# ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, Kazuo Fukuzumi, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

## • Fats and Oils

CATION-EXCHANGE PROPERTIES OF LIPIDS FILMS. H. Kumizuda, Tatsuo Nakahara, H. Uejo and A. Yamauchi (Dept. of Chem., Faculty of Sci., Kyusyu Univ., Fukuoka, Japan). *Biochim. Biophys. Acta* **137**, 549–56 (1967). The ion-exchange properties of lipid films were studied by direct measurement of the adsorption of radioactive $Ca^{2+}$. It was shown that films of phosphatidyl ethanolamine, soybean lecithin, egg lecithin, cephalin and proteolipid could take up $Ca^{2+}$ from the underlying solution. Chelating agents such as ATP and EDTA caused the desorption of bound $Ca^{+2}$ from the lipid film. Isotopic exchange between the $Ca^{2+}$ in the lipid film and in the underlying solution took place easily. Decrease in pH reduced the adsorption of $Ca^{2+}$ to the lipid film. The effects of $Na^+$ and $K^+$ on the adsorption equilibrium of $Ca^{2+}$ were found to be almost the same. The rate of exchange between $Ca^{2+}$ bound to the lipid film and $K^+$ in the underlying solution was found to be much greater than that between the bound $Ca^{2+}$ and $Na^+$ in the solution.

GLYCOLIPIDS OF MYCOBACTERIA AND RELATED MICROORGANISMS. E. Lederer (Institut de Chimie des Substances Naturelles, CNRS, Gif-sur-Yvette, and Institut de Biochimie, Faculte des Sciences de Paris-Orsay (Essonne), France). *Chem. Phys. Lipids* 1, 294–314 (1967). The following groups of glycolipids are reviewed: 1) The toxic cord factors (6,6′-diesters of trehalose), 2) Wax D, a macromolecular peptidoglycolipid having adjuvant activity, 3) The mycosides A, B and C, which are deoxyhexose containing "type-specific" glycolipids of mycobacterial origin, 4) The phosphatidyl myo-inositol mannosides, 5) Carotenol-glycosides. Wherever possible, chemical structure, biosynthesis and biological activities are considered.

INFRARED SPECTRA AND POLYMORPHISM OF GLYCEROL ETHER DERIVATIVES. E. O. Oswald, C. Piantadosi, C. E. Anderson and F. Snyder (Dept. of Biochem. and Med. Chem., Univ. N. Carolina, Chapel Hil, N.C.). *Chem. Phys. Lipids* 1, 270–81 (1967). The infrared spectra and the polymorphic forms of the α- and β-glycerol ethers, glycerol ether monoesters, and glycerol ether diesters were investigated. It was concluded from these studies that the α-ethers exist in at least two different crystalline forms, whereas the β-ethers exist in only one form. The stable A form of both isomers of the ethers probably has hexagonal packing of the side chains; however, the B form of the α-ethers may have triclinic packed chains. It was found that the α-monoester β-ethers and the β-monoester α-ethers also exist in at least two crystalline forms. The lower melting form B of the β-monoester α-ether does not correspond in crystalline structure to the lower melting form B of the α-monoester β-ether. The results indicate that there are at least three or possible four crystalline forms of dipalmitoyl-α-batyl alcohol.

FATTY ACIDS. PART 13. THE SYNTHESIS OF ALL THE CIS N-OCTADECENOIC ACIDS. F. D. Gunstone and I. A. Ismail (Chem. Dept., St. Salvator's College, The Univ. of St. Andrews, Scotland). *Chem. Phys. Lipids* 1, 209–224 (1967). All the *cis* n-octadecenoic acids ($\Delta^2$ to $\Delta^{17}$) have been synthesized along with several dodecenoic ($\Delta^7$ to $\Delta^{11}$), dodecynoic ($\Delta^7$ to $\Delta^{11}$), and octadecynoic ($\Delta^2$ to $\Delta^{12}$) acids required as intermediates.

PART 14. THE CONVERSION OF THE CIS OCTADECENOIC ACIDS TO THEIR TRANS ISOMERS. *Ibid.*, 264–9. The methyl *cis* octadecenoates have been converted to their *trans* isomers by heating with selenium and also by irradiation by ultra violet light in the presence of diphenyl sulphide. In the former method, but not in the latter, stereomutation is accompanied by extensive double bond migration. Apart from the $\Delta^2$ isomer all the equilibrium mixtures contain 74–80% of *trans* ester. The melting points of all the *cis* and *trans* octadecenoic acids and some octadecynoic acids are presented and discussed.

A STUDY ON LIQUID-GEL PARTITION OF STEROIDS AND STEROID DERIVATIVES ON LIPOPHILIC SEPHADEX GELS. P. Eneroth and E. Nystrom (Dept. of Chem., Karolinska Institutet, Stockholm, Sweden). *Biochim. Biophys. Acta* **144**, 149–161 (1967). A number of sterols and steroids have been chromatographed on columns of methylated Sephadex G-15, G-25 and G-50 and of Sephadex LH-20 in single solvents. The results indicate that a liquid-gel partition leading either to a straight or a reversed phase chromatography determines the separations. The size and shape of the steroid solute is also of importance. Depending on the nature of the solvent and the gel, ketonic steroids can be specifically excluded from or retarded on the column.

THE OCCURRENCE OF PRISTANE AND PHYTANE IN MAN AND ANIMALS. J. Avigan, G. W. A. Milne and R. J. Highet (Lab. of Metabolism, National Heart Inst., National Inst. of Health, Bethesda, Md., USA). *Biochim. Biophys. Acta* **144**, 127–131 (1967). The concentration of the branched-chain hydrocarbons, pristane and phytane, was determined in a number of human and animal tissues by quantitative thin-layer and gas chromatography. In human serum and liver, pristane was found at concentrations of 2–9 μg/g, and of 52 μg/g in a single sample of human skin. The amounts of phytane were significantly lower and represented 1–35% of those in pristane in the various tissue samples analyzed. Rat liver and a number of bovine tissue samples contained similar concentrations of pristane and phytane to that found in human organs. Pristane was found in livers from a number of shark species at a concentration of 2–5 μg/g and, in contrast to the mammalian tissues, phytane was present at similar concentrations to those of pristane. The possible sources of these and other hydrocarbons found in animals are briefly discussed.

MONOGALACTOSYL DIGLYCERIDE: A NEW NEUROLIPID. J. M. Steim (Dept. of Chem., Brown Univ., Providence, R. I., USA). *Biochim. Biophys. Acta* **144**, 118–26 (1967). Monogalactosyl diglyceride was isolated from bovine spinal cord and shown to be identical with the same lipid from spinach, except for fatty acid analysis. In particular, unequivocal evidence is presented for the presence of the glycosidic bond and the D configuration of the glyceryl moiety. In bovine spinal cord monogalactosyl diglyceride, palmitic and oleic acids are dominant, together comprising 75% of the total fatty acids present. The lipid is present in the brains of all animals examined (cow, cat, pig, rat, human), but is absent from mammary gland, spleen, intestine and liver. A small amount was tentatively identified in kidney. In the brain the lipid is restricted to white matter, and is suggested to be a component of myelin.

