containing an anionic detergent, a builder salt and either a C_8-C_{25} fatty acid soap, a foam depressant nonionic detergent, or a mixture of the soap and the nonionic detergent is improved by the addition of 0.5–10% of certain diethers of polyalkylene oxide diols which have a high temperature foam depressant action. The composition can also contain a perborate bleach.

Process for making mixtures of sodium polyphosphates and sodium sulfate. J.N. Dyer, L.B. Post, and H.J. Rosen (Stauffer Chemical Co.). *U.S. 3,684,724.* Mixtures of sodium sulfate and sodium polyphosphates are prepared in low bulk density, high relatively non-frangible, granular forms by spray drying an aqueous solution of monosodium/disodium orthophosphate and sodium sulfate, hydrating the product to a LOI of between 10 and 50%, and intermolecularly dehydrating the hydrated product in a fluidized converter at a temperature of 200–500C to provide the desired product. The product is useful as a detergent builder.

Optical brightening compositions. B. Kissling and H. Pummer. *U.S. 3,684,728.* The preparations consist of an anionic optical brightener and a water soluble polyamide amine or a polyether amine in the weight ratio of 1:0.1 to 1:15.

Low-foaming surface active compositions. W.L. Groves, Jr. and R.L. Huddleston. *U.S. 3,684,736.* The surface active agent is produced by combining an anionic surfactant, viz., an anionic ammonium ether sulfate compound, with a cationic surfactant, viz., dodecylbenzyltrimethylammonium chloride, to form an electroneutral complex of low solubility in water, and preferably utilized as an aqueous suspension containing less than 1% of the complex.

Skin protective washing and cleansing compositions. E. Gotte and R. Heyden (Henkel & Cie). *U.S. 3,649,544.* The compositions contain anionic surface active agents and a skin-protective polyamine derivative. The polyamine derivative is in a form selected from the group consisting of water dispersible polyamine derivatives and water-soluble acid addition salts of them. It is the reaction product of 1 mole of a bis-halohydrinether and from 1–2 moles of a polyalkyleneamine.

Synthetic detergent in masses and manufacturing methods. R. Suzuki, H. Hoshi, and J. Saito (Raion Yushi Kabushiki Kaisha). *U.S. 3,649,545.* Synthetic detergents in solid masses and in hollow masses are described. They are made by first preparing a slurry of synthetic detergent containing a relatively large amount of sodium silicate with or without a foaming agent, placing the slurry in a mold or on a tray, and then drying the slurry. This method of drying does not rely on spray-drying, which requires large, expensive equipment, and the resulting product has many advantages over powdered or granular detergents.

Mixed sugar alcohol esters of higher and lower saturated fatty acids. M. Ota and S. Yoshikawa (Okamura Oil Mill, Ltd.). *U.S. 3,649,647.* An ester of sugar alcohol having 5–6 carbon atoms with 1–3 moles of a higher saturated fatty acid having 14–18 carbon atoms and at least 1 mole of a lower saturated fatty acid having 2–4 carbon atoms is disclosed. The ester has a melting point of 30–40C.

Washing, bleaching, and cleansing agents containing poly-(N-acetic acid)-ethyleneimines. A. Werdehausen and M. Dohr (Henkel & Cie). *U.S. 3,650,693.* The polyethyleneimine is selected from the group consisting of (1) linear poly-(N-acetic acid)-polyethyleneimines of the formula:
$HOOC\,CH_2NH(CH_2)_2{-}(N(CH_2COOH)\,CH_2CH_2)_n{-}NHCH_2COOH$
where *n* is an integer from 3 to 50, and (2) their alkali metal, ammonium, and organic ammonium salts.

Low foam anionic acid sanitizer compositions. R.M. Sedliar, D.F. Garvin and O.T. Aepli (BASF Wyandotte). *U.S. 3,650,694.* The compositions are prepared from anionic surfactants in an acid medium. The anionics are members of the class of sulfonated oleic acids and their derivatives, alkali metal salts of sulfosuccinic acid esters and alkali metal salts of alkyl sulfates.

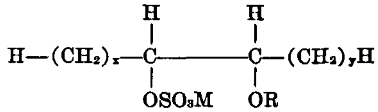
Low foam detergent composition. A. Cantor and M.W. Winicov (West Laboratories, Inc.). *U.S. 3,650,965.* The composition consists of (a) a nonionic surface active component having a cloud point above 45C; (b) one having a cloud point below 35C; (c) an aliphatic monocarboxylic acid or an aliphatic alcohol, containing 8–18 carbon atoms and (d) phosphoric acid (when a monocarboxylic acid is used in part c).

