ABSTRACTS

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

• Fats and Oils

ON THE ANALYSIS OF LONG-CHAIN ALKANE DIOLS AND GLYCEROL ETHERS IN BIOCHEMICAL STUDIES. M.L. Blank, E A. Cress, N. Stephens and F. Snyder (Med. Div., Oak Ridge Associated Univ., Oak Ridge, Tenn. 37830). *J. Lipid Res.* 12, 638–40 (1971). The chromatographic behavior of 1,2-, 1,3-, 1,4-, and 1,12-long-chain alkane diols and 1-0-alkylglycerols and their derivatives has been compared. Thin-layer chromatography on Silica Gel G gives poor separations of the 1,2-, 1,3-, and 1,4-alkane diols, 0-alkylglycerols, and some of their isopropylidene derivatives. However, gas-liquid chromatography on 10% EGSS-X (coated on 100–120 mesh Gas-Chrom P) resolves the isopropylidenes of the alkane diols and 0-alkylglycerols. We also document the formation of 1,3-alkane diols (after $LiAlH_4$ reduction) from 1-^{14}C-labeled fatty acids incubated with mitochondrial fractions from heart and liver of rats. The labeled 1,3-alkane diol was identified by gas-liquid chromatography of its isopropylidene derivative and by its behavior after periodate oxidation. These results serve to caution investigators in the glycerol ether field against incorrect interpretation of data obtained on the incorporation of labeled fatty acids into alkyl ether bonds of glycerolipids. The methodology described points out a technique for distinguishing several types of alkane diols from 0-alkylglycerols.

MASS SPECTROMETRY OF THE PHOSPHATIDYLCHOLINES: FRAGMENTATION PROCESSES FOR DIOLEOYL AND STEAROYLOLEOYL GLYCERYLPHOSPHORYLCHOLINE. R.A. Klein (Inst. Animal Phys., Agr. Res. Council, Babraham, Cambridge, England). *J. Lipid Res.* 12, 628–34 (1971). Mass spectra for the various phosphatidylcholines, together with accurate mass measurements on the more abundant fragment ions, have been described in a previous paper. No detailed fragmentation sequence was proposed on the evidence available. In the case of dioleoyl glycerylphosphorylcholine, some question arose as to whether certain ions were produced by electron impact or by pyrolysis. In this paper, results are reported which enable a more detailed fragmentation sequence to be proposed. By observing metastable transitions in the first field free region of a double-focusing mass spectrometer, it can be shown that the major ions in the spectrum are produced by electron impact processes, and not by pyrolysis; moreover, many of these ions are directly related to one another by metastable processes. In particular, it has been demonstrated that the ions at m/e 603 for dioleoyl glycerylphosphorylcholine and at me/e 604 for stearoyl-oleoyl glycerylphosphorylcholine are derived from the appropriate molecular ions by an electron impact-induced process. From measurements of the metastable ion intensities, as well as from the appearance potentials and ionization efficiency curves, conclusions may be drawn about many of the fragmentation mechanisms, allowing a distinction to be made between rearrangement and cleavage reactions.

ARTIFACTS PRODUCED BY BORON TRIFLUORIDE METHANOLYSIS OF A SYNTHETIC LECITHIN CONTAINING CYCLOPROPANE FATTY ACIDS (1-2-DIHYDROSTERCULOYL-3-SN-PHOSPHATIDYLCHOLINE). E.A. Dawidowicz and T.E. Thompson (Dept. of Biochem., Univ. of Virginia School of Med., Charlottesville, Va. 22001). *J. Lipid Res.* 12, 636–7 (1971). It is shown that methanolysis of dihydrosterculoyl lecithin with boron trifluoride-methanol introduces artifacts which are absent if the methyl ester is prepared by saponification of the lipid followed by treatment with diazomethane.

FATTY OIL REFINING PROCESS. *Anon. Chem. & Process Eng.* 52, No. 5, 51–5 (1971). A description of a new technique for deacidifying triglyceride oils using a readily recycled aqueous solvent. The soapstock—after separation from the neutral oil—is split with sulphuric acid, the fatty acids being recovered by conventional techniques. A further processing stage is necessary for recovery of the solvent for recycling. (World Surface Coatings Abs. No. 351)

CHARACTERISATION OF WAXES BY DIFFERENTIAL SCANNING CALORIMETRY. B. Flaherty. *J. Appl. Chem. Biotech.* 21, 144–8 (1971). The characterisation of hydrocarbon and natural waxes by differential scanning calorimetry is described. It is shown that the determination of the melting, cooling and remelting curves of a wax, and comparison with the corresponding curves of authenticated waxes, afford a rapid and valuable method for the identification of many waxes. Heats of transition of many waxes are also given. (World Surface Coatings Abs. No. 351)

OXIDATION PROCESS OF OLEYL (CIS-9-OCTADECENOIC) ALCOHOL AND OLEIC (CIS-9-OCTADECENOIC) ACID. J. Sliwiok and T. Kowalska. *Rev. Roumaine Chim.* 16, 439–48 (1971). The following measurements were performed: determination of peroxide number, I.V. and A.V. determination of refractive index, thin-layer partition and adsorption chromatography, I.R. and U.V. spectroscopy. The main result of the investigation is the establishment of correlations between the oxidation rates and different temps. The lower absorption rate of oxygen at lower temp. and the higher rate at higher temp. are characteristics of oleyl alcohol. In the case of oleic acid, the lower absorption rate of oxygen is related to the higher temp. and *vice versa*. Suggested reaction mechanisms are shown. (World Surface Coatings Abs. No. 351)

LIPIDS OF FRUITS AND VEGETABLES AND THEIR PHYSIOLOGICAL AND QUALITATIVE ROLE. III. CHANGES OF PHOSPHOLIPIDS AND SOME ENZYME ACTIVITIES OF TOMATO FRUITS CULTURED IN A GLASS HOUSE. Takahisa Minamide, Yoshinori Ueta, Kuniyasu Ogata and Hideo Kamata (Univ. Osaka Pref, Sakai, Osaka, Japan). *Nippon Shokuhin Kogyo Gakkaishi* 17, 496–501 (1970). The results of maturation on the vine and after harvest in a glass house were compared. These two tomato fruits were different concerning variety and cultivation period. Thus the following differences might be due to other conditions than cultivation in a glass house and in the open field. The tomato fruits from the glass house contained half the total phospholipid of those from the field. Its concentration showed only slight changes during ripening after harvest. Separation by thin-layer chromatography showed that the phospholipid consisted mainly of phosphatidylcholine and phosphatidyl-ethanolamine. Fatty acid compositions of total phospholipid, phosphatidylcholine, phosphatidylethanolamine, phosphatidylinositol and cardiolipid were examined by gas-liquid chromatography. The tomatoes from the glass house contained more unsaturated fatty acids and higher fatty acids than those of the field. Unsaturated fatty acids seemed to increase during ripening after harvest. Lipoxidase and peroxidase activities increased with the progress of after ripening, reached a maximum 3 days after harvest, and then lipoxidase tended to decrease and peroxidase remained constant. Catalase activity increased continuously through maturation and storage.

IV. CHANGES OF VOLATILE FATTY ACIDS DURING MATURATION OF BANANA FRUITS. Yoshinori Ueda, Takahisa Minamide, Kuniyasu Ogata and Takahiko Yamamoto. *Ibid.*, 545–8. Volatile acids were distilled and analyzed by gas chromatography. Column stability was increased by mixing 0.5% behenic acid in 20% Tween 20-coated Diasolid S. The residue of distillation was hydrolyzed to yield volatile acids, which were taken to be in bound form. Fatty acids of free and bound forms contained in banana pulp were acetic, propionic, isobutyric, butyric and isovaleric acids. Acetic acid was present in the highest concentration, that in bound form being several fold as much as that in free form throughout all stages of maturity. Free propionic acid was not detected, while bound form was the second major component and increased during ripening of banana fruits. The 3 other free acids were neglibible in green banana, but they increased rapidly in parallel with the flavor development of banana fruits.

CHANGES OF THE PROPERTIES OF PROTEIN RESULTING FROM THE OXIDATION OF FAT. I. THE PHENOMENON CALLED YAKU IN THE MANUFACTURE OF TENOBE-SOMEN, A KIND OF NOODLE. Ritsuko Niihara and Yosito Sakurai (Japan Women's Univ., Mejirodai, Bunkyo-ku, Tokyo, Japan). *Nippon Shokuhin Kogyo Gakkaishi* 17, 402–7 (1970). In manufacturing *tenobe-somen*, i.e. hand-extended *somen* (fine noodles), a small amount of cottonseed or soybean oil is added to wheat flour, and the prepared dried noodles are kept in a room of high humidity for several weeks. This process is called *yaku*. Analyses of

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Northeast Section Meeting Features Talk on Vitamin E

The Northeast Section AOCS sponsored a plant tour of Hoffmann-La Roche Company in Nutley, N.J. on November 11, 1971. Bud Gormley and John Munson acted as hosts for two groups of Northeast Section members that visited the Vitamin A plant and laboratories of the Hoffmann-La Roche Complex. Following the plant trip, a meeting and social hour was held at the Robin Hood Inn in Clifton, New Jersey.

Dr. Myron Brin, Assistant Director of Biochemical Nutrition at Hoffmann-La Roche, presented an interesting and informative talk on the new developments occurring in the evaluation of Vitamin E in nutrition. The talk was thoroughly enjoyed by the 80 members and guests that attended the meeting.

Left to Right: H. Hamilton, Secretary of N.E. Section, B. Gormley and R. Christiansen of Hoffmann-La Roche.

M. Stuermer of Drew-PVO, R.B. Muller of Frank E. Sullivan Co., and J. Kern of the Fatty Acids Producers Council.

A. Renold of Colgate Palmolive Co., R.E. Bambam of Croll-Reynolds Co., Inc., and T.B. Richey, Jr., of Malstrom Chem. Corp.

J. McHugh and H. Philips of Cellulo Co., J.B. Munson of Hoffmann-La Roche and R. Kurkar of The Nestlé Co., Inc.

P.A. Lachance of Rutgers State University, B. Borenstein of Hoffmann-La Roche, and R. Morcle of Nabisco.

N.E. Section Officers: B. Casparian, Treasurer; S. Dominik, Vice President; M. Eijadi, President; and the speaker of the evening, M. Brin, Assistant Director of Biochemical Nutrition, Hoffmann-La Roche.

F. Naughton of Baker Castor Oil Co., L. Chirgwin of American Cyanamid, Mrs. K. Chirgwin, and Lou Barta of Atlas Rfg., Inc.

• *Abstracts* . . .

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the ether extract of the 3 kinds of commercial product showed the decrease in iodine no. and the increase in peroxide no. To clarify the mechanism of *yaku*, some experiments were carried out on the mixtures of linseed oil (or its methyl esters) and wheat gluten (soybean protein, casein, or glycine) in the ratio of 1:8 or 2:8. It was observed that in high humidity oxidized oil reacted with protein resulting in the development of a brown color and a change in the character of the protein, while in low humidity browning and change of protein did not occur, though the oxidation of oil was faster and more severe. In the period of *yaku* oxidized oil may react with gluten, making the noodle more palatable.

LIPIDS IN SEA URCHIN EGGS. I. CHEMICAL CHANGE OF THE LIPIDS DURING CURING WITH SALT. Yasuhiko Fujino, Takashi Negishi and Kimiko Umatani (Obihiro Zootech. Univ., Obihiro, Hokkaido, Japan). *Nippon Shokuhin Kogyo Gakkaishi* 17, 343–9 (1970). The so-called sea urchin eggs (*I*) are the mixture of ovary and testis of sea urchin (*Strongylocentrotus pulcherrimus*). The lipids in *I* were fractionated into nonpolar and polar lipids, the ratio of which was 3:1 in the raw *I* and 4:1 in the salted. The main nonpolar lipids are hydrocarbons, sterol esters, triglycerides, fatty acids, sterols and monoglycerides. Triglycerides decreased and free fatty acids increased by salt curing. As the main polar lipids phosphatidyl ethanolamine and choline, sphingomyelin and lysolecithin were detected both in the raw and salted *I*. Phosphatidyl choline and ethanolamine decreased and lysolecithin increased by salt curing. Unsaturated fatty acids of C_{18}-C_{22} seemed to be liberated more easily than the other fatty acids during salt curing.

ANTIOXIDANT ACTIVITY OF BROWNING PRODUCTS DERIVED FROM AUTOXIDIZED OIL. I. COMPARISON OF ANTIOXIDANT ACTIVITY IN SEVERAL MODEL SYSTEMS. Masayuki Maruyama, Kenshiro Fujimoto and Takashi Kaneda (Tohoku Univ., Sendai, Japan). *Nippon Shokuhin Kogyo Gakkaishi* 17, 281–5 (1970). The following model systems were examined: 0.8 *M* glycine-0.8 *M* glucose (*I*), 7.0 g autoxidized cuttle fish liver oil-0.8 *M* glycine (*II*), 7.0 g the same autoxidized oil-0.8 *M* glycine-0.8 *M* glucose (*III*), 7.0 g the same oil-14 ml 0.02 *N* NH_3 in ethyl alc. (*IV*), 7.0 g the same oil-14 ml 0.02 *N* NH_3 in ethyl alc.-0.8 *M* glucose (*V*), and 30 ml aqueous extract of 35 g the same oil-0.8 *M* glycine (*VI*). Antioxidant activity was in the order $IV < V < II = III < VI = I$, when compared on acetone-soluble fraction of the mixtures incubated at 78C for 10 hr. *VI* showed the highest reducing activity and N content in the same acetone-soluble fraction. IR spectra were also compared. It was concluded that *VI* resembled *I*, i.e. the Maillard reaction, while $II = III$ and $IV = V$ were different from *I*.

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STUDIES ON LAURIC HARD BUTTER. I. DETERIORATION OF HYDROGENATED OIL. T. Kawada and M. Yamazaki (Edible Oil & Fat Res. Lab., Kao Soap Co., 2-1-3 Bunka, Sumida-ku, Tokyo). *Yukagaku* 20, 295–98 (1971). Lauric hard butter under moist conditions sometimes develops a sweet but unpleasant odor which is different from a characteristic odor of the lower fatty acids. This is due to mold infection. A chocolate cake with unpleasant odor, or *Asp. niger* or *Pen. roqueforti* were added to the hardened coconut oil emulsified with sucrose solution. The mixture was kept at 25C and 70% RH. After steam distillation of sample, IR and GLC study showed the presence of 2-pentanone, 2-heptanone, 2-nonanone and undecanone in the volatile fractions of all three samples.

II. FAT BLOOM. T. Kawada, S. Suzuki and N. Matsui. *Ibid.*, 332–335. The fat bloom of cocoa-type coating made from hydrogenated palm kernel oil was studied with a scanning electron microscope and a differential scanning calorimeter. The coating developed the fat bloom more easily when it was kept at 20C than at any other condition. It's microscopic appearance was different from the bloom of cocoa butter. The melting range of fat scalped off from bloomed surface was narrower than that of original fat. Fatty acid composition was analyzed by GLC. A higher lauric acid concentration was found in the bloomed fat than the original oil. The mechanism of fat bloom generation was discussed.

SIMPLE DETERMINATION OF WATER AND SOLID FAT INDEX IN MARGARINE BY DIFFERENTIAL SCANNING CALORIMETRY. T. Maruyama, I. Niiya, M. Imamura and T. Matsumoto (Jap. Margarine & Shortening Makers' Assoc., 3-30 Nihonbashi-Hamacho, Tokyo). *Yukagaku* 20, 290–95 (1971). The water concentration of soft and hard margarines was determined by differential scanning calorimetry with a ±2% error. Optimum conditions were 10–30 mg of sample, 3–10C/min of heating rate and 2–8 mcal/sec.