ORNITHINE-CONTAINING LIPID IN RHODOSPIRILLUM RUBRUM. J. A. Depinto (Pioneering Lab. for Microbiol. Chem., N. Reg. Res. Lab., Peoria, Ill., USA). *Biochim. Biophys. Acta* **144**, 113–117 (1967). An ornithine-containing lipid that lacks phosphorus has been observed in *Rhodospirillum rubrum*. Ornithine-$^{14}C$ is incorporated into lipid during growth. Formation of ornithine lipid does not seem to be related to the synthesis of bacteriochlorophyll. Arginine repressed the formation of the ornithine lipid, but at the same concentration it repressed ornithine transcarbamylase twice as much.

SEPARATION OF ACIDIC PHOSPHOLIPIDS BY ONE-DIMENSIONAL THIN-LAYER CHROMATOGRAPHY. V. P. Skipski, M. Barclay, E. S. Reichman and J. J. Good (Div. of Exptl. Chemotherapy, Sloan-Kettering Inst. for Cancer Res., Rye, N. Y.). *Biochim. Biophys. Acta* **137**, 80–9 (1967). Three one-dimensional thin-layer chromatographic systems for separation of acidic phospholipids such as cardiolipin phosphatidic acid and phosphatidylglycerol, are described. I. Silica gel with $CaSO_4$ binder, a two step developing system is used. The first solvent is acetone-light petroleum (1:3, by vol), the second solvent is a mixture of chloroform methanol-acetic acid-water (80:13:8:0.3, by vol). The separated compounds from the top of the chromatogram are: monoglyceride, cardiolipin, phosphatidic acid, ceramidemonohexosides (cerebrosides), phosphatidylglycerol and phosphatidylethanolamine. II. Silica gel thin-layer plates are prepared with 0.1 M $Na_2CO_3$. The first solvent is pyridine-light petroleum (3:1, by vol.); the second solvent is chloroform-methanol-pyridine-2 M $NH_4OH$ (35:12:65:1, by vol.). The following compounds are separated by the two-step developing system (from the top of chromatogram): ceramidemonohexosides, sulfatides and ceramidedihexosides (overlapping), phosphatidic acid, phosphatidylglycerol and cardiolipin. III: one step-development modification of System II. This system is suitable only for quantitative determination of phospholipids if the presence of glycolipids is not deemed detrimental.

ASYMMETRIC TRIGLYCERIDES FROM IMPATIENS EDGEWORTHII SEED OIL. M. O. Bagby and C. R. Smith (Northern Reg. Res. Lab., Peoria, Ill.). *Biochim. Biophys. Acta* **137**, 475–7 (1967). *Impatiens edgeworthii* Hook F. seed oil, which contains acetate, parinarate and the more common fatty acyl groups, was hy-

drogenated to give mainly α-acetodistearin. The hydrogenated oil produced a plane negative optical rotatory dispersion curve. Comparison of the dispersion curve with those of α-acetodiacyl triglycerides synthesized by stereoselective methods indicates that the triglycerides of *Impatiens edgeworthii* seed oil have the (S)-configuration.

THE CONTAMINATING EFFECTS OF CEPHALINS IN ESTIMATING NON-ESTERIFIED FATTY ACIDS. S. A. Ibrahim (Dept. of Biochem., Faculty of Medicine, Univ. of Khartoum, Khartoum, Sudan). *Biochim. Biophys. Acta* **137**, 413–419 (1967). A study has been made of the contaminating effects of phospholipids in the titrimetric procedure of Dole. Phosphatides were found to be extracted to varying degrees in the heptane phase of the method of Dole. None of the lysophosphatides was extracted. Unlike lecithin, phosphatidylethanolamine and phosphatidylserine were found to be titratable under the conditions used in the above method. Exclusion of cephalins by adsorption on silicic acid removed the interference and allowed for accurate free fatty acid estimation. The significance of these findings is discussed in relation to the extensive use of the Dole procedure without modification.

COLOR REACTIONS BETWEEN FATTY OILS AND SULFURIC ACID WITH AND WITHOUT AMMONIUM MOLYBDATE. S. Ansar Ahmed, D. Ramacher, B. A. R. Somayajulu and S. D. Thirumala Rao (Oil Techn. Res. Inst., Anantapur, India). *Oil Oilseeds J. (Bombay)* **70**(9), 8–10 (1967). The reaction of Rajnish Kumar has been expanded to include 25 fats and oils. In addition to carrying out the procedure described by Rajnish Kumar, both concentrated sulfuric acid and molybdic acid have been used separately. The fats and oils can be divided into two classes, those that do not give any coloration or turbidity and those that give characteristic color changes, turbidities, or precipitates. Castor and maroti oils are exceptions as their solutions show white opalescence even before addition of test reagent. Concentrated sulfuric acid alone shows the same reaction as concentrated sulfuric acid with ammonium molybdate in all cases except with palm oil. With sulfuric alone, green color persists, and with ammonium molybdate, the green color changes to blue.

THE VACCARINO PROCESS FOR OIL EXTRACTION FROM COTTONSEED AND RICE BRAN. *Oil Oilseeds J. (Bombay)* **70**(9), 4–6 (1967). This paper summarizes the Vaccarino process as applied to cottonseed oil. The economic importance to India of being able to produce a degossypolized meal for human consumption is related. The Vaccarino process could well be an economically attractive method to deoil rice bran. A third application (still under study) is the use of the Vaccarino process to deoil fish meal. Not only would an oil of excellent quality be obtained, but if the deodorization problem could be overcome, a meal fit for human consumption could be obtained.

PHOSPHATIDES OF SUNFLOWER SEED OIL AND THE POSSIBILITIES OF PRODUCTION OF OILS WITH HIGH PHOSPHATIDES CONTENT. A. D. Popov and I. D. Mizev (Inst. of Organic Chem. Acad. of Sci., Sofia, Bulgaria). *Rev. Franc. Corps Gras* **14**(6), 391–396 (1967). A study was made of the effect of phosphatides upon the flavor and oxidative stability of sunflower seed oil after deodorization. It was found that the nonhydratable phosphatides do not adversely affect the deodorized oil either in flavor or stability. This leads to the possibility that sunflower seed oil with a higher phosphatide content can be produced.

A GENERAL METHOD FOR THE TRANSFORMATION OF FATS INTO METHYL ESTERS REGARDLESS OF THEIR FREE ACIDITY. M. Loury (Inst. of Fats and Oil, Paris, Fr.). *Rev. Franc. Corps Gras* **14**(6), 383–389 (1967). A rapid and complete transformation of fats into methyl esters is often useful, and is required for most GLC analyses. Alkaline alcoholysis is useful for triglycerides devoid of free fatty acids. While on the other hand, acid alcoholysis which works well with free fatty acids, works slowly with triglycerides. The saponification-esterification method, which is very difficult to perform, also has the disadvantage that the short chain fatty acids are lost during the several washings. In the present work, a method is described which combines in succession the alcoholysis and esterification processes and transforms all fats into methyl esters, regardless of their free acidity. Another advantage is the preservation of the short chain fatty acids. The method is rapid; non-toxic materials are used. It is adaptable to micro methods. The method involves methanolysis of the fat or oil with sodium methoxide in methanol followed by esterification of any free or liberated fatty acids with methanol using anhydrous hydrochloric acid as catalyst. The methyl esters are then extracted from the reaction mixture with petroleum ether. The solvent is removed under vacuum, and the resulting methyl esters are stored under nitrogen.