Guanidino fatty acid esters and their production. S. Fujii. *U.S. 3,652,650.* Guanidino fatty acid esters of the formula $HN{=}C(NH_2){-}NH{-}(CH_2)_n{-}COOR$ wherein n is an integer from 3–5 and R is an alkyl, aryl or arylalkyl group in which the aromatic may or may not be substituted are disclosed.

Manufacture of noncaking blends of sodium tripolyphosphate hexahydrate and sodium nitrilotriacetate monohydrate or dihydrate. G. Heymer, H. Landgraber and K. Merkenich (Knapsack Aktiengesellschaft). *U.S. 3,639,289.* The sodium tripolyphosphate is used in the form of its high- and/or low-temperature modifications, and a fine mist of an aqueous sodium nitrilotriacetate solution at 0–80C is sprayed onto it. When an excess of water is used, a gas and/or air stream is simultaneously passed over the sprayed material to evaporate the excess water,

Combined cleaning and antisoiling compositions. C. Fearnley and T.I. Jones (Geigy). *U.S. 3,639,290.* The compositions contain a stabilizing aqueous non-film-forming dispersion of homo- or copolymer of styrene and a detergent mixture consisting of sulfate type detergent and foam stabilizing agent. The compositions not only clean fibers but also leave them with an antisoil finish.

Surfactant composition and liquid detergent formulations. E.A. Casey and J.M. Huggins (Monsanto). *U.S. 3,639,291.* The surfactant compositions comprise 25–75% of alkyl vicinal alkyl ether sulfates having the formula:



$$H{-}(CH_2)_x{-}\underset{OSO_3M}{\overset{H}{C}}{-}\underset{OR}{\overset{H}{C}}{-}(CH_2)_yH$$

where x and y are integers from 0 to 15, the sum of x + y is from 13 to 15, R is an alkyl group containing 1–8 carbon atoms, and M is an alkali metal or ammonium. An improved liquid detergent is produced using this compound in conjunction with a linear ABS.

Detergent. M.R.R. Gobert. *U.S. 3,640,877.* The detergent preparation contains a system of glucose and glucose oxidase or starch, amyloglucosidase, and glucose oxidase as precursor of hydrogen peroxide. It also contains hydroxylamine which stabilizes the hydrogen peroxide formed during use of the detergent.

Alkaline detergent composition. W. Chirash and R.L. Burke (Colgate-Palmolive). *U.S. 3,640,878.* A dishwashing detergent containing sodium silicate, pentasodium tripolyphosphate and sodium fluorosilicate is disclosed. The latter compound acts to protect the overglaze patterns of fine china.

Attenuated total reflectance studies of the skin. N.A. Puttnam (Colgate Palmolive Ltd. Manchester, M5 3FS). *J. Soc. Cosmet. Chem.* 23, 209–226 (1972). Three aspects of the application of infrared spectroscopy via the attenuated total reflectance technic to study human skin in situ have been considered. It has been shown that with a 45° Irtran II crystal, satisfactory spectra can be obtained of skin in situ and the uptake of dodecylbenzene sulfonate from weak solutions by skin has been studied. The effect of an alcohol ether sulfate and a hand cream on this uptake has been investigated together with the ease of removal of the absorbed sulfonate by washing with soap and water. The reproducibility of the technic to study "normal" skin for one individual has been established as better than 5% for those absorptions which are not influenced by moisture and/or hydrogen bonding. Preliminary studies of a small number of individuals are also described and it has been shown that differences between individuals, particularly of different ages, can be detected; these differences possibly being due to differences in the physiochemical structure of the skin.

Changes in interfacial tension with temperature and their effects on particle size and stability of emulsions. T. Mitusi, S. Nakamure, F. Haruswa and U. Nachide (Shiseido Laboratory, Yokahama, Japan). *Koll.-Z. u. Z. Polymere* **250**, 227–230 (1972). Changes in interfacial tension of an oil-water-nonionic surfactant system with temperature were investigated using liquid paraffin and squalene as oils and commercial polyoxyethylene oleyl ether and polyoxyethylene stearyl ether as surfactants. The surfactants were found to behave differently depending upon the number of moles of ethylene oxide (EO) contained therein; with 10-molecule ethoxylate as a boundary, a surfactant with a smaller number of moles of EO caused an increase in the interfacial tension as the temperature rose while a surfactant with a larger number of moles of EO caused a decrease. The 10-molecule ethoxylate caused substantially no changes in the interfacial tension with temperature. This phenomenon of no changes in the interfacial tension with temperature was explained by considering a broad distribution of EO in the surfactant. The particle size and stability of the resultant emulsions depended on the changes in the interfacial tension with temperature. In a system containing a surfactant with a smaller number of moles of EO than 10, the particle size decreased and the stability improved as the emulsification temperature fell. When a surfactant with a larger number of moles of EO is used, however, the particle size decreased and the stability improved as the emulsification temperature rose. At the 10-molecule ethoxylate, both the particle size and the stability did not change appreciably with emulsification temperature.