REMOVAL OF THE FREE FATTY ACID IN FRYING OILS BY MgO ADSORPTION. E. Yuki (Food Ind. Expt. Sta. Hiroshima, Hijiyama-honmachi, Hiroshima, Japan). *Yukagaku* 20, 313–16 (1971). The proposal that MgO could remove free fatty acid from frying oil was checked. The free fatty acid concentration of frying oil was determined during heating in a continuous water-spraying heating system or heating with potato chips in an automatic test fryer. The acid value was remained low in the initial stages of heating, but the value was increased in the later stages by hydrolysis of the triglycerides in the presence of magnesium soaps. The proposal was judged unpractical.

HYDROGENATION OF TRIOLEIN WITH VARIOUS CATALYSTS ON THE SELECTIVITY TOWARD THE POSITION OF ACYL GROUP. T. Hashimoto, Y. Kubota and K. Shibuya (Nat. Expt. Sta. Tokyo, 1-1-5 Honmachi, Shibuya-ku, Tokyo). *Yukagaku* 20, 10–15 (1971). The hydrogenation of triolein with Pt, Pd and 3 types of Ni was studied. After hydrogenation, triolein was hydrolyzed by Mucor lipase and analyzed by GLC and IR. The oleyl groups on α,α'-position were hydrogenated slightly faster than that on β-position with Ni catalysts. But other catalysts did not show such position selectivity. No relationship between acyl group position and trans isomer formation was found during hydrogenation with Ni. Ni formed more trans isomer than other catalysts.

THE CONSTITUENTS OF THE SEED OF ILEX INTEGRA THUMB (IIT). I. THE COMPONENTS OF THE FATTY ACIDS OF SEED OF IIT (MOCHINOKI). M. Hirose, K. Kosuzume, M. Goshima, F. Tanabe, Y. Satoh and A. Hagitani (Dept. Chem., Rikkyo Univ., Nishiikebukuro, Tokyo). *Yukagaku* 20, 7–9 (1971). The lipid of IIT was extracted, and analyzed by GLC and mass spectroscopy. Octadecadienoic acid was a main component. Eicosanoic acid and odd number acids such as heptadecadienoic and nonadecadienoic acid were identified as minor components.

STUDIES ON THE ANTIOXIDATIVE COMPOUNDS IN THE DEORDORIZER SLUDGE OF SOYBEAN OIL. H. Seino, S. Watanabe and Y. Abe (Hygienic Sci. School, Kitazato Univ., 5-9-1 Shirogane, Tokyo). *Yukagaku* 20, 218–23 (1971). Antioxidants in the deordorizer sludge of soybean oil were concentrated by silicic acid column chromatography and separated by a preparative TLC. Three kinds of tocopherol dimer were isolated as well as tocopherols. UV, IR, mass and NMR spectroscopy suggested that one of the three was a newly found dimer of tocopherol. The mixture of these three dimers had a strong antioxidant activity on partially hydrogenated whale oil.

THE CONSTITUENTS OF THE SEED OF MAGNOLIA SALICIFOLIA MAXIM. H. Hirose (Dept. Chem., Rikkyo Univ., 3 Nishi-Ikebukuro, Tokyo). *Yukagaku* 20, 238–41 (1971). GLC, mass and IR spectroscopy showed that the constituents of petroleum ether and methanol soluble fraction of *Magnolia salicifolia* Maxim seed were similar to those of *Magnolia kobus* DC in fatty acids, unsaponifiable components, alkaloids and lignan, but different in essential oil composition.

GLC DETERMINATION OF MONO- AND DIGLYCERIDE. R. Uerara, T. Horii, H. Katayama and Y. Tomita (Tech. Div., Nikko Sci. & Chem. Ind. Co., 98 Bessho, Urawa, Japan). *Yukagaku* 20, 174–78 (1971). For quantitative GLC analysis of mono- and diglycerides, methods for preparation of their derivatives was studied. The trimethylsilylation of the glycerides by trimethylsilylation reagent (TMS) and acetylation by acetic anhydride-pyridine (AAP) were found to be satisfactory, but acetylation by acetyl chloride was not good. Results using TMA and AAP well agreed with those of other chemical determinations.

STUDIES ON THE PANCREATIC HYDROLYSIS OF GLYCERIDES. I. THE METHOD OF HYDROLYSIS AND THE HYDROLYSIS OF C_{10}-C_{18} SATURATED GLYCERIDES. Y. Usui, H. Kuwayama and M. Nagakura (Res. Lab., The Nishin Oil Mills Ltd., 1-3 Chiwaka, Kanagawa-ku, Yokohama, Japan). *Yukagaku* 20, 284–9 (1971). The hydrolysis of triglycerides with pancreatic lipase was studied using myristo-1,3-dilaurin as a substrate. Satisfactory results were obtained by emulsifying the triglyceride with polyvinyl alcohol and a phosphate buffer (0.1 M, pH 8.0). Hydrolysis was conducted at 40C with the enzyme. The hydrolysis of saturated triglycerides by the method showed that shorter chain fatty acids were split more rapidly than longer ones.

THE PHOSPHOLIPASE IN COW'S MILK. Fumi Manda, Kazuo Sato, Sawako Fukuda and Takashi Kaneda (Tohoku Univ., Sendai, Japan). *Nippon Shokuhin Kogyo Gakkaishi* 17, 451–5 (1970). The off-flavor in milk is due, according to one explanation, to autoxidation of the unsaturated fatty acids liberated from phospholipids by phospholipase. The presence of phospholipase was suggested by the increase in lysophosphatidylethanolamine during the incubation of milk at 18C for 10 hr or at 5C for 20 hr. Addition of toluene to milk as a preservative suppressed the production of lysophosphatidylethanolamine. Incubation of milk phospholipase mixed with bacteria from milk resulted in an increase in lysophosphatidylethanolamine and free fatty acids. Thus it was presumed that lysophosphatidylethanolamine was not present originally in milk but was produced by bacteria grown in the milk. During the incubation of milk, no increase was observed of lysolecithin. Therefore, this phospholipase seems to have substrate specificity.

METHOD FOR GAS CHROMATOGRAPHIC ANALYSIS OF FATTY ACID COMPOSITION OF GLYCERIDES CONTAINING SHORT-CHAIN FATTY ACIDS. T. Fujikawa, M. Hamashima and K. Yasuda (Res. Lab., The Nishin Oil Mills Co., 1-3 Chiwaka-cho, Kanagawa-ku, Yokohama, Japan). *Yukagaku* 20, 138–43 (1971). n-Propyl esterification of fatty acids was found to be a simple and convenient method for the GLC analysis of fats and oils containing both low and high molecular weight acids. The sample (0.25 g) and 1.25 g of 0.3% Na in n-propyl alcohol were agitated for 5 min. A 20% aqueous solution of NaCl was added to separate the ester produced. After vigorously shaking, the mixture was allowed to stand at 40C. The propyl ester which appeared as an upper layer was analyzed.

APPLICATION OF NON-AQUEOUS COULOMETRY FOR THE ANALYSIS OF OIL AND PETROLEUM PRODUCTS. S. Miyake (Hiranuma Sangyo Co., Motoyoshida, Mito, Japan). *Yukagaku* 20, 125–30 (1971). Review with 33 references on the principle of coulometry and it's application for the determination of unsaturation, halogens, neutralization valve and for moisture by the Karl Fisher method.

STUDIES ON THE LIPID COMPOSITIONS IN THE HORNY TISSUES OF ANIMALS. III. LIPID COMPOSITION OF HOLSTEIN HOOFS. N. Suzuki and T. Mitsuhashi (Keio Elementary School, Ebisu, Shibuya, Tokyo and Tokyo Gakugei Univ., Nukuikita, Koganei, Tokyo). *Yukagaku* 20, 106–9 (1971). Holstein hoofs were powdered and extracted with ether. GLC showed that the acetone soluble fraction of extract contained 10:0, 1.1; 12:0, 1.8; 14:0, 1.1; 16:0, 28.2; 10:1, 1.2; 12:1, 1.6; 14:1, 0.8; 14:2, 0.2; 16:1, 0.7; 16:2, 1.2; 18:1, 56.2; 20:1, 2.6; 20:2, 2.0%.

VARIATION OF THE CONTENT OF ASH IN SUNFLOWER OIL DURING REFINING. M.A. Kamysan *et al. Mashloezhir. Prom.* 37(7), 12–4

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(1971). The authors found that refined oils containing an excess of iron and especially of calcium or phosphorus were difficult to filter following hydrogenation. Demineralization of the water used in refining was very important. (Rev. Franc. Corps Gras)

IMPROVEMENT OF THE METHOD FOR DETERMINING WATER IN MARGARINE. A. Jakubowski *et al. Tluszcze Jadalne* 15(3), 130–5 (1971). The standard Polish method (PN-65/A-86907) consists of heating the sample in an aluminum cup on an electric hotplate with continuous manual agitation. The normal heating time is 4–5 minutes, but the total analysis usually takes 7–10 minutes. The difference between duplicate determinations should not exceed 0.4%. By substituting mechanical agitation for the manual stirring, the authors were able to shorten the average time per determination as well as increase the precision. (Rev. Franc. Corps Gras)

METHOD AND APPARATUS FOR MANUFACTURE OF PARTICULATE FATTY MATERIALS. R.W. Carnahan (Kraftco Corp.). *U.S. 3,612,131.* A higher melting fat is spray-chilled and mixed with a flow-conditioning agent. The blend is subjected to high intensity impact milling so as to texturize and homogenize it. The resultant material is flowable and not susceptible to melting or agglomerizing.

COPPER-NICKEL CATALYSTS FOR SELECTIVE HYDROGENATION OF LINOLENIC ACID IN RAPESEED OIL. W. Pezinski. *Tluszcze Jadalne* 15(3), 123–9 (1971). The catalysts were prepared by introducing appropriate volumes of $NiSO_4$ and $CuSO_4$ solutions, each having concentrations of metal equal to 10 g/l, into a 10% solution of Na_2CO_3 at 40C. After filtration, the Cu/$NiCO_3$ was washed with warm redistilled water until all the sulfate ions were removed. The precipitate was dried at 70C and then ground in a ball mill. In this manner, catalysts having ratios of Cu:Ni of 0:1, 1:1, 2:1, 3:1, 5:1, 10:1, 50:1, and 100:1 were prepared. Reduction of the catalysts occurred simultaneously with the hydrogenation. This reaction was carried out in a glass reactor at 180C with a hydrogen flow rate of 2 l/min. The quantity of catalyst, calculated as the metal, was 0.1% of the oil, except for the 50:1, Cu:Ni catalyst which was used at the level of 1%. Simultaneously with the reduction of linolenic acid, there was a reduction of linoleic acid and formation of geometrical isomers. The quantities of stearic and behenic acids increased with the degree of hydrogenation. Increasing the ration of Cu:Ni from 1:1 to 50:1 did not improve the selectivity at all. This result may have been due to decreased activity. The overall selectivity of these catalysts, as determined from ratios of the reaction rate constants for linolenic and linoleic acids, varied between 3 and 4 as compared with a selectivity no higher than 3 for conventional nickel catalysts. (Rev. Franc. Corps Gras)

ADSORPTIVE BLEACHING OF COTTONSEED OIL ON NATURAL ADSORBENTS. R.G. Gafurov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971(3), 175–7. The best adsorbent among the natural earths was found to be that from Darbaza (Kazakhie SSR). This earth had an oil absorption capacity of 46% and lowered the color of cottonseed from 12.2 to 2.8 red units. Among the chemically activated adsorbents, the best were the Darbazan earths which had been activated with 5% H_2SO_4 and gray-green bentonite from Azhamar (Ouzbekistan SSR) treated with 10% H_2SO_4 for 6 hours. Oil absorption capacities were 59% and 20%, respectively, and the colors of the cottonseed oils after bleaching were 1.2 and 2.6 red units. (Rev. Franc. Corps Gras)

THE GAMMA FORM OF COCOA BUTTER. I.V. Nikonov. *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971(3), 23–6. (Rev. Franc. Corps Gras)

MATHEMATICAL MODEL FOR OPTIMIZING THE ECONOMIES OF OIL MILL OPERATION. V.G. Scerbakov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971(3), 7–10. (Rev. Franc. Corps Gras)

HYDROGENATION OF COTTONSEED OIL IN A SATURATED HYDROCARBON SOLVENT ON A FIXED BED CATALYST. N.G. Krupenja *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971(3), 82–4. The solvents used were pentane, hexane, heptane, and cyclohexane, and the catalyst contained nickel, aluminum and palladium. Various temperatures, hydrogen pressures and concentrations of oil in solution were used, and the reaction rate constants for the processes were determined. (Rev. Franc. Corps Gras)

HYDROGENATION OF COTTONSEED OIL IN AN AROMATIC HYDROCARBON SOLVENT ON A FIXED BED CATALYST. *Ibid.*, 57–9. Benzene was found to be the best solvent. (Rev. Franc. Corps Gras)

EFFECT OF HYDROTHERMIC TREATMENT PROCESSES ON THE ENZYMATIC ACTIVITY OF RICE BRAN. V.M. Kopejkovskij *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971 (4), 50–2. Inactivation of the enzymes in rice bran is necessary to prevent increase in free fatty acids during storage. The process involves hydration of the rice bran to 19–20% moisture followed by drying at 105–108C. Heating the bran above 115C degraded the quality of the protein. (Rev. Franc. Corps Gras)

CONTINUOUS COOKER. F.D. Hickey (FMC Corp.). U.S. *3,614,824.* A deep fat cooker having rotating reels with pockets for containing the food is described. The hot fat is contained in a vessel under the reels and is maintained at a level up to, but not covering, the axle of the reels. The reels may be driven independently to permit variable cooking times.

METHOD OF TESTING SHORTENING. N.P. Apter (Apter Inds.) *U.S. 3,615,226.* The method is a rapid qualitative test for free fatty acids. A measured volume of shortening is added to a known amount of an alcoholic NaOH solution of known concentration and containing an alkaline indicator. A color change designates a positive test.

HYDROGEN PRODUCTION BY REACTION OF CARBON WITH STEAM OR STEAM AND OXYGEN. P.E. Fischer and M.M. Holm (Chevron Research Co.). *U.S. 3,615,299.* The process involves contacting subdivided carbonaceous matter with steam (preferably) or steam plus oxygen in a reaction zone at 800-1350F to form H_2 and CO_2. The ratio of CO_2 to CO and of CO_2 to CH_4 in the hydrogen-rich gas withdrawn from the reaction zone is maintained above 2.5.

HYDROGEN PRODUCTION BY REACTION OF CARBON WITH STEAM AND OXYGEN. M.M. Holm and P.E. Fischer (Chevron Research Co.). *U.S. 3,615,300.* Process is similar to that described in *U.S. 3,615,299* except that the oxidizing agent is a mixture of steam and oxygen.

GLYCERIDE MIXTURE AND PLASTIC EDIBLE FATS PREPARED THEREFROM. C. Heine and W. Stein (Henkel & Cie GmbH). *U.S. 3,615,588.* The fat has a wide plastic range and is composed of the following: 0–7% mono and diglycerides and the rest triglycerides. The triglycerides consist of 60–90% soft stock and 10–40% hard stock containing 10–75% of glycerides melting between 30–45C and having one unsaturated and two saturated fatty acid moieties per molecule, 25–90% of glycerides melting between 48–60C and having at least one myristic acid moiety per molecule, and 0–12% of glycerides melting above 60C. The process for preparing the shortening with a wide plastic range is also described.

INCORPORATING FAT IN MARSHMALLOWS. M.A. Peterson (Beatrice Foods). *U.S. 3,615,592.* Polyglycerol partial stearates permit aeration of the marshmallow as well as emulsification of fat in the mixture. The aerated product may be blended or layered with peanut butter to give a product in which water migration from the marshmallow to the peanut butter is reduced.

PASTRY MIX AND MARGARINE THEREFOR. G.D. LaBaw, D.P. Kidger, and F. Vanderveer (National Biscuit Co.). *U.S. 3,615,682.* A margarine for laminated doughs capable of entrapping up to 25% by volume of air is prepared from 80–86% of partially hydrogenated soybean oil, 0–1% emulsifier, 12–16% water, and 0–4% salt. The soybean oil is hydrogenated to an I.V. of 65–70 under conditions to give SFI's of 43–47 at 10C, 28–32 at 21.1C, 23–27 at 26.7C, 10.5–14.5 at 33.3C, 1.5–4.5 at 37.8C, and 2 maximum at 40C.