CONTINUOUS HYDROLYSIS OF FATS. C. D. Miserlis and J. R. Ghublikian (The Badger Co., Inc., Cambridge, Mass.). *Rev. Franc. Corps Gras* **14**(6), 377–382 (1967). Between 1964 and 1965 The Badger Co. has started three units for the continuous hydrolysis of fats both in the United States and in Great Britain. Their annual joint capacity for the production of fatty acids is over 90,000 tons. The technical description on one of the splitters and of a continuous fatty acid distillation unit are described. Also described is an associated unit for the recovery, purification and distillation of glycerin. This unit will produce more than 11,000 tons per year of natural, superfine, pharmaceutical and edible glycerin.

OILS FROM FISHES CAUGHT IN THE INLAND SEA OF JAPAN. V. COMPOSITIONS OF HORSE-MACKEREL, SEA-EEL, SILLAGO SIHAMA, SCINA SCHLEGELLII, BASS, SURF-FISH, GILTHEAD AND RED-PORGY OILS. Shigeru Hamada and Shei-ichi Ueno. *Yukagaku* **16**, 419–23 (1947). Iodine numbers of these fish oils were in the range of 120–160. There was not much difference in the composition of body, internal organ and liver oils. The fatty acid were composed of $C_{10}$–$C_{22}$ saturated and $C_{12}$–$C_{22}$ highly unsaturated acids.

EFFECT OF HYDROXYCARBOXYLIC ACID AND FAT OXIDATION. Tadaki Bito and Kazuhito Aoshima (Nagoya Inst. Technology). *Yukagaku* **16**, 423–5 (1967). Concurrent use of hydroxycarboxylic acid with antioxidant gives greater antioxidant effect than the use of the antioxidant alone.

SELECTIVE REDUCTION OF SPERM BLUBBER OIL USING CADMIUM-ALUMINA AS CATALYST. Shigeo Kitamura, Susumu Tsubota, Giichi Akazome and Koichi Murai (New Japan. Chem. Co., Kyoto). *Yukagaku* **16**, 355–60 (1967). Catalytic reduction of sperm blubber oil with cadmium-alumina under high pressure of hydrogen has been carried out for production of unsaturated alcohol. The best result was obtained by using partial pressure of water 20–30 kg./cm$^2$ at 300C and 30% cadmium content in the catalyst.

INFLUENCE OF HYDROLYSIS ON PARTIAL GLYCERIDE COMPOSITION IN RICE BRAN OILS. Hiroshi Inoue and Tatsuo Noguchi (Ind. Research Inst. Hokkaido). *Yukagaku* **16**, 361–3 (1967). Change of mono-, di- and triglyceride content and of acid number of fat during storage of rice bran is given.

DETERIORATION OF FRYING OILS IN CONTINUOUS WATER-SPRAYING AND HEATING SYSTEM. I. CONTINUOUS WATER-SPRAYING AND HEATING SYSTEM AS A MODEL OF COMMERCIAL DEEP FAT FRYING. Etsuji Yuki (Food Ind. Expl. Sta., Hiroshima Pref.). *Yukagaku* **16**, 351–4 (1967). In the continuous water-spraying and heating system, soybean oil was tested and its chemical and physical changes were determined. The effect of specific surface area exposed in air for the deterioration was examined by means of metal float. The ratio of increase of viscosity of the deteriorated oil was proportional to the width of specific surface area, where the increase of acid value was greater when fat surface was protected by means of metal float. Thus, this continuous water-spraying and heating system is considered suitable as a model of commercial deep fat frying with simplicity and good reproducibility.

II. CHEMICAL AND PHYSICAL CHANGES OF SOYBEAN OIL TREATED IN THE CONTINUOUS WATER-SPRAYING AND HEATING SYSTEM COMPARED WITH THAT OF CONTINUOUS HEATING WITHOUT WATER. *Ibid.* 410–12. Heating of soybean oil with spraying of water is accompanied with an increase in acid value, monoglyceride content and hydroxyl value of the oil as well as the development of color. These changes were much less in the absence of water although the extent of thermal oxidation of the oil was twice as much more than the former case.

INCREASE IN INVASION BY STORAGE FUNGI AND IN FAT ACIDITY VALUES OF COMMERCIAL LOTS OF SOYBEANS STORED AT MOISTURE CONTENTS OF 13.0–14.0%. C. M. Christensen (Dept. of Plant Pathology, Univ. of Minnesota, St. Paul, Minn.). *Phytopathol.* **57**, 622–624 (1967). None of eight samples of soybeans, each representative of a different carload lot, increased appreciably in invasion by storage fungi or in fat acidity value when stored at moisture contents of 13.0 and 14.0% and 5C for 150–170 days. Samples stored at 13.0% moisture content and 5C increased slightly in fat acidity value and in invasion by fungi in 480–500 days. Those stored at the original moisture contents and at 25C increased appreciably in invasion by storage fungi and in fat acidity value, the increases being greater at the higher moisture content and at the longer storage period.

A MICROBIAL SULFOLIPID. II. STRUCTURAL STUDIES. G. L. Mayers and T. H. Haines (Dept. of Chem., The City College of The City Univ. of New York, New York, N. Y.). *Biochemistry* 6, 1665–70 (1967). A new sulfolipid, 1,14-docosyl disulfate, was isolated from the phytoflagellate, *Ochromonas danica*, by solvent extraction, chromatography, ion-exchange gel filtration, and crystallization. Acid hydrolysis of the sulfatide produced a diol. The structures of the sulfatide and the diol were determined by analysis, infrared spectroscopy, proton magnetic resonance spectrometry and mass spectrometry. The mass spectra of the analogous diols, eicosane-1,4-diol and octadecane-1,12-diol, were studied. Eicosane-1,4-diol was synthesized via 1-hydroxy-4-eicosanone.

REFINING OF TALL OIL. S.-C. Chang, H.-M. Huang and Y.-P. Ch'ou. *Hua-Hsueh Shih-Chieh (Chem. World, China).* 1965, No. 8, 360–2. Whilst tall oil is used extensively in the United States, its use in China has been restricted on account of technical problems in the refining. After one reduced-pressure distillation, the principal distillate still contains about 16–17% unsaponifiable matter and an A.V. $< 160$. In order to improve its usefulness, the NaOH and lime methods are used to eliminate the unsaponifiable matter and the $ZnCl_2$ decoloration treatment is used to prepare high-acid light-colour tall oil. Esterification is further used to separate resin acids from tall oil to obtain tall oil fatty esters; then alkaline liquor is used to draw free resinic acid away. The authors conducted experiments to eliminate unsaponifiable material, on the decoloration treatment, and finally on the preparation of high A.V. light-colour tall oil. Experiments on the separation of resin acids by partial esterification of tall oil are also discussed. (Rev. Current Lit. Paint Allied Ind. No. 300.)