Surface properties of mixed anionic/cationic surfactant solutions. E.H. Lucassen-Reynders (Gayton, Wirral). *Koll.-Z. u. Z. Polymere* 250, 356–9 (1972). Published experimental surface pressures for mixtures of anionic and cationic surfactants are compared to what can be predicted from the surface behavior of the separate constituents. Simple theory correctly predicts, for soluble surfactants, a large increase of surface pressure upon mixing an anionic and a cationic solution having the same surface pressure, and, for insoluble surfactants, a decrease of surface pressure upon mixing at a given area per long chain ion. These effects are due to the different adsorption characteristics of the four electroneutral combinations involved, and will occur even in the absence of specific surface interactions.

Laundry post-treatment agent. A. Heins and H. Bellinger (Henkel & Cie). *U.S. 3,644,204.* The composition is added to the rinse water either as a liquid or a solid and comprises a softening agent with the following formula: $R_1N(Z)COR_2$ alone or in combination with a softening agent with the following formula: $R_1N(CH_2(CHOH)_nCH_2OH)COR_2$ where R_1 is alkyl containing 10 to 22 carbon atoms and may be interrupted by ether oxygen atoms in the vicinity of the N atom, R_2 is alkyl containing 7 to 22 carbon atoms, n is either 3 or 4 and Z is either $-CH_2CHOHCH_2OH$ or $-CH(CH_2OH)_2$.

Process for preparing detergent sulfonates. C.R. Murphy, A. Onopchenko, J.M. Piatt and R. Seekircher (Gulf Res. and Dev. Co.). *U.S. 3,644,499.* A process is disclosed for the stabilization of the pH of sulfonates obtained from the reaction of an olefinic compound with an alkali bisulfite. The process involves contacting an aqueous slurry of the sulfonates containing an alkaline compound with oxygen.

Optical brighteners in detergent and bleach compositions. L.R. Hamilton (Procter and Gamble). *U.S. 3,646,015.* The brighteners are isoindolinyl compounds. They brighten natural and synthetic materials and can be used in laundry detergents and in hypochlorite bleach-containing compositions.

(Continued on page 41A)

Abbreviations. Without period or degree sign, e.g., ml, g, sec, 100 C or 373 K (for others see CBE Style Manual, Third Edition, Am. Institute of Biological Sciences, Washington, D.C., 1972).

Other Items of Form. Metric system wherever feasible; decimals in preference to fractions; per cent symbol (%) only after numbers; characters subject to misinterpretation, e.g., Greek letters, spelled in margin, formal name and E.C. number for enzymes at first mention—trivial name subsequently, if more convenient; commercial products expressed by common name or scientific name (if one exists) followed by trade names in parentheses only if essential; promotional statements concerning commercial products are not accepted.

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• Abstracts. . .

(Continued from page 38A)

HARD SURFACE CLEANER. J.R. Martin (Lever Bros.). *U.S. 3,640,880.* The composition consists of a mixture of two olefin sulfonates of 12 and 20 carbon chain length, respectively. This combination may be used alone or with anionic or nonionic surface active agents.

SULFOSUCCINATE HALF ESTER LIME SOAP DISPERSING AGENTS. W.L. Groves, Jr. (Continental Oil Co.). *U.S. 3,640,882.* The soap bar consists of a water-soluble soap and a lime soap curd dispersant. These latter compounds are sulfosuccinate half esters prepared from ethoxylated alcohols. From 10–50% by weight of dispersant may be used.

FABRIC SOFTENER. V. Lamberti and R.R. Sepulveda (Lever Bros.). *U.S. 3,644,203.* A softener such as a quaternary ammonium compound, or an imidazoline is mixed with an anti-yellowing agent which is a complex of C_{12} to C_{22} alkyl alcohol and C_{12} to C_{19} alkyl sulfate.