LIQUID SALAD DRESSING BASE. H.E. Swisher (Sunkist Growers, Inc.). *U.S. 3,615,702.* The base consists of an edible oil carrying oil-insoluble particles of essential oil in emulsion form in a water-soluble matrix. Upon addition of an aqueous phase and shaking, the water-soluble matrix dissolves, and a

finished salad dressing containing all the necessary oil, flavor and aqueous materials is formed.

DEEP FRY OIL-FILTERING UNIT, METHOD, AND APPARATUS. R.D. Van Vleet. *U.S. 3,616,907.* The oil from the fryer is pumped through a portable filtering unit.

CONTINUOUS HIGH TEMPERATURE PROCESS FOR RECLAIMING REUSABLE FRYING FATS. E.R. Lowrey and R.O. Schmitt (Proctor and Gamble). *U.S. 3,616,909.* Particles are continuously removed from the frying oil in a centrifugal separator.

MARGARINE FAT AND PROCESS FOR PREPARING THE SPREAD. H.A. Graffelman (Lever Bros.). *U.S. 3,617,308.* The hard stock comprises 8–15% of the composition and consists of vegetable oil containing predominantly 16–18 carbon atom fatty acids interesterified with fully hardened palm kernel oil. The soft stock consists of liquid oil containing at least 40% linoleic acid.

POTATO AND POTATO CHIP FLAVOR AND AROMA. S.S. Chang and B.R. Reddy (Research Corp.). *U.S. 3,619,211.* A flavor and aroma reminiscent of potato and potato chip is prepared by heating methionine or a mixture of methionine and a reducing sugar in the presence of an oil such as a frying oil. The flavor can also be imparted to foods such as snack foods by adding methionine to the foods before frying. Similarly, the flavored oil can be used in the manufacture of various food products for conveying the potato flavor.

DARKENING RESISTANT FRYING FAT. D.J. Hayes and V.E. Weiss (Proctor and Gamble). *U.S. 3,619,213.* The frying fat contains 0.05–0.7% of pyrogenic silica which retards darkening during long periods of use.

SINGLE PHASE COMPOSITION. E.J. Conklin (Proctor and Gamble). *U.S. 3,620,712.* The composition consists of methyl esters of C_8-C_{12} fatty acids and specific nonionic emulsifiers, coupled with a critical amount of water. The ratio of esters to emulsifier can range between 1:1.2 and 3:1.

FRACTIONAL CRYSTALLIZATION PROCESS. K. Saxer (Metallwerk Aktiengesellschaft Buchs). *U.S. 3,621,664.* The fluid flows down a cooled surface and crystallizes thereon. Each step comprises a single crystallization and all steps of a complete cycle are carried out within a single unit.

APPARATUS FOR AUTOMATICALLY SHAKING FILTER CAKE IN A FILTER PRESS. K.-I. Kurita (Kurita Machinery Mfg. Co., Osaka). *U.S. 3,622,005.* The device is suspended above the press, and as the plates are opened, the device shakes each filter cloth in turn.

PUDDING COMPOSITION CONTAINING LIPID ESTER. J.L. Hegadorn, R.R. Ferguson, and B.J. Bahosky (General Foods). *U.S. 3,619,209.* The pudding contains a lipid ester surfactant which helps to reduce sticking to the pan and scorching during preparation.

PROPYLENE GLYCOL MONOESTER EMULSIFIER-CONTAINING SHORTENINGS AND CAKE MIXES CONTAINING THEM. M.K. Gupta (Proctor and Gamble). *U.S. 3,622,345.* The emulsifier has a particular ratio of fatty acid ester chains to provide high specific volume cakes. The shortenings have a relatively high solids content at room temperature, a relatively low solids content at mouth temperature, and some solids remaining at the highest storage temperature normally encountered.

METHOD OF RECOVERING WATER-FREE FATTY ACID DISTILLATES BY SELECTIVE CONDENSATION. R.W. West (Carrier Corp.). *U.S. 3,622,466.* The method involves spraying the liquid fatty acid into direct heat transfer relation with the vaporous mixture in a vessel subject to an equilibrium condition enabling condensation of the fatty acid vapors only.

• Fatty Acid Derivatives

SYNTHESIS OF ISOPHYTOL. K. Suga, S. Watanabe and Y. Yamaguchi (Dept. Applied Chem., Chiba Univ., Chiba-shi, Japan). *Yukagaku* 20, 356–9 (1971). Isophytol, a starting material of α-tocopherol synthesis from hexahydro-ø-ionone, was synthesised. Synthetic conditions were investigated in detail.

• *Obituary*

Word has been received of the death of Donald E. Johnson, Chemist, Spencer Kellogg Division of Textron, Minneapolis, Minn. Johnson joined AOCS in 1964.

UTILIZATION OF ACYLOINS. I. THE SYNTHESIS OF SATURATED KETONES AND HYDROCARBONS. Y. Abe, Y. Nakamura, A. Iwasaki and N. Ono (Faculty of Eng., Keio Univ., Maehara, Koganei, Tokyo). *Yukagaku* 20, 224–9 (1971). A series of C_8-C_{36} symmetrical and mixed acyloins could be synthesized by condensation of fatty acid methyl esters in the presence of a metallic sodium dispersion in an inert solvent such as xylene. The mass spectroscopy of mixed acyloins showed that the reaction of fatty acid mixture generally gave mixed acyloins, in which the longer chain had a carbonyl group and the shorter chain carried a hydroxyl group. The acyloins produced were reduced to the corresponding unsymmetrical ketones by Clemensen method. The hydroxyl group changed to methylene group, but carbonyl groups unreacted in the reduction. The Clemensen reduction of long chain ketone did not give the corresponding hydrocarbon, while Wolff-Kishner reduction gave the hydrocarbon in rather good yield.

PREPARATION OF EDIBLE GRADE PROPYLENE GLYCOL MONOSTEARATE. A.P. Necaev *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1971(4), 27–8. It was found necessary to carry out the reaction with a molar ratio of stearic acid to propylene glycol of 1:5 using toluene sulfonic acid as a catalyst at 100C. The product was purified by extraction with hexane and crystallization from the hexane solution at −10 to −15C. (Rev. Franc. Corps Gras)

TEXTILE FABRIC SOFTENER. L.T. Murray (Colgate-Palmolive). *U.S. 3,620,807.* The composition contains either a fabric-softening quaternary ammonium salt and an alkali metal borohydride or the corresponding quaternary borohydride. It imparts softness without yellowing to textiles.

SOPHOROSIDE ESTERS IN PREPARED FOOD PRODUCTS. R.P. Allingham (Pfizer, Inc.). *U.S. 3,622,344.* Sophoroside alky esters of certain C_{16}-C_{18} monohydroxy fatty acids, wherein the alkyl groups contain from 2 to 18 carbon atoms, show highly desirable effects in improving the properties and general eating characteristics of starch based and emulsion based food products at levels of 0.01–3% of the product.

SYNTHETIC POLYAMIDES OF A DIMERIC FATTY ACID, A LOWER ALIPHATIC CARBOXYLIC ACID ETHYLENE DIAMINE, AND A CO-DIAMINE. M. Drawert and E. Griebsch (Schering AG). *U.S 3,622,604.* Methods for preparing the polyamides are disclosed. The products are useful as binders in the formulation of printing inks.

PROCESS FOR PREPARING HYDROXYCARBOXYLIC ACID ESTERS. K. DeJong and B. Van der Ven (Lever Bros.). *U.S. 3,622,605.* Aliphatic δ-hydroxy carboxylic esters, *e.g.*, δ-hydroxydecanoic acid and δ-dodecanoic glycerides, which are flavoring agents for fatty foodstuffs, are prepared by the acid catalyzed reaction of a δ-lactone with a polyhydric alcohol until at least 80% of the ester present at equilibrium in the esterification reaction has been formed. The acid catalyst is removed before 10% of the lactone polymer is formed.

POLYETHYLENIMINE FATTY ACID EPICHLOROHYDRIN PRODUCT. J. Longoria (Dow Chem. Co.). *U.S. 3,622,528.* An improved polyethylenimine adduct for cellulosic products is prepared by condensing polyethylenimine with 0.05–0.4 mole of C_{12}-C_{22} fatty acids and thereafter capping the residual free amino groups by reaction with epichlorohydrin in aqueous solution at 0–50C. The resulting product is an effective softener, sizing agent, and wet-strength additive for paper and other cellulosic products with superior color stability and increased resistance to yellowing.

• Biochemistry and Nutrition

LOSS OF LIPID TO PLASTIC TUBING. K.Y. Lee (Dept. of Phys., Univ. W. Australia, Nedlands, W. Australia 6009). *J. Lipid Res.* 12, 635–6 (1971). ^{14}C-labeled oleic acid and ^{3}H-labeled monoether in a bile salt solution were perfused through three types of plastic tubing. Large porportions of lipid were lost to the walls of silicone rubber and polyvinyl chloride tubes. The major portion of the lipid lost was recoverable only when chloroform-methanol was perfused through the tubings. On the other hand, very little lipid was lost to the wall of polyethylene tubing. Polyethylene tubing should therefore be used in perfusion studies involving lipid-soluble compounds.

UTILIZATION OF FATTY ACIDS IN PERFUSED HYPOTHERMIC DOG KIDNEY. J.S. Huang, G.L. Downes, and F.O. Belzer (Dept. of Surgery, Univ. Cal., San Francisco, Cal. 94122). *J. Lipid Res.* 12, 622–7 (1971). Utilization of oleic acid in whole

dog kidneys perfused in vitro for 24 hr at 10C was studied, and the data were correlated with results on the utilization of oleic acid in kidney slices incubated in the same perfusate at 10C. Kidneys perfused without added oleate lost 35% of their total lipid content and 27% of their phospholipids. Addition of serum albumin-bound oleate to the perfusate prevented the loss of neutral lipid and reduced the loss of phospholipid to 8%. The kidney slices incorporated 29% of the added oleate into lipid and oxidized 3.2% to CO_2. Oleate apparently largely replaces endogenous fatty acids which are oxidized to meet the energy requirements of the kidney. The loss of phospholipid from the perfused organ is taken as an indication of all damage, which may be reduced but is not prevented by the addition of oleate to the perfusate.

UTILIZATION OF EXOGENOUS FREE FATTY ACIDS FOR THE PRODUCTION OF VERY LOW DENSITY LIPOPROTEIN TRIGLYCERIDE BY LIVERS OF CARBOHYDRATE-FED RATS. G. Schonfeld and B. Pfleger (Dept. of Med., Wash. Univ. School of Med., and the Med. Serv., Cochran VA Hosp., St. Louis, Mo. 63106). *J. Lipid Res.* 12, 614–21 (1971). High carbohydrate diets enhance the hepatic output of very low density lipoprotein triglycerides. The fatty acids of these triglycerides could come from exogenous sources (i.e. diet or adipose tissue) or from de novo fatty acid synthesis in the liver. The role of exogenous free fatty acids was evaluated in rats fed Purina Chow or diets containing 10% fructose for up to 14 wk. In carbohydrate-fed rats, serum triglycerides were twice normal, and VLDL accounted for about 60% of the increases. Pre-β-lipoprotein was increased and α- and β-lipoprotein were decreased. Phospholipid and cholesterol levels were unchanged. Livers were perfused with glucose and free fatty acids. Perfusate free fatty acids rose from 180 to 1800 μeq/liter as the infused acids increased from 0 to 992 μeq/3 hr; simultaneously, net free fatty acid uptake rose from <1 to 18 μeq/g/hr and triglyceride output by the liver doubled. However, rates of secretion of triglyceride became constant, and triglyceride accumulated in liver at uptakes of free fatty acids >13 μen/g/hr. More lauric and myristic acid appeared in the perfusate than was infused, suggesting the hepatic discharge of free fatty acids. Livers of fructose-fed rats secreted twice as much oleate-^{14}C-labeled triglyceride as controls at all levels of free fatty acid uptake. The ratios of the specific activities of perfusate triglyceride to free oleate-^{14}C were unaffected by diet and were about 0.6 to 1.0 at low and high triglyceride secretion rates, respectively. Thus, carbohydrate feeding did not result in altered uptakes of free fatty acids or preferential secretion of triglycerides containing endogenously synthesized fatty acid.

MICELLAR PROPERTIES OF SODIUM FUSIDATE, A STEROID ANTIBIOTIC STRUCTURALLY RESEMBLING THE BILE SALTS. M.C. Carey and D.M. Small (Div. of Biophy. and Gastroenterology, Dept. of Med., Boston Univ. Med. Center, Boston, Mass. 02118). *J. Lipid Res.* 12, 604–13 (1971). The properties of sodium fusidate micelles were determined by a spectral shift technique, surface tension measurements and ultracentrifugal analysis. The critical micellar concentrations, mean molecular areas and apparent aggregation numbers were estimated as a function of the concentration of counterion (0.001—1.0 M Na^+) at 20C. The critical micellar concentrations were studied over a temperature range of 10C to 40C at one counterion concentration (0.001 M Na^+), and from these data the standard thermodynamic functions of micellization were calculated. The ability of sodium fusidate solutions to solubilize the insoluble swelling amphiphiles, lecithin and monoolein, was investigated, and the results were compared with the solubilizing properties of sodium taurocholate. The critical micellar concentrations of sodium fusidate approximated those of sodium taurocholate. The values fell in the range of 1.44–4.56 mM, varying with the technique used, counterion concentration and temperature. The percentage of counterions bound to fusidate micelles in water, calculated from the log critical micellar concentration-log Na^+ curve, was estimated to be negligible, which compares with sodium taurocholate micelles.

EFFECTS OF HIGH SUCROSE DIETS AND 4-AMINOPYRAZOLOPYRIMIDINE ON SERUM LIPIDS AND LIPOPROTEINS IN THE RAT. T.S. Shiff, P.S. Roheim and H.A. Eder (Dept. Med. and Physiol., Einstein College Med., Bronx, N.Y. 10461). *J. Lipid Res.* 12, 596–603 (1971). The effect of feeding a semipurified diet high in sucrose on serum lipid and lipoprotein concentrations was studied. In rats fed this diet the serum triglyceride concentration doubled, and liver triglyceride concentration increased by 30%. A fivefold increase in VLDL protein concentration and a small but significant increase of HDL protein concentration was also observed. In these rats there was increased incorporation of labeled amino acids into the proteins of plasma VLDL and HDL. Fatty livers developed in the animals receiving 4-aminopyrazolopyrimidine, and levels of serum triglyceride and cholesterol fell markedly. The concentration of all lipoprotein classes decreased, with VLDL showing the most marked effect. Incorporation of labeled amino acids into lipoproteins and other plasma proteins was depressed.

UTILIZATION OF FREE FATTY ACIDS COMPLEXED TO HUMAN PLASMA LIPOPROTEINS BY MAMMALIAN CELL SUSPENSIONS. A.A. Spector and Janice M. Soboroff (Dept. Int. Med. and Biochem., and Clinical Res. Center, Univ. of Iowa, Iowa City, Iowa 52240). *J. Lipid Res.* 12, 545–52 (1971). The purpose of this study was to determine whether lipoprotein-bound free fatty acid could be utilized by isolated mammalian cells. Ehrlich ascites tumor cells were incubated in vitro with radioactive free fatty acids that were bound to human plasma lipoproteins. Under these conditions, lipoprotein-bound free fatty acids were readily taken up by the cells. After 2 min of incubation with free fatty acids bound to low density lipoproteins, most of the radioactivity that was associated with the cells was in the form of free fatty acids. As the incubation continued, increasing amounts of radioactivity were incorporated into CO_2 and cell lipids, particularly phospholipids. Most of the free fatty asid uptake was the result of fatty acid transfer from low density lipoproteins to the cell, not from irreversible incorporation of the intact free fatty acid-low density lipoprotein complex. Fatty acid uptake increased as the ratio of free fatty acid to low density lipoprotein was raised. When albumin was added to the medium, free fatty acid uptake decreased. A large percentage of the newly incorporated cellular radioactivity was released into the medium if the cells were exposed subsequently to a solution containing albumin. Most of the released radioactivity was in the form of free fatty acid. The results with this experimental model suggest that lipoprotein-bound free fatty acid, like albumin-bound free fatty acid, is readily available for uptake by isolated cells. The mechanism of free fatty acid utilization by the Ehrlich cell is similar when either low density lipoprotein or serum albumin serves as the fatty acid carrier.