STUDIES IN FAT SPLITTING: II SPLITTING OF NON-EDIBLE OILS. S. D. Vaidya, V. V. R. Subrahmanyan and J. G. Kane. *Indian J. Tech.* 4, 301–4 (1966). Splitting of 7 non-edible oils, *viz.*, (1) *Karanja* (*Pongamia glabra*), (2) *Kavathi* (*Hydnocarpus wightiana*), (3) *Khakan* (*Salvadora oleoides*), (4) *Kusum* (*Schleichera trijuga*), (5) *Mahua* (*Madhuca indica*), (6) *Neem* (*Azadirachta indica*) and (7) *Pisa* (*Actinodaphne hookeri*), by the Twitchell method using commercial alkyl benzene sulphonic acid as the catalyst has been investigated. Splitting to the extent of 86–92% is obtained in single-stage operation and over 95% in 2- and 3-stage operations. When the catalyst is taken initially in the fat phase rather than in the aqueous phase, faster rates of fat splitting are achieved. Pretreatment with dilute $H_2SO_4$ reduces the initial induction period in the case of some fats, such as *Mahua*, while for others, such as *Neem* oil, strong $H_2SO_4$ treatment is necessary to achieve satisfactory splitting. The effect of subjecting *Neem* oil to different pretreatments on the rate of splitting and on the quality of fatty acids produced has been studied. The quality of fatty acids obtained is improved by subjecting the oil to hexane/methanol pretreatment. The lyes produced in pressure splitting of *Neem* oil are acidic. (Rev. Current Lit. Paint Allied Ind. No. 300.)

SILICONES. CVII—MOLECULAR SIZE DISTRIBUTION OF HIGH-VISCOSITY DIMETHYL POLYSILOXANES. H. Reuther and G. Reichel. *Plaste u. Kautschuk* 13, No. 6, 341–3 (1966). The dimethyl polysiloxanes have been fractionated on a glass bead column using ethyl acetate and methanol as eluting liquids and the fractions examined viscometrically. (Rev. Current Lit. Paint Allied Ind. No. 300.)

POLYCYCLIC AROMATIC HYDROCARBONS IN VEGETABLE OILS. Anon. (U.S. Food Drug Admin.). *Brit. Ind. Biol. R. A. Inf. Bull.* 5, No. 9, 611 (1966). No traces of polycyclic aromatic hydrocarbons were detected in safflower oil, although some were isolated from corn (maize), cottonseed, soyabean, groundnut and olive oils. The majority of the corn oil samples contained some benzo[*a*]pyrene (1,2-benzopyrene, the carcinogenic isomer), but the highest level (0·0015 p.p.m.) was detected in a soybean oil sample, although only two of the nine soyabean oil samples gave a positive result. Refining solvents have not been implicated and it is thought that the contamination may arise from the crude oils. (Rev. Current Lit. Paint Allied Ind. No. 300.)



## • Fatty Acid Derivatives

SYNTHETIC STUDIES ON SPHINGOLIPIDS. XII. SYNTHESIS OF SPHINGOSINEPHOSPHORYLCHOLINE. D. Shapiro, E. S. Rachaman, Y. Rabinsohn and A. Diver-Haber (Daniel Sieff Research Inst., The Wizemann Inst. of Sci., Rehovoth, Israel). *Chem. Phys. Lipids* 1, 183–191 (1967). A synthesis of sphingosinephosphorycholine is reported, which involves a mild alkaline hydrolysis of its N-trifluoroacetyl derivative. Sphingosinephosphorylcholine has been converted into N-stearoylsphingomyelin in good yield by treatment with *p*-nitrophenyl stearate.

CHLOROHYDRIN STEARATE. COMPARISON OF THE TWO SYNTHESIZING METHODS AND THE INFRARED SPECTRA OF THE RELATED COMPOUNDS. Gaku Izumi and Masayoshi Kita (Gov. Ind. Res. Inst., Nagoya). *Yukagaku* 16, 363–5 (1967). One step method of using benzylmethylammonium chloride as the catalyst for reaction of epichlorohydrin with sodium stearate was superior to the two step method of using epichlorohydrin and sodium stearate followed by the reaction by hydrogen chloride.

## • Biochemistry and Nutrition

CARBOHYDRATE-LIPID EFFECTS ON CHOLESTEROL METABOLISM. Roslyn B. Alfin-Slater (School of Public Health, Univ. of Calif., Los Angeles). *J. Dairy Sci.* 50, 781–6 (1967). The marked differences in results with the different fats used indicate that the effect of dietary lipids on serum and tissue cholesterol and cholesterol biosynthesis in liver is much greater than the carbohydrate effect. One of the conclusions to result from this study is that it is impossible to define the effects of a particular nutrient from one set of experimental conditions and without due consideration of the other constituents of the diet. Nutrient:nutrient interrelationships are becoming more and more important in nutrition and disease conditions.

FORCES BETWEEN LECITHIN BIMOLECULAR LEAFLETS ARE DUE TO A DISORDERED SURFACE LAYER. V. A. Parsegian (Dept. of Chem., Mass. Inst. Technol., Cambridge, Mass. 02139). *Science* 159, 939–42 (1967). The long-range repulsion observed between bileaflets of lecithin cannot be explained either with the usual view that the polar groups are arrayed coplanar with the bileaflet surface or by the assumption that charges protrude straight into the aqueous environment. Statistical-thermodynamic analysis of experimental data suggests rather that structure of the leaflet surface is better described as a diffuse charge layer. Forces between leaflets are caused largely by entropy changes in the surface with leaflet separation.

LIPID COMPOSITION OF MITOCHONDRIA FROM BOVINE HEART, LIVER, AND KIDNEY. S. Fleischer, G. Rouser, Becca Fleischer, Anna Casu, and G. Kritchevsky (Dept. of Molecular Biology, Vanderbilt Univ., Nashville, Tenn. 37203). *J. Lipid Res.* 8, 170–80 (1967). Highly purified preparations of mitochondria from bovine heart, liver, and kidney were isolated and characterized by electron microscopy, oxidative phosphorylation ability, cytochrome *c* reductase activity, and cytochrome content. Components of lipid extracts of the preparations were determined by thin-layer chromatography, and spectrophotometric procedures. The major phospholipids were identified by their chromatographic behavior, IR spectrometry and paper chromatography of their hydrolysis products.

THE IONIC STRUCTURE OF LECITHIN MONOLAYERS. D. O. Shah and J. H. Schulman (Stanley-Thompson Lab., School of Eng., Columbia Univ., N. Y. 10027). *J. Lipid Res.* 8, 227–33 (1967). Surface potentials of mixed monolayers of dicetyl phosphate and eicosanyl trimethylammonium bromide (1:1) were the same on subsolution of 0.02 *M* NaCl or 0.01 *M* $CaCl_2$, which indicated that ionic phosphate does not interact with $Ca^{++}$ in the presence of a neighboring trimethylammonium group. Surface potential-pH plots of dicetyl phosphate, and of dipalmitoyl, egg, and dioleoyl lecithins showed that as the pH of the subsolution is decreased the phosphate groups in the monolayer are neutralized in the order: dicetyl phosphate > dipalmitoyl lecithin > egg lecithin > dioleoyl lecithin. The binding of cations ($Na^+$, $Ca^{++}$) to the phosphate group of lecithin also showed the same order. The binding of $Ca^{++}$ to egg phosphatidic acid monolayers, as measured by the increase in surface potential, is considerably greater than that to egg lecithin.