TREATING DETERGENT ALKYLATE. H.E. Jacobs (Atlantic Richfield Co.). *U.S. 3,646,238.* A method is disclosed for treating raw detergent alkylate to improve the color and odor characteristics of the ABS produced from the alkylate. The raw alkylate is contacted with activated charcoal and thereafter selectively hydrogenated in such a manner as to avoid hydrogenating the alkyl benzene compounds.

LINEAR ALKYLBENZENE COMPOSITIONS. A.E. Straus (Chevron Res. Co.). *U.S. 3,647,899.* Sulfonated derivatives of novel detergent alkylate compositions exhibiting synergistic detergent characteristics comprise mixtures of secondary C_{11} and C_{15} sulfonated phenyl-*n*-alkanes in a weight ratio of from 1:10 to 4:1, respectively.

COMBINATIONS OF HYDROXYALKYL-N-METHYL TAURINES AND ANIONIC SURFACTANTS AS SYNERGISTIC EMULSIFIERS. A. Cahn, J.A. Ackilli and F.E. Carroll (Lever Bros.). *U.S. 3,649,543.* Emulsifying agents characterized by unusual mildness toward the skin are described. They consist of a synergistic combination of a water soluble taurine salt of the general formula: $R_1\text{–}CH(OH)\text{–}CH_2\text{–}N(CH_3)\text{–}CH_2\text{–}CH_2\text{–}SO_3M$ with a surface active organic sulfate or sulfonate detergent in a weight ratio from 1:3 to 3:1. R_1 is an alkyl or oxyalkyl radical having from 10–18 carbon atoms and M is a water-solubilizing cation.

RESEARCH ON RECIPROCAL ACTING POLYMERS AND SURFACTANTS. 1. POLYVINYLPYRROLIDONES WITH ANIONIC SURFACTANTS. G. Popescu, M. Radu and D. Anghel ("P. Poni-" Inst., Macromolecular Chem. Colloid Div., Bucharest, Rumania). *Koll.-Z. u. Z. Polymere* 250, 303–10 (1972). The viscometric and conductometric behavior of complex solutions of polyvinylpyrrolidone and anionic surfactants of the fatty acid sodium salt type (laurate, palmitate, stearate, oleate) and of the sulfate or sulfonate derivatives type (sodium dodecylsulfate, hexadecylsulfate, Igepon T) were investigated over a wide range of concentrations (0.05–16%) and of temperatures (30–70C). For the various surfactants characteristic curves were obtained, displaying at certain concentrations gradient changes depending on the length of the hydrocarbon chain, on its unsaturation and on the presence of ionizable groups, factors which determine the structure of particles in solutions. The results confirmed the formation of polymer-surfactant complexes of a polyelectrolyte character, where a significant role is played by the hydrophobic character of the surfactant as well as that of the polymer.

DETERGENT FORMULATIONS. M.T. Yang (Ethyl Corp.). *U.S. 3,637,511.* The nonphosphorus detergent builders provided are the water soluble salts of N,N-di(carboxymethyl)-aspartic acid (*e.g.*, the tetrasodium salt). Synthesis of the builders is described.

PROCESS FOR MAKING MONOGLYCERIDES RESISTANT TO THE FORMATION OF FREE FATTY ACIDS. R. Gibson, R.L. Campbell, Jr. and G. Smith (Anderson, Clayton). *U.S. 3,637,773.* Monoglycerides are made by a conventional process. The resistance to the later formation of free fatty acids when the reaction products are solidified is increased by reacting the chloride or sulfate salts of sodium, potassium, or lithium with the reaction products after neutralization of the catalyst and thereafter distilling off the water in the aqueous solution.

PROCESS FOR PREPARATION AND PURIFICATION OF POLYGLYCEROLS AND POLYGLYCEROL ESTERS. V.K. Babayan and H. Lehman. *U.S. 3,637,774.* There is disclosed the process for preparing these compounds, decolorizing and deodorizing them, and for their use in many different industrial and edible applications.

MANUFACTURE OF SPRAY-DRIED DETERGENTS CONTAINING SODIUM TRIPOLYPHOSPHATE. H. Gabler, H. Harnish, G. Heymer, K. Merkenich and W.-D. Pirig (Knapsack Aktiengesellschaft). *U.S. 3,639,287.* The slurry which is spray dried is prepared with sodium tripolyphosphate which is formed at least partially of material with a crystal water content between 17 and 22.7% by weight. ■

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