STUDIES ON THE HORMONE-SENSITIVE LIPASE OF ADIPOSE TISSUE. Joan P. Schwartz and R.L. Jungas (Dept. of Biol. Chem., Harvard Med. School, Boston, Mass. 02115). *J. Lipid Res.* 12, 553–62 (1971). Sucrose gradient centrifugation has been used to examine the triglyceride lipases present in extracts of rat epidiymal adipose tissue. The aqueous phase recovered between the pellet and fat cake of tissue homogenates which had been centrifuged at 40,000 g was shown to contain two types of triglyceride lipase activity. One of these appears in the 15s region and has been identified as the active form of the "hormone-sensitive lipase" believed to be responsible for initiating the hydrolysis of tissue triglyceride stores in response to lipolytic stimuli. The activity of this enzyme was selectively increased in extracts prepared from tissue exposed to epinephrine and decreased in extracts of insulin-treated tissue. The increased lipolytic activity of extracts of tissue from fasted or fasted-refed rats was also found largely in this region. When the tissue was incubated with orthophosphate-^{32}P, raaioactivity was incorporated into a protein migrating at 15s. A second peak of triglyceride lipase activity appeared in the 6s region coincident with location of the monoglyceride and diglyceride lipase activities. The amount of 6s triglyceride lipase activity did not correlate with changes in the lipolytic activity of the tissue from which the extracts were prepared, and its physiological function remains to be elucidated. The lipoprotein lipase and the short-chain triglyceride lipase

("tributyrinase") each moved more slowly in the gradient than the 6s triglyceride lipase. Both the 6s and 15s enzymes were shown to be present in washed adipocytes isolated from the tissue by collagenase digestion.

FOUR-DIRECTIONAL-DEVELOPMENT THIN-LAYER CHROMATOGRAPHY OF LIPIDS USING TRIMETHYL BORATE. J.D. Pollack, Donna S. Clark and N.L. Somerson (Dept. Med. Microbiol., Ohio State Univ., and Children's Hosp. Res. Found., Children's Hosp., Columbus, Ohio 43205). *J. Lipid Res.* 12, 563–69 (1971). Solvent mixtures containing trimethyl borate virtually eliminated the pronounced interconversion of 1,2- and 1,3-dipalmitins during their resolution by thin-layer chromatography on Silica Gel G. With trimethyl borate, an average of 1–2% of 1,2-dipalmitin was converted to 1,3-dipalmitin. A four-directional-development TLC procedure incorporating trimethyl borate resolves cholesteryl glucoside, ceramides, monogalactosyl diglyceride, 1- and 2-monopalmitin, palmitic acid, cholesterol, 1,2- and 1,3-dipalmitin, tripalmitin, methyl palmitate, cholesteryl palmitate, β-carotene and some of its degradation products, squalene and tetracosane. Digalatosyl diglyceride, phosphatidic acid, phosphatidylglucose, cerebrosides and other phospholipids remain near the origin. A mixture containing triolein, 1,2- and 1,3-diolein, 1- and 2-monoolein, oleic acid and cholesterol was resolved in one dimension. A similar series of palmitic-containing neutral lipids was also resolvable in one dimension. These procedures were applied to the TLC of human sera lipids.

LIPID COMPOSITION OF RAT BRAIN MYELIN IN TRIETHYL TIN-INDUCED EDEMA. Y. Eto, K. Suzuki and K. Suzuki (Dept. Neurol., and Div. Neuropathol., Dept. of Pathol., Univ. Pa. School of Med., Philadelphia, Pa. 19104). *J. Lipid Res.* 12, 570–79 (1971). Chronic triethyl tin intoxication was induced in young adult rats by oral feeding of triethyl tin sulfate. Progressively severe brain edema developed during the 3-month experimental period. The yield of myelin from the brains of the experimental animals decreased to almost half normal per brain, but the isolated myelin appeared morphologically normal. The analysis of whole brain showed corresponding decreases in proteolipid protein and total lipid, particularly galactolipids. The proportions of the major constituents of isolated myelin (chloroform-methanol-insoluble residue, proteolipid protein, and total lipid) were unchanged despite the low yield. However, the proportion of cholesterol increased from 16 to 21% dry weight, and that of total galactolipid decreased from 21 to 15%, as the yield of myelin decreased. This decrease of total galactolipid was mainly due to the decrease in cerebroside. Total phospholipid remained constant initially but showed a slight decrease toward the end of the experiment, due mostly to decreased ethanolamine phospholipid. There was no preferential loss or preservation of phosphatidalethanolamine. The fatty acid composition of sulfatide showed statistically significant shifts to less long-chain fatty acids and less monoenoic acids, but cerebroside and sphingomyelin did not show significant changes in the fatty acid composition.

AN ELECTRON MICROSCOPIC STUDY OF ENDOGENOUS VERY LOW DENSITY LIPOPROTEIN PRODUCTION IN THE INTESTINE OF RAT AND MAN. A.L. Jones and R.K. Ockner (Dept. of Med. and Anatomy, Univ. Cal. Med. Center, San Francisco, Cal. 94122). *J. Lipid Res.* 12, 580–89 (1971). Previous studies have shown that in the absence of dietary lipid, intestinal lymph contains endogenous very low density lipoproteins (VLDL) which are identical to those in plasma in size, flotation rate, composition and electrophoretic mobility. In order to document that these particles are produced in the mucosa of the small intestine itself, electron microscopic studies of rat and human intestinal mucosa were carried out. Absorptive cells from the small intestines of rats fasted and restrained for 48 hr were rich in osmiophilic particles of the size of VLDL (300–1000 A). These particles were present in the endoplasmic reticulum and Golgi apparatus, and in intercellular spaces and lacteals; they were most abundant in mucosa from mid-jejunum. Similar particles were seen in jejunal mucosal biopsy specimens obtained from normal human volunteers after a 40-hr fast. After 6 hr of bile diversion or cholestyramine administration to fasted rats, the VLDL-sized particles virtually disappeared from the mucosa, suggesting that they were produced in the mucosa itself and depended upon the absorption of endogenous intralumenal lipid. These studies provide further evidence for the production of VLDL in absorptive cells of fasting rat and human intestine, and support the concept that the small intestine is a source of endogenous plasma VLDL.

ESTRADIOL- AND TESTOSTERONE-INDUCED ALTERATIONS IN PHOSPHATIDYLCHOLINE AND TRIGLYCERIDE SYNTHESIS IN HEPATIC ENDOPLASMIC RETICULUM. D.L. Young (Dept. of Med., Duke Univ. Med. Center, Durham, N.C. 27706). *J. Lipid Res.* 12, 590–5 (1971). Pathways of phosphatidylcholine and triglyceride biosynthesis were studied in hepatic endoplasmic reticulum from castrated and noncastrated male rats pretreated with estradiol or testosterone. In vitro measurements of hepatic microsomal enzymes which catalyze phosphatidylcholine biosynthesis revealed a significant increase in the specific activity of the enzyme governing phosphatidylcholine biosynthesis by the sequential methylation of phosphatidylethanolamine in the estradiol-treated castrate animals. The specific activity of phosphorylcholine-glyceride transferase decreased by estradiol pretreatment in both castrate and noncastrate animals. The specific activity of diglyceride acyltransferase, which catalyzes triglyceride biosynthesis, was decreased by estradiol pretreatment in both castrote and noncastrate animals and was increased by testosterone in the castrate animals. The changes in specific activity of the enzymes governing phosphatidylcholine biosynthesis may account for the previously noted increased in vivo incorporation of methyl groups of L-methionine into hepatic phosphatidylcholine in female and estradiol-treated animals; the data suggest that in female and estradiol-treated rats a greater proportion of hepatic phosphatidylcholine is synthesized by the stepwise methylation of phosphatidylethanolamine. The decrease in diglyceride acyltransferase specific activity seen after estradiol administration may account for the lipotropic-like effect of estradiol.

INTRA- AND EXTRACELLULAR COMPARTMENTALIZATION OF THE SURFACE-ACTIVE FRACTION IN DOG LUNG. R. Pawlowski, M.F. Frosolono, B.L. Charms and R. Przybylski (Pulmonary Res. Lab., Mt. Sinai Hosp. of Cleveland, Univ. Circle, Cleveland, Ohio 44106). *J. Lipid Res.* 12, 538–44 (1971). Adult mongrel dogs were killed at various times after injection of ^{3}H-labeled palmitate. The lungs were removed and subjected to an extensive saline lavage. The surface-active fraction was isolated from the lavage and from homogenized residual lung by a procedure based upon differential centrifugation in sucrose solutions. The material isolated from the lavage was designated extracellular surfactant; material from the residual lung was designated intracellular surfactant. Both had similar chemical composition and surface activity. The results of the isotopic labeling studies demonstrate that the two fractions have distinctly different specific activity curves. Label was incorporated into the intracellular surfactant rapidly and reached a peak at 1 hr. No radioactivity was found in the extracellular surfactant for the first 15 min, and the specific activity increased much more slowly than in the intracellular surfactant. These results demonstrate at least two anatomically distinct metabolic "pools" of pulmonary surfactant in the lung. While our data are not conclusive, one possible interpretation is that the biosynthesis of pulmonary surfactant takes place intracellularly with a subsequent secretion onto the alveolar surface.

LIPID PATTERNS IN HUMAN LEUKOCYTES MAINTAINED IN LONG-TERM CULTURE. E.L. Gottfried (Dept. of Med., Cornell Univ. Med. College, New York, N.Y. 10021). *J. Lipid Res.* 12, 531–7 (1971). The lipid composition of leukocytes maintained in long-term culture was examined in order to clarify the role of immaturity in previously observed differences between normal mature leukocytes and leukemic cells. Cell cultures derived from three types of leukocytes were examined: normal lymphocytes, Burkitt lymphoma and chronic myelocytic leukemia. Lipid extracts were analyzed for total lipid weight, phospholipids, neutral lipids and glycolipids. Distribution of individual phospholipids was determined by quantitative two-dimensional thin-layer chromatography. The main phospholipids were phosphatidylcholine (51–54%) and phosphatidylethanolamine (24–25%), with smaller amounts of phosphatidylinositol, phosphatidylserine, sphingomyelin and cardiolipin. All three types of cultured cells showed a remarkable similarity in total phospholipid content (17–18 $\times$ 10^{-15} moles/cell) as well as in phospholipid distribution. More variation was seen in neutral lipid content. Glycolipid was abundant (17–24% of total lipid weight) and was present mostly as ceramide dihexoside. Compared with normal lymphocytes or polymorphonuclear leukocytes, the cultured cells showed increased phosphatidylcholine, decreased sphingomyelin and decreased cholesterol content, similar to the changes found in leukemic leukocytes. These findings suggest that the altered lipid patterns found in leukemic

leukocytes are a reflection of cell immaturity rather than a characteristic peculiar to the leukemic state.

MICROSCOPIC FAT CELL SIZE MEASUREMENTS ON FROZEN-CUT ADIPOSE TISSUE IN COMPARSION WITH AUTOMATIC DETERMINATIONS OF OSMIUM-FIXED FAT CELLS. L. Sjöström, P. Björntorp and J. Vrána (First Med. Service, Sahlgren's Hosp., Univ. of Gothenburg, Gothenburg, Sweden). *J. Lipid Res.* 12, 521–30 (1971). Diameters of fat cells in adipose tissue slices, floating in an isoosmolar solution, were measured under a microscope. The slices were obtained from percutaneous biopsies by freeze-cutting after brief formaldehyde fixation. All cells in a given part of the slice were measured, thus avoiding selection. A normal distribution of fat cell diameters could be demonstrated with this method, as has been found with previously described methods. The error of the method was 2.6% for diameter and 8.0% for weight determinations. Storage of adipose tissue at 4C for 48 hr had no effects on cell size determinations. Results with this microscopic method were compared with those obtained from a previously described method for automatic determinations of osmium-fixed fat cells. The latter method was slightly modified by using a viscous electrolyte, which prevented sedimentation of large fat cells, and by using sonication to complete cell separation. The methods agreed closely. A method for calculating mean fat cell weight using osmium-fixed fat cell is described, which makes determinations of sample wet weight and ratio of lipid to wet weight unnecessary.

THE EFFECT OF TEMPERATURE AND IODINATED CASEIN ON LIVER LIPIDS OF LAYING CHICKENS. J.H. Wolford (Poultry Sci. Dept., Michigan State Univ., E. Lansing, Mich. 48823). *Poultry Sci.* 50, 1331–5 (1971). The influence of temperature and iodinated casein on the lipid level of livers from egg-strain layers was evaluated. Placing laying chickens in a 1.7C temperature control room for 28 days significantly ($P<0.01$) reduced total liver lipids in comparison to the values observed when layers were housed at 26.7C. (9.0 vs. 20.8g./100g. wet liver weight). Feeding 0.033% iodinated casein to chickens, 23 weeks of age, for 161 days resulted in a significant ($P<0.01$) reduction in total liver lipid (12.2 vs. 23.6g./100g. wet liver weight) and total liver triglycerides (4.1 vs. 16.6g./100g. wet liver weight). Other liver lipids including sterol esters, sterols, mono- and diglycerides, cephalins and lecithins were not statistically altered. A similar significant ($P<0.01$) reduction in total liver lipid was observed in older layers (32 weeks of age) when fed either 0.016 or 0.033% iodinated casein for 42 days.

RELATION BETWEEN STRUCTURE AND RETENTION TIME OF STEROLS IN GAS CHROMATOGRAPHY. G.W. Patterson, (Botany Dept., Univ. of Maryland, College Park, Md. 20742). *Anal. Chem.* 43, 1164–70 (1971). Gas chromatographic rention times relative to cholesterol have been determined for 92 sterols and related compounds. Relative retention times were also obtained for the acetate derivatives vs. cholesterol acetate on four different columns—SE-30, QF-1, Hi-Eff 8BP, and PMPE. Sterols behave in a very predictable way in gas chromatography, so that the retention time of most sterols can be calculated from their structures. Gas chromatography can be very useful in the identification of unknown sterols because of this predictability. Although much GLC work has been accomplished using only one GLC column, it is apparent that at least three columns are necessary to even tentatively identify a sterol by gas chromatography. With the exception of sterols isomeric at C-24, all 92 of the sterols studied could be distinguished from each other on the basis of their retention times on these four columns.

ADDITIONAL EVIDENCE SUBSTANTIATING THE EXISTENCE OF A READILY PRECIPITABLE FORM OF CHOLESTEROL IN TRIGLYCERIDE SOLUTION. L.D. Wright (Grad. School of Nutr., Cornell Univ., Ithaca, N.Y. 14850). *Proc. Soc. Exp. Biol. Med.* 137, 1364–9 (1971). Experiments involving the precipitation of cholesterol from saturated solution in coconut oil by excess amounts of either ^{14}C-pimelic acid or ^{14}C-imidazole demonstrate that at equilibrium in either case there is essentially no more ^{14}C in solution than that due to the inherent solubility of the ^{14}C-pimelic acid or ^{14}C-imidazole in coconut oil. These findings are interpreted as indicating the absence of "soluble" clathrates of cholesterol and pimelic acid or imidazole and are consistent with the hypothesis that cholesterol at saturation in triglycerides is present both as a "less stable" (dimeric and/or higher form) and as a "more stable" (monomeric) form, where only the dimeric and/or higher form precipitates under the in vitro experimental conditions.