THE PLASMA FREE FATTY ACID REBOUND INDUCED BY NICOTINIC ACID. J. N. Pereira (Pharmacol. Res. Dept., Med. Res. Lab., Chas. Pfizer & Co., Inc., Groton, Cann. 06340). *J. Lipid Res.*

8, 239–44 (1967). The time course of the nicotinic acid-induced changes in levels of plasma free fatty acids (FFA) was examined. The plasma FFA response of fasted dogs to graded doses of nicotinic acid was shown to be biphasic: an initial depression of the level of plasma FFA was followed by a rebound elevation to supernormal levels. FFA rebound was not seen after the administration of the nicotinic acid homologue, pyridylacetic acid, or a variety of nicotinic acid metabolites. A similar pattern of FFA response was observed in fasted, normal rats. Adrenalectomy did not abolish the secondary elevation of FFA but did cause a somewhat delayed response. Hypophysectomy modified the time course of the response—the initial FFA decrease was prolonged—and the intensity of the FFA rebound was diminished. No rebound was observed in hypophysectomized, adrenalectomized rats. In normal rats, nicotinic acid caused a significant rise in the level of plasma corticosterone.

REMOVAL OF THE SPHINGOLIPID IMPURITY FROM PREPARATION OF YEAST PHOSPHATIDYL INOSITOL. W. E. Trevelyan (Distiller Company (Yeast) Ltd., Great Burgh, Epsom, Surrey, England). *J. Lipid Res.* 8, 281–2 (1967). A complex sphingolipid containing inositol and mannose, present in lipid extracted from toluene-autolyzed baker's yeast, was eluted from silicic acid columns immediately after phosphatidyl inositol, and was the main nitrogenous impurity in crude preparations of this phospholipid. Nitrogen-free phosphatidyl inositol was obtained by rechromatography on alumina. Modifications to the chromatographic procedure also gave diphosphatidyl glycerol containing the theoretical 4.29% P.

METABOLISM OF DOUBLE-LABELED CHYLOMICRON CHOLESTERYL ESTERS IN THE RAT. S. H. Quarfordt and D. S. Goodman (Dept. of Med., Columbia Univ. College of Physicians and Surgeons, New York 10032). *J. Lipid Res.* 8, 264-73 (1967). Chylomicrons labeled *in vitro* with doubly-labeled cholesteryl esters were injected intravenously into fasted rats, and the tissue distribution and chemical form of each isotope were observed for 24 hr. The use of doubly-labeled cholesteryl esters provided information about metabolism of both the sterol and the fatty acid moieties. Similar results were obtained with doubly-labeled cholesteryl palmitate, oleate and linoleate. In each instance, most (80–90%) of the chylomicron cholesteryl ester was removed from the plasma by the liver; small amounts were also taken up by all other tissues examined. There was no hydrolysis during uptake. In the liver the newly absorbed cholesteryl esters underwent slow hydrolysis (60% after 1 hr and 85–90% after 3.5 hr.); the rate of reesterification of the liberated cholesterol was still slower. After 24 hr only 20–28% of the labeled cholesterol present in the animal was found in the liver.

THIN-LAYER CHROMATOGRAPHY OF STEROLS ON NEUTRAL ALUMINA IMPREGNATED WITH SILVER NITRATE. R. Kammereck, Wen-hui Lee, A. Paliokas and G. J. Schroepfer, Jr. (Dept. of Chem. and Chem. Eng., Univ. of Ill., Urbana, Illinois 61803). *J. Lipid Res.* 8, 282–4 (1967). Thin-layer chromatography for the rapid separation of several sterols on neutral alumina impregnated with silver nitrate is described. The method is particularly effective for sterols that differ in the number and location of olefinic bonds.

SPHINGOMYELINASE IN NORMAL HUMAN SPLEENS AND IN SPLEENS FROM SUBJECTS WITH NIEMANN-PICK DISEASE. P. B. Schneider and E. P. Kennedy (Dept. of Biol. Chem., Harvard Med. School, Boston, Mass. 02115). *J. Lipid Res.* 8, 202–9 (1967). The purification and some of the properties are described of an enzyme from human spleen that catalyzes the hydrolysis of sphingomyelin with the formation of ceramide and phosphoryl choline. The enzyme, which is located in the subcellular particulate fraction that sediments between 700 and 8500g, is readily made soluble and has been partially purified. Its pH optimum is between 4.5 and 5.0. It is unaffected by divalent cations, chelating agents, and sulfhydryl reagents, but is inhibited by phosphate. The enzyme attacks sphingomyelin and dihydrosphingomyelin, but is inactive toward sphingosine, phosphoryl choline, O-acetylsphingomyelin, and lecithin. In some of its properties, the enzyme from human spleen is different from the previously studied sphingomyelinase from rat tissues.

SERUM AND LYMPH LIPIDS IN RABBITS WITH CARBON TETRACHLORIDE-INDUCED CIRRHOSIS OF THE LIVER. M. Kotani, K. Seiki, A. Yamashita, A. Takashima, T. Nakagawa and Isoo Horii (Univ. Kyoto Med. School, Kyoto, Japan). *J. Lipid Res.* 8, 181–4 (1967). Lymph flow and the composition of lymph lipids from the hepatic and thoracic ducts of rabbits with cirrhosis of the liver (induced by 46–51 intramuscular injections of a mixture of carbon tetrachloride and olive oil at 4-day intervals) have been compared with those of control animals injected with olive oil only. In cirrhotic animals, the concentration of lymph lipids was not greatly altered, but lymph flow, and consequently the hourly transport of lipids by lymph were greatly increased; the increase in transport of cholesteryl esters, free cholesterol, and phospholipids by way of the thoracic and hepatic duct lymph was particularly striking. The concentration of these lipid fractions in serum from the cirrhotic rabbits was also increased. The differences normally observed between lipid fatty acid compositions of serum and lymph disappeared in cirrhotic animals; this is interpreted as due to increased hepatic permeability to lipoproteins.

RATES OF TISSUE UPTAKE OF PALMITIC ACID-1-$^{14}$C COMPLEXED WITH ALBUMIN BY TWO DIFFERENT PROCEDURES. J. I. Kessler, M. Demeny and H. Sobotka (Depts. Med. Chem., Mt. Sinai Hosp., New York City, N.Y. 10029). *J. Lipid Res.* 8, 185-90 (1967). The effect was investigated of two different methods of preparing an albumin-palmitic acid complex on the tissue uptake of the palmitic acid, both *in vivo* and *in vitro*. Complex A was prepared by exposing monomolecular layers of palmitic acid-1-$^{14}$C deposited on a solid surface to albumin dissolved in buffer. Complex B was prepared by the interaction of albumin with a micellar solution of palmitate-1-$^{14}$C. The radioactivities and chemical compositions of the two complexes were almost identical. Rat epididymal fat pads took up, during a 1 hr incubation, about 2.5 times as much palmitic acid from complex A as from complex B; the extent of esterification of the incorporated label was equal for the two complexes. The fractional turnover rate of palmitic acid of complex A, administered intravenously to dogs, was about twice that of palmitic acid from complex B. The label of the two complexes recirculated in the esterified fatty acid fraction of plasma to an equal extent.