6-CHLOROCHROMAN-2-CARBOXYLIC ACIDS. SYNTHESIS AND BIOLOGICAL EVALUATION AS ANTAGONISTS FOR CHOLESTEROL BIOSYNTHESIS AND LIPOLYSIS IN VITRO. D. Witiak, E. Stratford, R. Nazareth, G. Wagner and D. Feller (Div. Med. Chem., Ohio State Univ., Columbus, Ohio 43210). *J. Med. Chem.* 14, 758–66 (1971). The synthesis of DL-6-chlorochroman-2-carboxylic acid and DL-2-methyl-6-chloro-chroman-2-carboxylic acid are presented. These compounds are cyclic analogs of the hypocholesterolemic and hypolipidemic agent α-(4-chlorophenoxy)-α-methylpropionic acid. Preliminary results on their ability to antagonize glycerol release from rat epididymal fat pads and inhibit mevalonate-2-C incorporation into nonsaponifiable material for rat liver homogenate are discussed.

FATTY ACID-REQUIRING MUTANT OF BACILLUS SUBTILIS DEFECTIVE IN BRANCHED CHAIN α-KETO ACID DEHYDROGENASE. K. Willecke and A.B. Pardee (Dept. Biol. Biochem. Sciences, Princeton Univ., Princeton, N.J. 08540). *J. Biol. Chem.* 246, 5264–73 (1971). A new mutant of *B. subtilis* is described lacking the activity of branched chain α-keto acid dehydrogenase. The mutant requires short branched chain fatty acids biosynthetically related to leucine, isoleucine and valine for growth. Long branched chain fatty acids derived from these short "primer" molecules can also serve as growth factors. One type of branched chain fatty acid, however, is sufficient to support growth of the mutant at 37C, although wild type cells of *B. subtilis* normally contain three different pairs of long branched chain fatty acids. Therefore, this mutant allows extensive alterations of the fatty acid composition in membranes of *B. subtilis*. Straight chain fatty acids do not support growth. Out of a series of tested analogues, 2-methylvalerate, 2-ethyl butyrate and trimethylacetate were found to be active in vivo as primer molecules of branched chain fatty acid biosynthesis. The chain-lengthened products derived from these primer substrates were characterized by mass spectrometry.

EFFECTS OF LIPID PEROXIDATION ON MEMBRANE-BOUND ENZYMES OF THE ENDOPLASMIC RETICULUM. E.D. Wills (Dept. Biochem. Chem., Med. College of St. Bartholomew's Hosp., Charterhouse Square, London EC1M 6BQ, U.K.). *Biochem. J.* 123, 983–91 (1971). Induction of the formation of lipid peroxide in suspensions of liver microsomal preparations by incubation with ascorbate or NADPH, or by treatment with ionizing radiation, leads to a marked decrease of the activity of glucose 6-phosphatase. The effect of peroxidation can be imitated by treating microsomal suspensions with detergents such as deoxycholate or with phospholipases. The substrate, glucose 6-phosphate, protects the glucose 6-phosphatase activity of microsomal preparations against peroxidation or detergents. All experiments lead to the conclusion that the loss of activity of glucose 6-phosphatase resulting from peroxidation is a consequence of loss of membrane structure essential for the activity of the enzyme. This group is not readily inactivated by treatment with detergents. Lipid peroxidation is a consequence of loss of membrane structure a regulating effect on the oxidative metabolism and carbohydrate metabolism of the endoplasmic reticulum in vivo.

PYRIDINE NUCLEOTIDE REQUIREMENTS OF FATTY ACID SYNTHETASES. H.B. White, III, O. Mitsuhashi and K. Bloch (Conant Lab., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* 246, 4751–54 (1971). The multienzyme fatty acid synthetase complexes from *Mycobacterium phlei, Euglena gracilia* and *Saccharomyces cerevisiae* require both TPNH and DPNH for optimal efficiency. In the presence of both nucleotides, the K_m values for TPNH and for DPNH for all three synthetase complexes are less than 5 μM. By measuring the formation of triacetic acid lactone in the presence of either DPNH or TPNH, it has been possible to show that in *M. phlei* TPNH is the specific coenzyme for the β-ketoacyl reductase step while DPNH is preferentially utilized in α,β-enoyl reduction.

TURNOVER OF PROTEIN-BOUND PHOSPHORYLSERINE IN MEMBRANE PREPARATIONS FROM OX BRAIN CATALYSED BY INTRINSIC KINASE AND PHOSPHATASE ACTIVITY. M. Weller and R. Rodnight (Dept. Biochem., Inst. Psychiatry, British Postgrad. Med. Fed., Univ. of London, DeCrespigny Park, London S.E. 5, U.K.). *Biochem. J.* 124, 393–406 (1971). The turnover of protein-bound phosphorylserine in preparations of membrane fragments from ox brain cortex was studied. Turnover was considered to arise from the action of intrinsic protein kinases and phosphatases on a membrane protein or proteins. Properties of the kinase system were studied by measuring the rate of incorporation of ^{32}P from labelled ATP into protein-bound phosphorylserine isolated from

partial acid hydrolysates of membrane proteins. Properties of the phosphatase system were studied by observing the rate of loss of ^{32}P from membrane preparations pre-labelled with ^{32}p-ATP. Net phosphorylation and dephosphorylation of membrane protein was observed during incubation of membrane preparations with and without ATP. The rate of turnover was about 4nmol of P/h per mg of protein at 20C; dephosphorylation was considered to be the rate-limiting step.

CHOLESTEROL CONTENT OF MARKET EGGS. D.E. Turk and B.D. Barnett (Poultry Science Dept., Clemson Univ., Clemson, S.C. 29631). *Poultry Sci.* **50**, 1303–6 (1971). Market eggs from layers of known ages, breeds, management systems, feed sources and geographic location were collected and analyzed for cholesterol content. The amount of cholesterol per egg increased with increasing age of the layers, but this effect was almost entirely due to the increase in egg size as the bird aged, since cholesterol concentrations in the eggs did not change with age. Eggs from broiler breeders contained significantly more cholesterol and had significantly greater cholesterol concentration than did eggs laid by commercial layer strains. Eggs from caged layers tended to contain less cholesterol than did eggs laid by birds on the floor. These differences were not significant ($P \leqslant 0.05$) and require further investigation. No differences due to strain of commercial layer, geographic location or feed source were found, indicating that these are not factors affecting cholesterol levels of market eggs. Turkey, duck and *Coturnix* quail eggs were found to have greater cholesterol concentrations than did chicken eggs.

BINDING OF DDT TO LECITHIN. I.J. Tinsley, R. Haque and D. Schmedding (Dept. of Agri. Chem. and Environmental Health, Sciences Center, Oregon State Univ., Corvallis, Or. 97331). *Science* **174**, 145–7 (1971). An interaction between DDT and lecithin is indicated by the reciprocal effects of each compound on the proton magnetic resonance spectrum of the other. The phosphoryl choline moiety of the lecithin and the benzylic proton of the DDT seem to be involved. The most pronounced response in the proton magnetic resonance spectrum of the lecithin produced by increasing concentrations of DDT was a change in the chemical shift of the resonance peak due to the protons of the choline methyl groups. Increasing concentrations of lecithin produced changes in the chemical shift of the resonance peaks of the benzylic proton and adjacent ring protons of the DDT. Equilibrium constant of 0.597 ± 0.015 molal^{-1} was obtained for this interaction.

STUDIES ON RELEASE OF LIPOPROTEIN LIPASE ACTIVITY FROM FAT CELLS. J.E. Stewart and M.C. Schotz (VA Hosp. (Wadsworth), Los Angeles, Cal. 90073). *J. Biol. Chem.* **246**, 5749–53 (1971). Several factors were studied which influence the release of lipoprotein lipase activity from fat cells incubated at 23C in Krebs-Ringer buffer containing glucose and albumin. Release was partially reduced when either glucose, calcium or potassium was omitted and was not detectable when albumin was omitted from this medium. During 45 min of incubation approximately 3 times as much lipoprotein lipase activity was found in the medium compared to the intracellular levels which remained constant during this period. When protein synthesis was inhibited with cycloheximide, the amount of intracellular lipoprotein lipase activity as well as the amount of this enzyme activity released was essentially unchanged. The release of lipoprotein lipase activity from fat cells does not require protein synthesis under the conditions investigated. To explain the 3-fold increase in enzyme activity in the absence of protein synthesis we suggest that lipoprotein lipase is activated prior to or in conjunction with release from these cells.

SEMIAUTOMATED, SPECIFIC ROUTINE SERUM CHOLESTEROL DETERMINATION BY GAS-LIQUID CHROMATOGRAPHY. J.L. Driscall, D. Aubochon, M. Descoteaux and H.F. Martin (Pathology Dept., Rhode Island Hosp., Providence, R.I.), *Anal Chem.* **43**, 1196–1200 (1971). By gas-liquid chromatography, a specific, routine, semiautomatic method for determining serum cholesterol levels at a rate of 40 samples per hour is reported. Using peak height ratio measurements, heptane extracts of saponified serum specimens containing an internal standard are chromatographed with the resulting cholesterol date having an accuracy better than 97% and a coefficient of variation of the order of 5%. The gas-liquid chromatographic results accumulated over a 12-month period agreed very favorably with cholesterol values obtained by other laboratories using the Abell-Kendall procedure.

FATTY ACID SYNTHETASE FROM LACTATING RAT MAMMARY GLAND. S. Smith and S. Abraham (Bruce Lyon Mem. Res. Lab., Children's Hosp. Med. Center of N. California, Oakland, Cal. 94609). *J. Biol. Chem.* **246**, 2537–42 (1971). Homogeneous preparations of fatty acid synthetase from mammary glands of lactating rats were used to prepare an antiserum and a γ-globulin fraction was isolated from the antiserum. The antiserum and the γ-globulin fraction were shown to be specific against the fatty acid synthetase multienzyme complex. Addition of the γ-globulin to homogenate fractions of lactating rat mammary glands resulted in complete inhibition of synthesis from acetate of fatty acids of all chain lengths. These results show that the multienzyme complex is an obligatory enzyme for the synthesis of all chain length fatty acids in the mammary glands of lactating rats.

CHANGES IN THE MOLECULAR STRUCTURE OF AXONAL AND RED BLOOD CELL MEMBRANES FOLLOWING TREATMENT WITH PHOSPHOLIPASE A_2. H. Simpkins, S. Tay and Elaine Panko (Lady Davis Inst. Med. Res., Jewish Gen. Hosp., Montreal, Quebec, Canada). *Biochemistry* **10**, 3579–85 (1971). Phospholipase A_2 treatment of erythrocyte membranes resulted in no detectable release of protein and fatty acids, but between 5 and 10% of the lipid phosphorus was released from the membranes. Also phospholipase A_2 and lysolecithin treatments result in similar changes in the polyacrylamide gel patterns of the membrane proteins of the red blood cells. It therefore appears that enzyme treatment produces changes in the lipid conformation, and specific changes in the protein conformation. The latter may solely be a result of lysophosphatidyl compounds binding to some membrane proteins, or binding plus changes produced by the conformational changes occurring in the lipid array.

A REVISED STRUCTURE FOR THE FORSSMAN GLYCOLIPID HAPTEN. B. Siddiqui and S. Hakomori (Dept. of Pathobiol., School of Public Health and Community Med., Univ. Washington, Seattle, Wash. 98105). *J. Biol. Chem.* **246**, 5766–69 (1971). A glycolipid hapten of the Forssman antigen of horse spleen was found to be a ceramide pentasaccharide, which contained 2 moles of *N*-acetylgalactosamine, 2 moles of galactose and 1 mole of glucose per ceramide. The oligosaccharide released from the Forssman hapten gave an intense Morgan-Elson reaction and 1 of the 2 moles of galactosamine was periodate resistant. With these results and those of methylation studies, the structure of Forssman hapten was proposed as N-acetylgalactosaminosyl-α-(1 $\rightarrow$ 3) N-acetylgalactosaminosyl-β-(1 $\rightarrow$ 3)galactopyranosyl-α-(1 $\rightarrow$ 4)galactopyranosyl-β-(1 $\rightarrow$ 4)glucopyranosyl-(1 $\rightarrow$ 1)ceramide.

THE EFFECT OF THE LEVEL AND SOURCE OF DIETARY FAT ON THE GROWTH, FEED SUFFICIENCY, GRADE AND CARCASS COMPOSITION OF TURKEYS. R.E. Salmon and J.B. O'Neil (Res. Station, Res. Branch, Canada Agr., Swift Current, Saskatchewan, Canada). *Poultry Sci.* **50**, 1456–67 (1971). Diets of equal calorie:protein ratio containing 0, 2 and 11.4% palm oil (PO) or rapeseed oil (RSO) were fed to male turkeys from day-old to 24 weeks of age. Body growth was depressed by 11.4% RSO but stimulated by 11.4% PO Feed conversion was inversely proportional to the level of added fat. Increasing the dietary fat level improved carcass fat scores, increased the yield of skin, the fat content of breast and thigh meat and drip losses in cooking, and decreased the yield of breast meat, thigh meat, and drumsticks and volatile cooking losses. The initial addition of 2% fat to the diet had more effect on the carcass characteristics than a further increase from 2 to 11.4% fat. Volatile cooking losses decreased and drip losses increased with increasing carcass skin percentage. The source of dietary fat influenced the carcass fat score, carcass composition and cooking losses. Back fat score and back skin fat were more reliable indicators of overall finish as measured by carcass skin percentage than breast score and breast skin fat.

BIOHYDROGENATION OF UNSATURATED FATTY ACIDS. VI. SOURCE OF HYDROGEN AND STEREOSPECIFICITY OF REDUCTION. I.S. Rosenfeld and S.B. Tove (Dept. of Biochem., N. Carolina State Univ., Raleigh, N. Car. 27607). *J. Biol. Chem.* **246**, 5025–30 (1971). The biohydrogenation of either linoleic acid or cis-9,trans-11,cis-13-octadecatrienoic acid (punicic acid) by *Butyrivibrio fibrisolvens* results in the formation of trans-11-octadecenoic acid. Incubation of whole cells with tritiated formate, tritiated succinate, and glucose labeled with tritium in various positions failed to result in the labeling of the monoenoic acid product. In contrast, ex-

periments performed in D_2O indicated that deuterium was incorporated at the cis double bond(s) reduced by the microorganism. This reduction, which takes place stereospecifically, was found to occur by cis addition to the D side of cis-9,trans-11-octadecadienoic acid, an intermediate in the biohydrogenation of linoleic acid. The distribution of deuterium at the reduced carbon atoms shows an isotope effect and leads to the speculation that reduction occurs by addition of a proton and hydride ion mediated by an unknown carrier.

SPECIFICITY AND ROLE IN CHOLESTEROL BIOSYNTHESIS OF A SQUALENE AND STEROL CARRIER PROTEIN. Mary C. Ritter and E. Dempsey (Dept. of Biochem., Univ. Minnesota, Minneapolis, Minn. 55455). *J. Biol. Chem.* **246**, 1536–47 (1971). A purified (300-fold) liver protein specifically binds squalene and sterol precursors of cholesterol and activates (4-fold or greater) the microsomal enzymic steps of cholesterol biosynthesis in which these precursors participate. This heat-stable protein appears to play a general role as vehicle for cholesterol and its water-insoluble precursors, i.e. it is a squalene and sterol carrier protein (SCP). Apo-SCP (molecular weight 16,000) aggregates to a higher molecular weight species (>150,000) during binding of squalene or sterols and yields a noncovalent squalene- or sterol-SCP complex. Apo-SCP similarly binds stoichiometric levels of a cholesterol precursor and the pyridine nucleotide cofactor required for the oxidation or reduction of the precursor, by microsomal enzymes. The apparent K_m for a particular sterol-SCP complex is markedly lower than that for initially unbound sterol, although the maximum rate of the particular reaction is unchanged. Of the other liver and serum proteins tested, only apo-high density lipoprotein (HDL) will substitute for the binding and activation functions of apo-SCP. A component of HDL may be identical with apo-SCP.