ACETATE-1-$^{14}$C INCORPORATION INTO POLYUNSATURATED FATTY ACIDS OF PHOSPHOLIPIDS OF DEVELOPING CHICK BRAIN. K. Miyamoto, L. M. Stephanides and J. Bernsohn (Northwestern

Univ. Med. School, Chicago, Ill. 60611). *J. Lipid Res.* 8, 191–5 (1967). The incorporation of acetate-1-$^{14}$C into the polyunsaturated fatty acids of glycerophosphatides of chick embryonic brain has been studied. After the injection of acetate-1-$^{14}$C into the yolk sac, differences were found in the degree of labeling of the majjor fatty acids of the ω3 and ω6 series. Arachidonic acid (20:4ω6) showed a high degree of radioactivity while docosahexaenoic acid (22:6ω3) was poorly labeled, at a period of brain development when both fatty acids were being actively deposited. Evidence is presented to indicate that the low activity in docosahexaenoic acid is not explicable on the basis of either a low or high rate of turnover of this polyenoic acid. Similar results were obtained whether the rapid early or slower late stage of brain development was examined. It is suggested that the elongation of ω3 and ω6 series acids may be under the control of different regulatory mechanisms.

DIETARY FAT AND CHOLESTEROL AND SERUM CHOLESTEROL IN THE GERBIL. D. M. Hegsted and Anna Gallagher (Dept. Nutr., Harvard School Public Health, Boston, Mass. 02115). *J. Lipid Res.* 8, 210–14 (1967). Groups of gerbils were fed purified diets containing either 10 or 20% of safflower, olive or coconut oil. Each diet was fed without cholesterol and with 0.1 or 0.2% of added cholesterol. The animals were bled after 2, 4 and 8 wks for the determination of the level of serum cholesterol. The major factors affecting the level of serum cholesterol were the kind of dietary oil, the amount of dietary cholesterol, and the length of time the diet was fed. The level of safflower oil had a statistically significant effect but the level of olive or coconut oil had no significant effect. Various other statistically significant interactions were observed which make simple interpretations of the data difficult. The levels of serum cholesterol achieved in the gerbils fed the different oils with no or very low levels of dietary cholesterol were similar to those seen in men fed the same oils. Although the gerbil is apparently resistant to the development of atherosclerosis, it may be a useful model for studying the effect of dietary fats upon cholesterol metabolism.

EFFECT OF LIGHT ON EXTRACTION OF LIPID FROM RETINAL RODS. R. G. Adams (Nat. Inst. Arthritis and Metabolic Diseases, Bethesda, Md. 20014). *J. Lipid Res.* 8, 245–8 (1967). Chloroform-methanol (2:1) removes a significantly greater quantity of lipid from bleached bovine retinal rods than from a dark-adapted counterpart. The extracts contain phosphatidyl serine, phosphatidyl choline, phosphatidyl ethanolamine, sphingomyelin, and an unknown substance which may be a combination of phospholipid and retinaldehyde. The difference between extracts of light and dark-adapted rods is quantitative rather than qualitative. The data tend to confirm a model of rhodopsin in which isomerization of the retinaldehyde chromophore causes its displacement and opens a path to the interior of the molecule.

BIOSYNTHESIS OF RETINOIC ACID BY INTESTINAL ENZYMES OF THE RAT. F. D. Crain, F. J. Lotspeich and R. F. Krause (West Virginia Univ. School Med., Morgantown, W. V. 26506). *J. Lipid Res.* 8, 249–54 (1967). The incubation of β-carotene-$^{14}$C with the soluble fraction of the intestinal mucosa resulted in the formation of small amounts of acidic material. The addition of NAD or NADH to the soluble fraction caused a tenfold increase in this material. Incubation of retinal-15-$^{14}$C with the soluble fraction of the intestinal mucosa plus NAD or NADH resulted in the conversion of 80–90% of the retinal to acidic material, which has been shown to contain retinoic acid. *In vivo* studies on the formation of retinoic acid in the intestinal mucosa after the administration of β-carotene-$^{14}$C revealed that an appreciable amount of β-carotene was converted to acidic compounds. When retinal-15-$^{14}$C was administered, portal blood contained 30–40% of the absorbed radioactivity; 24% of this radioactivity was found in acidic material, which has been shown to contain retinoic acid. It is suggested that enzymes in rat intestine cleave β-carotene to retinal and oxidize the latter to retinoic acid, which is then transported via the portal circulation to the liver.

RELATIONSHIP OF LIPOPROTEIN LIPASE ACTIVITY TO TRIGLYCERIDE UPTAKE IN ADIPOSE TISSUE. Arlene S. Garfinkel, N. Baker and M. C. Schotz (Dept. Biol. Chem., UCLA School Med., Los Angeles, Calif. 90024). *J. Lipid Res.* 8, 274–80 (1967). Fasted rats injected with actinomycin or fed glucose show increased lipoprotin lipase activity of epididymal adipose tissue. Data from the actinomycin-treated animals showed a direct correlation between the lipoprotein lipase activity and the uptake of lipoprotein triglyceride by the epididymal fat pad *in vitro* and *in vivo*. Data from the animals fed glucose confirmed these findings *in vitro*. These data strongly suggest that lipoprotein lipase plays a major role in triglyceride deposition in adipose tissue.

INFLUENCE OF CALCIUM, CHOLESTEROL, AND UNSATURATION ON LECITHIN MONOLAYERS. D. O. Shah and J. H. Schulman (Stanley-Thompson Lab., School of Eng., Columbia Univ., N. Y. 10027). *J. Lipid Res.* 8, 215–26 (1967). Surface pressures and potentials of mixed monolayers of dicetyl phosphate-cholesterol, dipalmitoyl lecithin-cholesterol were measured. The surface potential is shown to be a more reliable parameter for the study of interactions in monolayers than the surface pressure. Monolayers of dicetyl phosphate-cholesterol follow the additivity rule for area/molecule whereas lecithin-cholesterol monolayers deviate from it. The reverse is true for the additivity rule with regard to surface potential/molecule. Thus, the surface potential indicates that there is no interaction (or complex formation) between lecithin and cholesterol, but that there is ion-dipole interaction between dicetyl phosphate and cholesterol, as well as between phosphatidic acid and cholesterol.