CEROID PIGMENT FORMATION AND IRREVERSIBLE STERILITY IN VITAMIN E DEFICIENCY. C. Raychaudhuri and I.D. Desai (Div. of Human Nutr., School of Home Econ. Univ. of British Columbia, Vancouver 8, Canada). *Science* **173**, 1028–9 (1971). Female rats maintained on a diet deficient in vitamin E for a prolonged period of 100 to 135 days, starting from birth, failed to conceive in spite of repeated matings. Dietary vitamin E supplementation for a period of 60 days following prolonged deficiency was ineffective in reversing the sterility, although a definite growth response was observed. These observations suggest that the tissue damage caused by lipid peroxidation, as evidenced by distinct brown ceroid pigment in the uterus and fallopian tubes, may be responsible for the irreversible loss of fertility observed in the vitamin E-deficient female rats.

THE GLUCAGON-SENSITIVE ADENYL CYCLASE SYSTEM IN PLASMA MEMBRANES OF RAT LIVER. S.L. Pohl, H. Michiel, J. Krans, V. Kozyreff, L. Birnbaumer and M. Rodbell (Natl. Inst. of Arthritis Metabolic Diseases, Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* **246**, 4447–55 (1971). Plasma membranes prepared from rat livers have been treated with digitonin or phospholipase A under conditions which result in substantial loss of glucagon-stimulated adenyl cyclase activity but no loss of fluoride-stimulated activity. These results are thought to reflect extensive modification of the structures responsible for hormone sensitivity without destruction of the catalytic component of the adenyl cyclase system in these membranes. Corresponding decreases in binding of ^{125}I-glucagon to the membranes are observed following digitonin or phospholipase A treatment. Both glucagon sensitivity of adenyl cyclase and binding of ^{125}I-glucagon can be partially restored by exposing treated membranes to aqueous suspensions of membrane lipids. The mechanism of the effects of these lipids has not been established. Pure phosphatidylserine, phosphatidylcholine, and phosphatidylethanolamine are all capable of partially restoring glucagon-stimulated adenyl cyclase activity and binding of ^{125}I-glucagon to phospholipase A-treated membranes. Of these, phosphatidylserine produces the greatest effects. Chromatographic fractions of membrane lipids produce positive and negative effects on control and treated membranes which are difficult to interpret. However, it appears that there is some specificity in the effects of the lipid fractions. These results may have significant implications regarding the relationship of adenyl cyclase systems to membrane structure and attempts to purify the components of these systems.

BIOSYNTHESIS OF PLASMALOGENS FROM ALKYL- AND ALKYL-ACYL-GLYCEROPHOSPHORYL ETHANOLAMINE IN THE RAT BRAIN. F. Paltauf (Inst. physiolog. Chemie, Univ. Graz, Austria). *FEBS Letters* **17**, 118–21 (1971). Results obtained from experiments in vivo and in vitro indicate that 0-alk-1-enyl glycerol lipids (plasmalogens) are derived from 0-alkyl glycerol lipids. However, the question has not been answered about the nature of the immediate precursor of plasmalogens. Desaturation of tht alkyl glycerol bond to an alk-1-enyl glycerol bond could possibly occur at any stage after the alkyl glycerol linkage has been formed from dihydroxy acetone phosphate and a long chain alcohol. The conversion in vivo of 1-0-(9,10-$^3H_2$ octadecyl)sn-glycerol 3-phosphoryl-(2-^{14}C) ethanolamine and its 2-octadecenoyl derivative respectively into doubly labelled plasmalogens without change of the $^3H/^{14}C$ ratio allows us to conclude that alkyl acyl GPE is the direct plasmalogen precursor in the brain. It is further suggested that this conversion represents the main route of degradation of brain alkyl glycerol lipids.

ON RATE CONTROLLING FACTORS OF LONG CHAIN FATTY ACID OXIDATION. S.V. Pande (Lab. of Nutr., Clin. Res. Inst. of Montreal, Montreal 130, Québec, Can.). *J. Biol. Chem.* **246**, 5384–91 (1971). Under appropriate conditions, mitochondria from red and white skeletal muscle of rabbit and from heart and liver of rat respired as rapidly with palmitoyl-coenzyme A plus carnitine as with palmitoyl carnitine. The ability of heart and skeletal muscle mitochondria to oxidize palmitoyl groups is limited by the acetyl-CoA-producing capacity of the β oxidation cycle rather than through a limitation of the citric acid cycle or by the capacity of electron transport oxidative phosphorylation system. In liver mitochondria, however, acetyl-CoA production from palmitoyl group appears to be limited by the capacity of the electron transport oxidative phosphorylation system. Mitochondria of liver, like those of heart or skeletal muscles, oxidize palmitoyl groups nearly completely to CO_2 when the citric acid cycle is functional but only to the oxidation level of acetate when the operation of the citric acid cycle is blocked. Under the latter conditions, the rate of acetyl group production from palmitoyl group increases in mitochondria of liver but not in those of heart or of skeletal muscles. Thus ketone body production in liver may be dependent on the suppression of the citric acid cycle. The activities of carnitine palmitoyltransferase and of ATP-dependent long chain acyl-CoA synthetase are unlikely to limit fatty acid oxidation in tissues of adult animals. It is suggested that the prevailing concentration ratio of long chain acyl-CoA esters to that of ADP near mitochondria may be one of the important factors that normally controls the rate of long chain fatty acid oxidation in vivo.

A NOVEL PROSTAGLANDIN DERIVATIVE FORMED FROM ARACHIDONIC ACID BY RAT STOMACH HOMOGENATES. C. Pace-Asciak and L.S. Wolfe (Donner Lab. of Exptl. Neurochem., Montreal Neurological Inst., McGill Univ., Montreal, Canada). *Biochemistry* **10**, 3657–64 (1971). A novel derivative of prostanoic acid was isolated during the biosynthetic conversion of arachidonic acid into prostaglandins by rat stomach homogenates. The structure proposed is 6(9)-oxy-11,15-dihydroxyprosta-7,13-dienoic acid (I). The elucidation of this structure was based on infrared and nuclear magnetic resonance spectroscopy, mass spectrometry of several derivatives and products obtained from oxidative ozonolysis. Evidence for the occurrence in minor amounts of an isomer of I, i.e., 6(9)-oxy-11,15-dihydroxyprosta-5,13-dienoic acid (II) was obtained from mass spectrometry of products of oxidative ozonolysis. Prostaglandins E_2 and $F_{2\alpha}$ were also isolated in smaller amounts and identified by mass spectrometry. Two pathways for the formation of I are proposed.

POLYHYDROXY CYCLIC ETHERS FORMED FROM TRITIATED ARACHIDONIC ACID BY ACETONE POWDERS OF SHEEP SEMINAL VESICLES. C. Pace-Asciak. *Ibid.*, 3664–69. Three novel derivatives of polyunsaturated fatty acids were isolated during the enzymatic conversion of tritiated arachidonic acid into prostaglandins by acetone powders of sheep seminal vesicles. Two were derived from exogenous tritiated arachidonic acid and are: 9(12)-oxy-8,11,15-trihydroxyeicosa-5,13-dienoic acid (I) and 6(9)-oxy-11,15-dihydroxyprosta-7,13-dienoic acid (II). The third compound, 9(12)-oxy-8,11,15-trihydroxyeicosa-13-enoic acid (III), was derived from endogenous eicosatrienoic acid. Compound II was also shown to be formed from arachidonic acid by rat stomach homogenates. The structure of I was elucidated mainly by mass spectrometry of several derivatives and of the products of oxidative ozonolysis. Compounds III and I could be converted into the same compound by catalytic reduction.

MECHANISM OF SQUALENE CYCLIZATION. L.J. Mulheirn and E. Caspi (Worcester Found. for Exptl. Biol., Shrewsbury, Mass. 01545). *J. Biol. Chem.* 246, 2494–2501 (1971). It is generally accepted that the C-20 cation or its stabilized equivalent is an intermediate in the biosynthesis of certain triterpenes and sterols. To evaluate this hypothesis the biosynthesis of the protosterol, fusidic acid, was investigated. Fusidic acid was biosynthesized by incubating the fungus *Fusidium coccineum* on a medium containing (3RS, 4R)-(2-^{14}C,4-^{3}H)-mevalonic acid (MVA). The obtained fusidic acid was shown to contain 6 ^{14}C atoms and 4 tritium atoms. It was proven that tritium atoms were located at the critically important 9β and 13α positions. Evidence was also adduced for the location of the remaining 2 tritium atoms at the 5α and 24 positions. The results show that the tritium atoms derived from 4-pro-R position of MVA are located at the theoretically predicted positions.

THE EFFECTS OF SYNTHETIC SURFACTANTS ON INTESTINAL PERMEABILITY TO GLUCOSE IN VITRO. J.D. Moore, M.L. Zatzman and D.E. Overack (Dept. of Physiol. and Dept. of Anat., Univ. of Missouri Med. Center, Columbia, Mo. 65201). *Proc. Soc. Exp. Biol. Med.* 137, 1135–40 (1971). Two anionics, a cationic and a nonionic synthetic surfactant, were examined in an in vitro phloridzinized preparation for their effects on passive intestinal permeability to glucose. These agents increased intestinal permeability to glucose in a dose-related manner with the anionic surfactant, linear alkylate sulfonate, producing this effect at lower concentrations than any of the other surfactants tested. Histologic observations demonstrated that the mucosal epithelium was not altered by low surfactant concentrations which increased intestinal permeability. Increased glucose permeability could account, in part, for decreased glucose uptake by the intestine when exposed to detergents due to the production of a "leak" at the mucosal surface preventing a glucose gradient to be established between the mucosal cell and the serosal border.

INVESTIGATION OF THE COMPONENT REACTIONS OF OXIDATIVE DEMETHYLATION OF STEROLS. W.L. Miller, D.R. Brady and J.L. Gaylor (Grad. School of Nutr., Cornell Univ., Savage Hall, Ithaca, N.Y. 14850). *J. Biol. Chem.* 246, 5147–54 (1971). The metabolism of 4α-hydroxymethyl sterols by rat liver microsomes has been studied. Oxidation of the 4α-hydroxymethyl group to a carboxylic acid requires oxygen and reduced pyridine nucreotide. On the other hand, anaerobic dehydrogenation to the carboxylic acid is very low. Thus, in sharp contrast to earlier suggestions, it appears that oxidation of the hydroxymethyl group is catalyzed by microsomal mixed function oxidases. Oxidations of 4α-hydroxymethyl-5α-cholest-7-en-3β-ol and 4β-methyl-4α-hydroxymethyl-5α-cholest-7-en-3β-ol may be catalyzed by the same liver microsomal system. Furthermore, the properties of the oxidases that catalyze formation of 4α-carboxylic acids from 4α-methyl and 4α-hydroxymethyl groups are very similar.

EFFECT OF SELENIUM, SYNTHETIC ANTIOXIDANTS AND VITAMIN E ON THE INCIDENCE OF EXUDATIVE DIATHESIS IN THE CHICK. M.M. Mathias and D.E. Hogue (Dept. of Animal Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Nutr.* 101, 1399–1402 (1971). The direct capabilities and possible interactions of selenium, vitamin E, ethoxyquin and DPPD to prevent exudative diathesis (ED) and death was assessed in selenium- and vitamin E-depleted chicks. There was a strong interaction ($P<0.001$) between selenium and vitamin E and a weak interaction ($P<0.05$) between selenium and ethoxyquin for prevention of death. Deaths without signs of ED were observed when 300 or 500 ppm ethoxyquin or a combination of 200 ppm ethoxyquin and 1000 ppm DPPD were fed. These findings were interpreted as an inability of synthetic antioxidants in the presence of low levels of selenium and vitamin E to prevent death due to a selenium deficiency while partially capable of preventing ED.

INFLUENCE OF INSULIN, HYDROCORTISONE AND THYROXINE ON FATTY LIVER OF RATS FED A LOW CASEIN DIET SUPPLEMENTED WITH METHIONINE. K. Noda (Dept. of Nutr., School of Med., Tokushima Univ., Tokushima, Japan). *J. Nutr.* 101, 1391–98 (1971). Young rats fed an 8% casein diet supplemented with 0.3% methionine (methionine-supplemented diet) consumed more food and had a higher liver lipid content than animals fed an 8% casein diet (basal diet). With both diets, hydrocortisone injection significantly increased the liver content of intact or adrenalectomized rats, while thyroxine administration did not alter the liver lipid content of intact rats. In alloxan diabetic rats, the liver lipid content decreased although food intake increased. Injection of insulin into intact rats elevated the liver lipid content, the increase being greater in animals fed the basal diet than in those fed the methionine-supplemented diet. Insulin administration to adrenalectomized rats also increased the liver lipid. The level of immunoreactive insulin in the plasma of rats fed the methionine-supplemented diet was higher than that of animals fed the basal diet, but the level of plasma glucocorticoids was lower. There seemed to be no difference in the levels of plasma protein-bound iodine in the two groups. These results seem to indicate that insulin plays an important role in the accumulation of liver lipid due to methionine supplementation.

THE CONTRACEPTIVE ACTION OF GLYCEROL IN CHICKENS. W.J. Neville, J.W. MacPherson and B. Reinhart (Depts. of Animal Sci. and Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada). *Poultry Sci.* 50, 1411–5 (1971). Glycerol was added to chicken semen 5 to 10 minutes prior to insemination, at increasing levels up to 9% by volume of the semen extender. Fertility was determined by candling the eggs on day 7 of incubation. Fertility and hatchability levels of chicken eggs were significantly reduced ($P<0.01$) by the inclusion of even 1% of glycerol in the semen extender. There were no significant differences between fertility and hatchability. There was a very rapid recovery ($P<0.01$) in fertility and hatchability of eggs from chickens which were previously treated with glycerolated semen when insemination with non-glycerolated semen was practiced. However, there was still a significant depression ($P<0.05$) in the fertility and hatchability levels of the groups previously inseminated with glycerolated semen as compared with the control group.

THE INCORPORATION OF CAROTENOID PIGMENTS IN THE EGG YOLK OF CHICKEN AND ITS EMPLOYMENT TO MEASURE THE CAUSES OF ONE DAY PAUSES IN OVIPOSITION. E. Lifschitz, F. Manso, D. Suárez and E.A. Favret (Centro de Investigaciones en Ciencias Agronómicas, Castelar, Argentina). *Poultry Sci.* 50, 1017–21 (1971). Studies were undertaken to determine if the induced fluctuations of carotenoid pigment content in the egg yolk of chicken could allow a study of the ovule maturation process and the possible causes of the interruptions in the oviposition cycles. The results obtained are summarized as follows: A change in the feeding conditions every four days does not mark a cycle but if the pigment concentration of eggs laid during the second change is considered, the results suggest that the maturation course is not adjusted to a lineal development but is a parabolic one. A change in the feeding conditions every seven days produces changes that coincide with the period of fast maturation. The value of the mean regression coefficient estimated is 4.30 carotenoid units per day. The results obtained suggest that the assimilation index of carotenoid could allow a study of the way in which a pause in laying was manifested with this method. The statistical analysis of the distribution of the differences in pigment contents between eggs laid on consecutive days, between eggs within three consecutive eggs the middle one is artificially eliminated and the same difference when a one day pause exists between them, suggests that the distribution would be the result of the combination of several phenomena with the same final effects, as could be the loss of ovules.

VITAMIN C EFFECT OF AN OXIDIZED DIET. M.P. Lamden, R. Korson, and Perlita Riego (Dept. of Biochem. and Pathol., Univ. of Vermont College of Med., Burlington, Vt. 05401). *Proc. Soc. Exp. Biol. Med.* 137, 1249–53 (1971). Guinea pigs on an oxidatively rancid, ascorbic acid-free test diet showed a lesser degree of scurvy when compared to overtly scorbutic animals on the nonrancid ascorbic acid-free test diet. Simultaneous administration of alpha tocopherol, an antioxidant and free radical scavenger, to guinea pigs on the rancid, ascorbic acid-free diet blocked the antiscorbutic effect. It is postulated that lipid peroxidation may act antiscorbutically by supplying the free hydroxyl radical ordinarily arising in the presence of ascorbic acid.