NUTRITIONAL VALUE OF REFINED OR HYDROGENATED RAPESEED OILS AND THEIR PRINCIPAL COMPONENTS. STUDY WITH MALE GROWING RATS. T. Cheniti, G. Bourdel and R. Jacquot (Center for Res. on Nutr. of C.N.R.S., Bellevue (Hauts-de-Seine), Fr.). *Rev. Franc. Corps. Gras* 14(3), 151–166 (1967). Rats were fed balanced diets, *ad libitum*, in which only the nature of the lipid was varied. The following fats were fed at 20% level: sunflower oil, refined rapeseed oil and hydrogenated rapeseed oil. In addition, diets with 20% hydrogenated rapeseed oil supplemented with 7 g of various other oils were also fed. The various oils were sunflower seed oil, linoleic acid, and the ethyl esters of oleic, erucic and behenic acid. The tests showed that high fat diets are necessary to reveal deficiencies in the use of rapeseed oil. The slight depressing effect of rapeseed oil may be corrected by the addition of linoleic acid. The depressing effect of rapeseed oil disappears when the rat becomes an adult. No pathological symptoms were noted with either rapeseed oil, behenic acid or erucic acid.

TWO PARTICULAR ASPECTS OF THE UTILIZATION OF FATS, INTRAVENOUS AND ORAL FEEDING. M. T. Juillet (Inst. of Fats and Oils, Paris, Fr.). *Rev. Franc. Corps Gras* 14(2), 99–109 (1967). This paper is a review of the use of fats and oils for intravenous and oral feeding. 71 references.

STUDIES OF MEMBRANE FORMATION IN TETRAHYMENA PYRIFORMIS. I. RATES OF PHOSPHOLIPID BIOSYNTHESIS. G. A. Thompson, Jr. (Dept. of Biochem, Univ. of Washington, Seattle, Wash. 98105). *Biochemistry* 6, 2015–22 (1967). Characterization of the principal structural lipids of *Tetrahymena pyriformis* W discloses a unique pattern. Lecithin of the classical type is replaced to a significant degree by the glycerol ether analog, and the lipid resembling phophatidylethanolamine also contains considerable amounts of bound glyceryl ethers as well as 2-aminoethylphosphonic acid. The formation of these lipids from a number of radioactive precursors has been studied. The most active precursors examined are palmitic acid, acetic acid, and chimyl alcohol. It is entirely feasible to use these compounds in labeling lipids synthesized during a brief period in the cell cycle. The effects of several experimental variables are assessed in preparation for an evaluation of membrane interrelationships within the cell. The action of a potent system of lipolytic enzymes is measured.

BIOSYNTHESIS OF CARDIOLIPIN IN ESCHERICHIA COLI. N. Z. Stanacev, King-Ying Chang and E. P. Kennedy (Dept. of Biological Chem. Harvard Med. School, Boston, Mass. 02115). *J. Biol. Chem.* 242, 3018–19 (1967). Cell-free particulate fractions from *Escherichia coli* have been found to catalyze the synthesis of cardiolipin from cytidine diphosphate diglyceride and L-glycerol 3-phosphate. Evidence is presented that phosphatidylglycerol is the immediate precursor of cardiolipin in a reaction involving the transfer of a phosphatidyl moiety from CDP-diglyceride.

TURNOVER AND UTILIZATION OF ESTERIFIED FATTY ACIDS IN EHRLICH ASCITES TUMOR CELLS. A. A. Spector and D. Steinberg (Lab. of Metabolism, National Heart Inst., National Inst. of Health, Bethesda, Maryland 20014). *J. Biol. Chem.* 242, 3057–62 (1967). Net utilization of esterified fatty acids was demonstrated in Ehrlich ascites tumor cells incubated *in vitro*. Cells in which the lipids had previously been labeled by incorporation of fatty acid-1-$^{14}$C lost lipid ester radioactivity progressively during incubation. The fractional loss of such radioactivity from ester stores exceeded net loss of

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chemically determined lipid esters, showing that the endogenous esters must include more than one kinetically distinguishable pool. Phospholipids, predominantly lecithin, provided most of the ester fatty acid utilized. Part of the fatty acid hydrolyzed from endogenous esters was oxidized to $CO_2$, and the remainder was released into the medium as free fatty acid. Incubation in a medium containing a high concentration of free fatty acid did not prevent net depletion of lipid esters. On the other hand, incubation with free fatty acid plus glucose produced a highly significant net increment in lipid esters. But even in the face of this net increase in total lipid ester, radioactive fatty acid previously incorporated was released, indicating a true dynamic state. The primary effect of glucose and free fatty acid in the medium appears to be the stimulation of ester formation, not the suppression of lipid ester breakdown.

LONG-TERM REDUCTION OF SERUM CHOLESTEROL LEVELS OF PATIENTS WITH ATHEROSCLEROSIS BY SMALL DOSES OF NEOMYCIN. P. Samuel, C. M. Holtzman and Jane Goldstein (Dept. of Med., The Long Island Jewish Hosp. and Long Island Jewish Hosp.-Queens Hosp. Center Affiliation, New Hyde Park, N. Y., and Jamaica, N. Y.). *Circulation* **35**, 938–946 (1967). The effect and tolerance of long-term oral administration of small doses of neomycin as a serum cholesterol reducing agent has been investigated. Sixteen patients were given neomycin sulfate orally for periods varying from 12 to 40.1 months, following control periods of 2.6 to 14.6 months. After an initial daily dose of 2 g of neomycin, the daily dose was varied between 0.5 and 2 g according to response. Average total serum cholesterol concentrations decreased in each of the 16 patients by 15 to 32%; the average decrease for the group was 22%. The difference was statistically significant in each patient at the 0.1% level. Serum cholesterol concentrations were maintained at the lower plateau as long as the drug was given. In an additional patient, after administration of neomycin for 2 months there was no change in serum cholesterol concentrations and the study was discontinued. Another developed severe diarrhea, nausea, and abdominal cramps during the first week of study.

FATTY ACID COMPOSITION AND WEIGHTS OF ORGANS FROM ESSENTIAL FATTY ACID-DEFICIENT AND NONDEFICIENT HENS. H. Menge (U. S. Dept. of Agr., Beltsville, Maryland). *J. Nutr.* **92**, 148–52 (1967). Fatty acid analyses and relative weights of organs from hens severely depleted of linoleic acid were made and compared with those obtained from corresponding organs from nondeficient hens. Group 1 was fed a purified EFA-deficient diet, and group 2 was given the same diet supplemented with corn oil calculated to supply 4% linoleic acid (18:2). The control group (group 3) was composed of 20 birds selected at random from pullets fed a practical-type diet hatching. At 23 weeks group 3 was given a practical-type diet containing sufficient corn oil to supply 4% 18:2. The spleen, pituitary, pineal, thyroid and adrenals of the EFA-deficient hens weighed significantly more than corresponding organs from non-deficient hens (groups 2 and 3). This increase in weight was regarded as a reflection of the severe dietary stress imposed on the hens. The fatty acid composition of the tissue lipids from group 2 differed only slightly from that of group 3, even though egg production, egg weight, and hatchability of fertile eggs were significantly lower in group 2 as compared with that of group 3. These results demonstrated that the purified diet lacked a factor(s) other than 18:2 that was necessary for optimal reproduction.