THE REGULATION OF HEPATIC TRIGLYCERIDE METABOLISM BY FREE FATTY ACIDS. K. Kohout, B. Kohoutova and M. Heimberg (Dept. of Pharmacol., Vanderbilt Univ., School of Med., Nashville, Tenn. 37203). *J. Biol. Chem.* 246, 5067–75 (1971). Livers from normally fed male rats were perfused in vitro with equimolar quantities of either caproic, caprylic, lauric, palmitic, stearic, oleic, linoleic or linolenic acid. The concentration of free fatty acid in the medium was maintained at approximately 0.5 mM by constant infusion of the fatty acid during the experimental period of 4 hours. The rate of uptake of free fatty acid by the liver, about 13.2 μ moles per g of liver per hour, was similar for all fatty acids. The total output of triglyceride by the liver, however, was a function

of the chemical structure of the specific fatty acid infused. The differential effects of the various free fatty acids on secretion of triglyceride by the liver may, in part, be the mechanism by which dietary factors in the intact animal influence the concentration of triglyceride in the serum.

WATER-HOLDING LIPID AND WATER TRANSMISSION THROUGH HOMEOTHERMIC AND POIKILOTHERMIC SKINS. C. Jalenko, III and J.M. Ginsburg (Dept. of Surg. and Phys., Med. College of Ga., Augusta, Ga. 30902). *Proc. Soc. Exp. Biol. Med.* 136, 1059–62). Water transmission was measured through isolated human, rabbit, marine fish and frog skins. The water transmission rate of fish and frog skins approximates free evaporation of water, and is 6 to 20 times greater than in mammalian skins. Human and rabbit skins contain a hexane-soluble lipid which appears to be the major regulator of passive water holding. This hexane-extractable lipid was not detected in the fish or frog skin. Burned mammalian skin contained 30% or less of the normal water-holding lipid and transmitted up to 4 times more water than intact skin. Water transmission by the surfaces examined was inversely proportional to the water-holding lipid content of the surface. The postburn decrease of hexane-extractable lipid in burned mammals was associated with production of a surface which closely resembles the skin of poikilotherms in water transmissivity and thermoregulatory capability. The maintenance of homeothermia may therefore be, in part, related to the presence of water-holding lipid in the skin.

25-HYDROXYDIHYDROTACHYSTEROL$_3$. BIOSYNTHESIS IN VIVO AND IN VITRO. R.B. Hallick and H.F. DeLuca (Dept. of Biochem., College of Agricultural and Life Sciences, Univ. Wisconsin, Madison, Wisc. 53706). *J. Biol. Chem.* 246, 5733–38 (1971). Dihydrotachysterol$_3$-1,2-^{3}H, specific activity 350 Ci per mole, was chemically synthesized from 5-cholestene-3β-yl-1,2-^{3}H benzoate. The structural assignment and radiochemical purity were confirmed by ultraviolet spectrum and co-chromatography with crystalline dihydrotachysterol$_3$. The metabolism of an intravenous dose of 0.65 nmole of dihydrotachysterol$_3$-1,2-^{3}H in vitamin D-deficient rats was studied by chromatographing $CHCl_3$-MeOH extracts of serum on Sephadex LH-20. The major polar metabolite of dihydrotachysterol$_3$ was isolated and identified as 25-hydroxydihydrotachysterol$_3$ by co-chromatography with synthetic 25-hydroxydihydrotachysterol$_3$. In vitro biosynthesis of 25-hydroxydihyrdotachysterol$_3$ from dihydrotachysterol$_3$ was demonstrated in a liver homogenate system previously described for the 25-hydroxylation of vitamin D$_3$.

THE ASSOCIATION OF THE GALACTOSYL DIGLYCERIDES OF BRAIN WITH MYELINATION. I. CHANGES IN THE CONCENTRATION OF MONOGALACTOSYL DIGLYCERIDE IN THE MICROSOMAL AND MYELIN FRACTIONS OF BRAIN OF RATS DURING DEVELOPMENT. T. Inoue, D.S. Deshmukh and R.A. Pieringer (Dept. of Biochem., Temple Univ. School of Med., Philadelphia, Pa. 19140). *J. Biol. Chem.* 246, 5688–94 (1971). Through the use of a sensitive and specific gas chromatographic assay, the concentration of monogalactosyl diglyceride has been measured in whole brain and in fractions of brain from rats of varying ages. The concentration of monogalactosyl diglyceride in whole brain was barely measurable before 10 days of age; increased sharply especially after 16 days up to about 20 days of age; and then decreased rather quickly to adult values. In adult brain, most of the monogalactosyl diglyceride was associated with myelin (64 to 68%); the next highest amount (15 to 18%) was recoverable from the microsomal fractions. These data indicate that a temporal relationship exists between the site of synthesis (microsomal) and site of deposition (myelin) of monogalactosyl diglyceride.

II. THE INABILITY OF THE MYELIN-DEFICIENT MUTANT, JIMPY MOUSE, TO SYNTHESIZE GALACTOSYL DIGLYCERIDES EFFECTIVELY. *Ibid.*, 5695–99. The brain of the jimpy mouse, a mutant with a severe deficiency of myelin in the central nervous system, has little ability to synthesize galactosyl diglyceride. Lipase and α- and β-galactosidase activity in the brain of the jimpy mouse were the same as in normal littermates. Thus the very low concentration of monogalactosyl diglyceride found in the brain of the jimpy (19 nmoles per g, wet wt) compared with the normal (438 nmoles per g, wet wt) must be attributed to low synthesis by a galactosyltransferase pathway rather than to overly active degradative enzymes. The relative inability of the jimpy mouse to make and to transfer galactosyl diglyceride to myelin correlates well with relative absence of myelin in the jimpy and supports the contention that the galactosyl diglycerides are associated with the process of myelination.

BILIARY AND URINARY EXCRETION AND ENTEROHEPATIC RECYCLING OF VITAMIN A IN SHEEP. I.D. Hume, G.E. Mitchell, Jr. and R.E. Tucker (Dept. of Animal Sci., Univ. of Kentucky, Lexington, Ky. 40506). *J. Nutr.* 101, 1169–77 (1971). Mature ewes fitted with bile duct cannulae and urinary bladder catheters were used to study the excretion and enterohepatic recycling of vitamin A. In the first experiment, in which collected bile was replaced by duodenal infusion of unlabeled bile, 55.9% of the activity injected as retinoic acid-14-^{14}C was recovered in the bile in 24 hours and 39.6% in the urine. When retinyl acetate-11,12-^{3}H was injected, only 7.9% of the activity appeared in the bile in 24 hours and 8.7% in the urine. This supports the proposed roles of retinyl esters as storage forms, and retinoic acid as a possible end product, of vitamin A metabolism. In a second experiment, 22.9% of the activity from retinyl acetate-11,12-^{3}H was recovered in the bile in 24 hours when collected bile was not replaced, but this increased to 31.0% ($P<0.001$) when bile was replaced. Differences in vitamin A status may explain the different biliary recoveries of the radioactivity from retinyl acetate-11,12-^{3}H (7.9% vs. 31.0%) obtained on separate ocasions under similar conditions. In the final experiment 25.3% of the activity infused into the duodenum as ^{14}C-labeled biliary vitamin A metabolites was excreted in the bile in 24 hours, indicating substantial recycling of vitamin A metabolites from the intestine to the liver of sheep.

THE ROLE OF CHOLESTERYL 14-METHYLHEXADECANOATE IN PEPTIDE ELONGATION REACTIONS. J. Hradec and Z. Dusek (Dept. of Biochem., Oncological Inst., Prague 8, Czechoslovakia). *Biochem J.* 123, 959–66 (1971). Peptide-elongation factors were purified from rat liver and human tonsils and the contents of cholesteryl 14-methylhexadecanoate were determined in fractions obtained during enzyme purification. The relative contents of this compound in purified enzyme preparations was several times higher than that in the crude starting material. Elongation factors from human tonsils contained a significantly larger quantity of the cholesteryl ester than enzyme from rat liver. Transfer enzymes extracted with various organic solvents showed decreased activities in both binding and peptidization assay. The decrease of enzymic activity was proportional to the amount of cholesteryl 14-methylhexadecanoate extracted from a given enzymic preparation. In systems containing both extracted elongation factors the polyphenylalanine synthesis was limited by the residual activity of the less active transfer factor. The original enzymic activity of extracted transferases was fully recovered by the addition of pure cholesteryl 14-methylhexadecanoate in quantities corresponding to those extracted. Increase of the relative contents of this cholesteryl ester during enzyme purification, decrease of the enzymic activity after the extraction and its recovery by the addition of this compound indicates that the presence of this ester in elongation factors is essential for the normal function of these enzymes.

KIDNEY: PRIMARY SOURCE OF PLASMINOGEN AFTER ACUTE DEPLETION IN THE CAT. R.F. Highsmith and D.L. Kline (Dept. of Physiol., Univ. of Cincinnati College of Med., Cincinnati, Ohio 45219). *Science* 174, 141–2 (1971). The kidney was the primary source of plasminogen to restore normal plasma levels, after acute plasminogen depletion was produced by injection of streptokinase in cats. The concentration of plasminogen in the hepatic vein remained below that in the artery during the time when concentrations in the artery and renal vein were returning to normal.

CHOLESTEROL-ESTERIFYING ACTIVITY IN SERUM OF THE CHOLESTEROL-FED RABBIT. S. Hashimoto and S. Dayton (Med. Service and Res. Service, Wadsworth Vet. Hosp., Los Angeles, Cal. 90073). *Proc. Soc. Exp. Biol. Med.* 137, 1186–9 (1971). Serum LCAT activity was studied in hypercholesterolemic rabbits, employing an assay mixture in which initial substrate concentrations were fixed. Activity of the enzyme was indistinguishable from that in normal control serum.

THE CHARACTERIZATION OF A DISCRETE SERIES OF LOW DENSITY LIPOPROTEINS IN THE DISEASE, HYPER-PRE-β-LIPOPROTEINEMIA Mary Hammond and W.R. Fisher (Dept. of Med. and Biochem., College of Med., Univ. of Florida, Gainesville, Fa. 32601). *J. Biol. Chem.* 246, 5454–66 (1971). Five separate low density lipoproteins (LD lipoproteins) have been isolated from the plasma of a group of subjects with the disease hyper-pre-β-lipoproteinemia. These lipoproteins have been shown to be discrete, stable components within the LD lipoprotein class which may be isolated repeatedly by differential density ultracentrifugation from the serum of these subjects. The marked density and molecular weight heterogeneity ob-

served within the lipoproteins constituting the LD lipoprotein class in these subjects with the disease hyper-pre-β-lipoproteinemia is in apparent contrast to that observed with LD lipoprotein from normal subjects. It is thus tempting to speculate that a structurally altered apoprotein occurs in these patients which binds lipid in an atypical fashion and thus generates the multiple components found within the LD lipoprotein class of these subjects with this familial disease.

ON THE METABOLISM OF PROSTAGLANDIN $F_{2\alpha}$ IN FEMALE SUBJECTS. Elisabeth Granström and B. Samuelsson (Dept. of Med. Chem., Royal Vet. College, S-104 05 Stockholm 50, Sweden). *J. Biol. Chem.* **246**, 5254–64 (1971). Metabolites of prostaglandin $F_{2\alpha}$ administered intravenously to female subjects were isolated. The structures of the two main compounds were 5α-7α-dihydroxy-11-ketoterranorprosta-1,16-dioic acid and its δ-lactone. The elucidation of their structures was based on gas chromatography and mass spectrometry of several derivatives and on infrared and nuclear magnetic resonance spectrometry. The structure of the δ-lactone was further established by its conversion into 5α-, 7α-dihydroxy-11-ketotetranorprosta-1,16-dioic acid by alkaline hydrolysis and by mass spectrometry of a derivative obtained by borodeuteride reduction. A pathway for the formation of 5α, 7α-dihydroxy-11-ketotetranor-prosta-1,16-dioic acid from prostaglandin $F_{2\alpha}$ is proposed.

ESTROGEN RECEPTORS. G. Giannopoulos and J. Gorski (Dept. of Physiol. and Biophys., Univ. Ill., Urbana, Ill. 61801). *J. Biol. Chem.* **246**, 2524–29 (1971). Quantitative studies were carried out on the uptake and binding of ^{3}H-estrogen in the cytoplasm of rat uterus and the subsequent appearance of the estrogen in the nuclear fraction. At high levels of estrogen (2×10^{-9}M) the 8 S binding protein in the cytosol rapidly (within 5 min) became saturated with estrogen, and within one hour 90% had disappeared from the cytoplasm. Concomitantly, the estrogen appeared in the nucleus. Lower concentrations of estrogen result in peaks of cytoplasmic binding at 15 to 60 min. The estrogen-binding protein extracted from the nuclear fraction was unable to bind additional estrogen, indicating that its binding sites were saturated. Movement of estrogen into the nucleus showed a straight line relationship with concentration at all levels of saturation. This strongly suggests that the native state of the estrogen-binding protein has a single estrogen binding site.

LIPOXYGENASE FROM POTATO TUBERS. T. Galliard and D.R. Phillips (Agr. Res. Council Food Res. Inst., Colney Lane, Norwich NOR 70F, U.K.). *Biochem. J.* **124**, 431–8 (1971). A lipoxygenase (EC 1.13.1.13) was partially purified from potato tubers and was shown to differ from previously characterized soybean lipoxygenases in the positional specificity and pH characteristics of the oxygenation reaction. The potato enzyme converted linoleic acid almost exclusively (95%) into 9-D-hydroperoxy-octadeca-trans-10,cis-12-dienoic acid. The 13-hydroperoxy isomer was only a minor product (5%). Linolenic acid was an equally effective substrate, which was also oxygenated specifically at the 9-position. The enzyme had a pH optimum at 5.5–6.0 and was inactive at pH 9.0. A half-maximal velocity was obtained at a linoleic acid concentration of 0.1 mM. No inhibition was observed with EDTA (1 mM) and cyanide (1 mM) or with *p*-chloromercuribenzoate (0.2 mM). Haemoproteins were not involved in the lipoxygenase activity. The molecular weight of the enzyme was estimated from gel filtration to be about 10^5. Preliminary evidence suggested that the enzyme oxygenated the *n*-10 position of fatty acids containing a penta(*n*-3, *n*-6)diene structure.

LOSS OF HYDROGEN FROM DIHYDROXYACETONE PHOSPHATE DURING GLYCERYL ETHER SYNTHESIS. S.J. Friedberg, A. Heifetz and R.C. Greene (Dept. of Physiol. and Med., Univ. of Texas Med. School, San Antonio, Texas 78229). *J. Biol. Chem.* **246**, 5822–27 (1971). In order to obtain information on the mechanism of ether bond formation in the synthesis of 0-alkyl lipids, a study was carried out to determine if there is a loss of hydrogen from carbon 3 of dihydroxyacetone phosphate (DHAP) (non-phosphorus-linked carbon) in the course of its incorporation into glyceryl ethers. Accordingly, a mixture of (1,3-$^3H_2$) DHAP and (1,3-$^{14}C_2$) DHAP was prepared. In a microsomal enzyme system from *Tetrahymena pyriformis* which synthesizes 0-alkyl lipids, it was found that there was a loss of hydrogen from carbon 3 of glyceryl ethers synthesized from double-labeled DHAP. The loss was quantitatively consistent with the labilization of one of the hydrogens linked to carbon 3 of DHAP and was not due to isomerase activity.

LIPIDS AND FATTY ACIDS OF SARCOLEMMA, SARCOPLASMIC RETICULUM AND MITOCHONDRIA FROM RAT SKELETAL MUSCLE. W. Fiehn, J.B. Peter. J.F. Mead and M. Gan-Elepano (Dept. Med., UCLA School of Med., Los Angeles, Cal. 90024). *J. Biol. Chem.* **246**, 5617–20 (1971). The major classes of neutral lipids and the phospholipids were determined in sarcolemma, fragmented sarcoplasmic reticulum, and mitochondria of rat skeletal muscle. The lipid composition of the sarcolemma is clearly different from that of sarcoplasmic reticulum and mitochondria. The sarcolemma contains a high content of phosphatidylserine and sphingomyelin in the phospholipid as well as large amounts of cholesterol, cholesterol ester and fatty acids in the neutral lipid fraction. The fatty acid content of the neutral lipids is high in 16:0 + 18:0 and is less unsaturated than that of mitochondria or fragmented sarcoplasmic reticulum, which are very similar. Each of the cell fractions shows a distinct fatty acid pattern in the phospholipid fraction.

THE EFFECT OF VITAMIN E ON THE OXIDATION STATE OF SELENIUM IN RAT LIVER. A.T. Diplock, H. Baum and J.A. Lucy (Dept. Biochem , Royal Free Hospital School of Medicine, Univ. London, London WC1N 1BP, U.K.). *Biochem. J.* **123**, 721–29 (1971). ^{75}Se as $Na_2{}^{75}SeO_3$ was administered orally to rats under different nutritional conditions. The selenium found in the liver subcellular organelle fractions was present in at least three oxidation states: acid-volatile selenium, assumed to be selenide, zinc-hydrochloric acid-reducible selenium, assumed to be selenite, and higher oxidation states of selenium and organic derivatives, called selenate for convenience. These results are consistent with the hypothesis that the active form of Se may be selenide and that the selenide may form part of the active centre of an uncharacterized class of catalytically active non-haem-iron proteins that are protected from oxidation in vivo by vitamin E.

ON THE FUNCTION OF BILE SALTS AND PROTEINS AS COFACTORS OF LIPASE. H. Brockerhoff (Fisheries Res. Board of Canada, Halifax Lab., Halifax, Nova Scotia). *J. Biol. Chem.* **246**, 5828–31 (1971). Pancreatic lipase is rapidly and irreversibly inactivated at a hexadecane-water interphase. The unfolded protein is only very slowly, in the course of hours or days, released into the aqueous phase. Bile salts prevent the denaturation of the lipase. Bovine albumin also protects the enzyme. Denaturation of lipase occurs also at the interphase of the substrates, tributyrin or olive oil, and water. Kinetic studies show that taurocholate and albumin prevent but cannot reverse the unfolding of the enzyme. The accelerating effect that these agents have on lipolysis can be explained on this basis. It is concluded that it is one of the functions of bile salts, and of proteid cofactors, to protect the native structure of lipase and to keep the oil-water interphase free from blockage by unfolded proteins. Despite its preferential specificity for insoluble triglycerides, lipase is not better adapted to an existence at the oil-water interphase than other enzymes.

• Drying Oils and Paints

PHOTOCHEMICAL REACTIONS OF UNSATURATED FATTY ACID METHYL ESTER. I. PHOTO-DIMERIZATION OF METHYL β-ELEOSTEARATE IN SOLUTION IN N-HEPTANE. O Suzuki and T. Hashimoto (Nat. Ind. Expt. Sta., Tokyo, 1-1-5 Honmachi, Shibuya, Toyko). *Yukagaku* **20**, 72–77 (1971). β-Eleostearate could be dimerized in n-heptane under high intensity Hg illumination. Kinetic studies showed that the reaction was based on first order kinetics and suggested that the excitation of eleostearate by the illumination was the rate limiting of reaction; 274 ± 30 mμ was effective wave length for this reaction.

II. PHOTO-DIMERIZATION OF METHYL β-ELEOSTEARATE IN CCl_4 AND CCl_3H. *Ibid.*, 143–8. Methyl β-eleostearate was dimerized in CCl_4 and CCl_3H. However, in these chlorinated solvents the dimer produced was chlorinated. The dimerization in CCl_4 was based on a first order reaction, but in CCl_3H it was not. The dimerization in CCl_4 was about 6 times as fast as that in n-heptane.

ISOMERISED SAFFLOWER OIL. II. V.Markandey, G.S.R. Sastry, B.G.K. Murthy and J.S. Aggarwal. *Paint Manuf.* **41** No. 5, 40–1 (1971). Of the various catalysts tried for the isomerisation of safflower oil, anthraquinone (5%) at 250–260C for 3 hr gave the maximum amount of conjugation (24.6%), the major portion of which (14%) was a *trans-trans* isomer. (World Surface Coatings Abs. No. 351)

(Continued on page 32A)

Call for Nominations for Ninth AOCS $2500 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; and E.S. Lutton, October 1971.

The award consists of $2,500 accompanied by an appropriate certificate. It is now planned that the ninth award will be presented at the AOCS Fall Meeting in Ottawa, Canada, September 24–28, 1972.

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; B.A. Greenwell; R.H. Purdy; Dorothy M. Rathmann; and G. Sumrell. The function of this committee is to solicit nominations for the ninth 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, USDA-ARS-DPL, 14th St. and Independence Ave., S.W., Washington, D.C. 20250, before the deadline of April 15, 1972. The supporting documents shall consist of professional biographical data, including a summary of the nominee's research accomplishments, a list of his publications, the degrees he holds, together with the names of the granting institutions, and the positions held during his professional career. There is no requirement that either the nominator or the nominee be a member of the American Oil Chemists' Society.

Remember the DEADLINE, April 15, 1972

• *Abstracts . .*

(Continued from page 30A)

PERMEABILITY OF MODIFIED ALKYD RESIN FILMS. P.H. Gedam, R. Vittal Rao, M.A. Sivasamban and J.S. Aggarwal. *Paint Manuf.* 41 No. 3, 23–5 (1971). Water vapour permeability of free films of alkyd resins modified with refined sardine oil and upgraded sardine oil has been compared with that of alkyd resins of similar oil lengths but modified with linseed, soybean, safflower and dehydrated castor oils. The permeability of upgraded sardine oil alkyd films was the lowest among the long oil length alkyds. In medium oil length alkyds, linseed oil alkyd was the least permeable. Medium oil length alkyds had much lower water vapour permeability than their long oil counterparts. (World Surface Coatings Abs. No. 351)

ANOTHER LOOK AT OITICICA OIL. A.E. Rheinbeck and P.R. Sampath (North Dakota State Univ.). *J. Paint Technol.* 43(560), 89–97 (Sept., 1971). Analyses of the fatty acid composition of oiticica oil revealed a much lower concentration of licanic acid than previously reported. Based on these analyses, products were prepared by incorporating acrylic copolymer resins through reactions involving the keto acid. A number of products exhibited definite improvements in film properties. These properties were significantly influenced by the amount of oiticica oil in the copolymers. With less than 25% oil, the products gave hard and brittle films. Soft and tacky films were obtained from products containing 50% or more oil. The latter products, however, were found to yield good films upon baking.

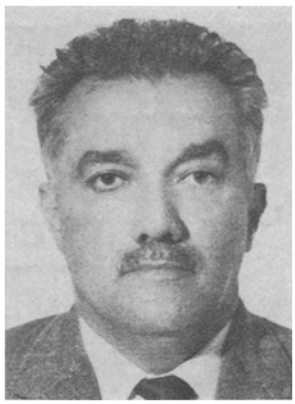
ALKYDS OF UNSATURATED DIBASIC ACIDS, POLYOLS, AND UNSATURATED FATTY ACID ESTERS. L.O. Cummings (Pacific Vegetable Oil Corp.). *U.S. 3,620,989.* A distinctive alkyd is made by reacting an unsaturated dibasic acid or anhydride (*e.g.*, maleic anhydride or fumaric acid) with an unsaturated fatty acid ester which has been alcoholized with a polyol (*e.g.*, ethylene glycol). This alkyd can then be emulsion copolymerized with various monomers (*e.g.*, vinyl acetate, styrene) to produce a high molecular weight polymer which is thermosetting and forms tough homogeneous films.

• Detergents

SOAP COMPOSITIONS. F. Lancashire (Procter and Gamble, Ltd.). *U. S. 3,536,628.* Soap compositions having improved curd-dispersing properties are described which consist essen-

(Continued on page 35A)

EMI Appoints Sales Representative for Mexico



A.G. Flores

EMI Corporation, Des Plaines, Ill., has announced the appointment of Desarrollo Industrial-Ingenieros, S.A., of Mexico City as exclusive representative in Mexico for the sale of EMI systems and plants for solvent extraction of oil seeds, production of edible proteins, and refining of fats and oils. A. Gonzalez Flores, pictured above, general manager of Desarrollo Industrial Ingenieros, S.A., is a member of the AOCS and the American Institutes of Chemical and Mechanical Engineers. He has 15 years experience in the supply of engineering and technical service to the vegetable oil industry in Mexico.

(Continued from page 32A)

tially of from about 40% to about 95% of a higher fatty acid soap; from about 5% to about 60% of a mixture of at least one synthetic detergent selected from the group consisting of (1) a detergent which contains in its molecular structure a zwitterion or a semi-polar bond and (2) an amphoteric synthetic detergent; and at least one water-soluble salt of a phosphonic acid of the general formula: $O=P(OH)_2-CX(Y)-P(OH)_2=O$ where X can be hydrogen, OH, or a carbonyl oxygen; and Y can be H, OH, CH_3, CH_2COOH, $CH_2PO_3H_2$, $CH_2CH(PO_3H_2)_2$, except when X is a carbonyl oxygen, Y has no value. The weight ratio of the synthetic detergent to phosphoric acid salt should be from about 1:4 to about 4:1, and preferably from about 1:2 to about 2:1.

DETERGENT COMPOSITIONS. T. L. Coward and T. E. Darling (Procter & Gamble Co.). *U.S. 3,537,993.* Detergent compositions, having both satisfactory detergent and fabric softening properties, consist essentially of: (1) nonionic detergent; (2) detergent selected from the group consisting of certain zwitterionic, amine oxide and amide detergents, and mixtures thereof; (3) detergency buffer; and (4) fabric softener.

PREPARATION OF FATTY ACID ESTERS OF SUGAR GLYCOSIDES. D.V. Myhre (Procter and Gamble). *U.S. 3,597,417.* A preferably solvent-free process for the preparation of long chain fatty acid esters (C_{10}–C_{22}) of sugar glycosides is disclosed.

COTTON DETERGENCY OF THE SODIUM SALTS OF 2-METHYLALKANOIC ACIDS, PRIMARY ALKYL SULPHATES AND LINEAR ALKYLBENEZENE SULPHONATES: A STATISTICAL APPROACH. H.M. Muijs, J. Meisner and C. Kortland (Kominklijke/Shell-Lab., Amsterdam, Holland). *Fette Seifen Anstrichm.* 73, 315–19 (1971). The cotton detergency of the sodium salts of 2-methylalkanoic acids, primary alkyl sulphates and linear alkylbenezene sulphonates has been evaluated as a function of molecular weight, active ingredient and sodium tripolyphosphate concentrations, water hardness, calcium/magnesium ratio and temperature. A regression equation relating the detergency to the six stated variables has been derived on the basis of the experimental results. The main conclusions from the work are that under normal washing conditions the sodium salts of 2-methylalkanoic acids are the best products; the primary alkyl sulphates rank second. At a given water hardness the amount of sodium tripolyphosphate is of major importance, the molecular weight and the active matter concentration rank second, then the temperature comes third.

DRY POWDER BLEACHING COMPOSITIONS. B. Weinstein and H.L. Marder (American Home Prod. Corp.). *U.S. 3,538,005.* Dry powder or granular bleaching compositions are disclosed comprising an alkali metal salt of dichloroisocyanuric acid or a complex thereof in combination with puffed borax. The compositions are particularly suited for use in clothes washing machines.

EMULSION CLEANER. A. Benson and G.M. Karg (Witco Chem. Co.). *U.S. 3,538,006.* Stable emulsion cleaners comprising (a) water-immiscible organic solvent emulsified into (b) an approximately 5 to 18% aqueous solution of at least one water soluble inorganic salt builder, said solution containing from 5 to 15% of a mono-alkyl benzene sulfonate in which not less than about 35% by weight of the alkyl contains from 8 to 10 carbon atoms, the volume ratio of (a) to (b) being in the range of about 1:1 to about 10:1.

METHOD FOR REDUCING SKIN IRRITATION IN DETERGENT COMPOSITIONS. R. Kelly and E.J. Ritter (Cincinnati Milling Machine Co.). *U.S. 3,538,009.* The degree of skin irritation of detergent compositions is reduced by adding to the detergent composition small amounts of polymerized fatty acid or salt thereof, e.g. dimer acid.

DETERGENT COMPOSITION. A.O. Snoddy, F.L. Diehl, N.R. Smith and J.E. Callen (Procter & Gamble Co.). *U.S. 3,539,521.* A detergent composition for cool water washing comprising a combination of specific sulfobetaines and specific builders.

FATTY AMIDO AMINES. M. Lewis (Swift and Co.). *U.S. 3,539,601.* Halogenated fatty amido amines are produced by a novel process of reacting an unsaturated triglyceride with a primary-tertiary amine at elevated temperatures followed by halogenation.

A STUDY OF WORKERS EXPOSED TO DETERGENT ENZYMES. H. Weill, L.C. Waddell and M. Ziskind (Tulane Univ., School of Med., New Orleans, La.). *JAMA* 217, 425–33 (1971). Respiratory symptoms in detergent-industry workers have been associated with exposure to the dust of proteolytic enzymes derived from *Bacillus subtilis.* This study characterizes the clinical and physiologic features in affected workers and relates them to environmental exposure and skin test response to the enzyme extract. Sensitization was common. Less frequent were symptoms which typically included cough, wheezing, chest tightness and dyspnea appearing several hours after leaving work. Airways obstruction was not accompanied by the constitutional, roentgenographic or pulmonary function abnormalities usually associated with the alveolar inflammatory reactions encountered after exposure to some organic dusts. Symptomatic workers frequently had an atopic history and positive skin test and usually improved after reduction or elimination of exposure. Analysis of physiologic data in exposed groups suggests that chronic irreversible impairment of pulmonary function has not occurred.

A NEW AMPHOTERIC SURFACTANT HAVING ETHER-BONDS IN THE MOLECULE. F. Tokiwa and K. Ohki (Ind. Res. Lab., Kao Soap Co., Minato-Yakushubata, Wakayama-shi, Japan). *Yukagaku* 19, 901–5 (1970). A new amphoteric surfactant, sodium N-dodecyl N,N-bisethoxyacetate (Na DEA) was synthesized from N-dodecyl N,N-bishydroxyethylamine and sodium monochloroacetate in NaOH. Na DEA was very soluble in water even at its isoelectric point probably owing to its ether linkage. Its electrical state greatly depended on pH. The solubilizing power toward Yellow OB was greater in acidic pH than in alkaline systems. Physicochemical properties of Na DEA mixtures with sodium dodecyl polyoxyethylene sulfate or sodium dodecylbenzene sulfate were studied.

PREPARATION OF METHANESULFONATES OF AROMATIC ACIDAMIDE AND THEIR PHYSICOCHEMICAL PROPERTIES. K. Negro and T. Suzuki (Dept. of Applied Chem., Hiroshima Univ., Hiroshima, Japan). *Yukagaku* 19, 905–9 (1970). Sodium methanesulfonates of benzamide, p-toluamide, p-toluenesulfonamide, p-tert-butylbenzenesulfonamide and p-dodecylbenzene sulfonamide were synthesized and their physicochemical properties were studied. The sulfonate of p-dodecylbenzene sulfonamide was very surface active and superior in the emulsification of paraffin and solubilizing power of dye to sodium dodecylbenzene sulfonate.

ON THE DETERGENCY OF CLOTHS. T. Tsunoda, Y. Oba and I. Kashiwa (Hitachi Central Lab., Kokubunji, Tokyo, and Lion Oil and Fat Co. Res. Lab., Edogawa-ku, Tokyo). *Yukagaku* 19, 935–45 (1970). A review with 107 references.

SPECTROSCOPIC DETERMINATION OF NONIONIC SURFACTANTS WITH AMMONIUM REINECKATE. S. Miyagishi, Y. Nakada and M. Nishida (Dept. Ind. Chem., Kanazawa Univ., Kanazawa-shi, Japan). *Yukagaku* 19, 979–83 (1970). About 5 ml of sample, 5 ml of 10% HCl and 10 ml of ammonium reineckate were mixed and kept in a refrigerator for 1 hr. The precipitate was collected by filtration or centrifugation. After addition of 10% HCl, the precipitate was dissolved in 80% acetone. Absorbance at 525 nm was measured.