THE EFFECT OF PROLACTIN ON LIPOGENESIS IN THE PIGEON. A. G. Goodridge and E. G. Ball (Dept. of Biol. Chem., Harvard Med. School, Boston, Mass. 02115). *Biochemistry* **6**, 1676–82 (1967). The effect of prolactin on lipogenesis in the pigeon was examined by injecting glucose-U-$^{14}$C and tristearin-9,10-$^{3}$H into birds which had been untreated or injected daily with 1 mg of bovine prolactin for 5 days. Radioactivity in plasma glucase and in liver, plasma, and adipose tissue total fatty acids ($^{14}$C and $^{3}$H) was determined 0.5, 7, 15, and 30 min after injection of the labeled substances. In those birds receiving prolactin the rate of accumulation of labeled fatty acids was three-to fourfold faster per gram of liver and the liver was nearly double the normal size. Accumulation of $^{14}$C fatty acids in plasma and adipose tissue was negligible at 7 min but increased rapidly and linearly with time thereafter. The rate of accumulation in both plasma and adipose tissue of the birds receiving prolactin was markedly accelerated, the increase over the normal being of nearly the same magnitude as seen for the total liver. The fate of the tritiated fatty acids indicates that the liver of birds receiving prolactin had a markedly enhanced capacity to process preformed fatty acids. The results are consistent with the hypothesis that in both normal and prolactin treated pigeons fatty acids were synthesized predominantly in the liver and released to the blood for transport to adipose tissue where they were picked up and stored. Treatment with prolactin produced an increase in the rate of hepatic fatty acid synthesis and turnover which was reflected in an increased level of plasma fatty acids and deposition of fatty acids in peripheral depots with an increase in body weight.

RELATIVE FAILURE OF SATURATED FAT IN THE DIET TO PRODUCE ATHEROSCLEROSIS IN THE RABBIT. W. E. Connor, J. J. Rohwedder, and M. L. Armstrong (Dept. of Internal Med., Univ. of Iowa College of Med., Iowa City, Iowa 52240). *Circ. Res.* **20**, 658–63 (1967). Three "saturated" fats of vegetable origin were fed to different groups of rabbits for periods up to 1 year. Cocoa butter and a hydrogenated vegetable oil shortening produced no hypercholesterolemia. Coconut oil feeding increased the serum cholesterol concentrations for 4 months, but a decline to baseline values occurred after 6 months. No gross atherosclerosis occurred in any animal fed coconut oil or the hydrogenated vegetable oil shortening. Slight atherosclerotic lesions were found in 50% of the rabbits fed cocoa butter. Aortic cholesterol content was slightly increased in animals fed coconut oil and cocoa butter. Dietary fats, even when highly saturated, had only a minimal capacity to produce atherosclerosis in the rabbit, a species usually highly susceptible to the induction of atherosclerosis. When a moderate amount of cholesterol was added to the diet, the serum cholesterol levels increased greatly and considerable atherosclerosis resulted.

VITAMIN E ACTIVITY AND METABOLISM OF N-METHYLTOCOPHERAMINES. J. G. Bieri and E. L. Prival (Nat. Inst. of Arthritis and Metabolic Diseases, Nat. Inst. of Health, Bethesda, Maryland 20014). *Biochemistry* **6**, 2153–8 (1967). The synthesis of new tocopherol derivatives has initiated reconsideration of structure-activity relationships of vitamin E active compounds. In two different bioassays with the chick, dl-α-tocopheramine, dl-N-methyl-β-tocopheramine, and dl-N-methyl-γ-tocopheramine were as active on a molar basis as dl-α-tocopherol. Considerably less active were dl-β-tocopheramine and dl-γ-tocopheramine. When the compounds were fed to rats, blood levels of N-methyl-β-and N-methyl-γ-tocopheramines were one-half that of α-tocopherol but in liver there was twice the concentration of the N-methyltocopheramines as α-tocopheral. The amounts of β- and γ-tocopheramines in blood and liver were considerably lower than those of α-tocopheramine and the N-methyl derivatives. The distribution of α-tocopherol, β-tocopheramine, and N-methyl-β-tocopheramine in liver cellular fractions was similar. Neither the tocopheramines nor N-methyl-tocopheramines, when administered to rats, gave rise to detectable amounts in the tissues of their corresponding tocopherols. The compounds were recovered from liver and identified by their ultraviolet absorption spectra and gas chromatographic retention times. N-Methyl-β-tocopheramine had antoxidant activity equal to that of α-tocopherol in stabilizing methyl linolenate emulsions, while β-tocopheramine was one-half as active.

ESSENTIAL FATTY ACID DEFICIENCY AND ITS EFFECT UPON REPRODUCTIVE ORGANS OF MALE RABBITS. B. Ahluwalia, G. Pincus and R. T. Holman (The Worcester Found. for Experimental Biol. Shrewsbury, Mass.). *J. Nutr.* **92**, 205–214 (1967). To study the effects of essential fatty acid deficiency upon rabbits, especially upon spermatogenesis, five immature, male, New Zealand rabbits were fed a purified diet devoid of fat for 14 weeks. The fatty acids of the testes showed a marked increase of 5,8,11-eicosatrienoic acid and a decrease in the members of the linoleate family of fatty acids. Gross evidence of essential fatty acid (EFA) deficiency included diminished growth and feed efficiency, and loss of hair. Total lipids, phospholipids, and free cholesterol of testes were found to be decreased, whereas triglycerides followed the reverse pattern. Testes of deficient animals showed an extensive degenerative change in the seminiferous tubules; no stage beyond secondary spermatocyte was evident. Glucose-6-phosphate dehydrogenase and $\Delta^5$-3β-hydroxysteroid dehydrogenase activity of Leydig cells in both groups showed that these enzymes were present. These observations suggest that the degeneration of gonads observed during essential fatty acid deficiency may be due to primary impairment of anterior hypophyseal function.

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CRUSTACEAN LIPOVITELLIN. ISOLATION AND CHARACTERIZATION OF THE MAJOR HIGH-DENSITY LIPOPROTEIN FROM THE EGGS OF DECAPODS. R. A. Wallace, Susan L. Walker, and P. V. Hauschka (Biol. Div., Oak Ridge Nat. Lab., Oak Ridge, Tenn.). *Biochemistry* 6, 1582–90 (1967). A simple procedure is described by which the principal protein component of the eggs and mature ovaries of six decapod crustaceans was isolated in relatively pure form and in large amounts. The component, in all cases, was a lipoprotein (30% lipid) which lacked protein-bound phosphorus and had an average molecular weight of $3.5 \times 10^5$. The relatively intense chromatic properties of the crustacean lipoproteins were due to the presence of a carotenoid noncovalently bonded to the lipid and/or protein. Those proteins displaying colors (purple, blue, and green) associated with shorter wave lengths of the visible spectrum undergo spectral changes dependent upon solvent conditions. Although these crustacean proteins may not be homologous to the vertebrate lipovitellins, they appear to serve in the same capacity, and generic use of the term "lipovitellin" is thus suggested for the major high-density lipoprotein found within animal eggs. The crustacean lipovitellins appear to offer several advantages for studies of lipoproteins in general and lipoprotein synthesis in particular.

ISOLATION OF A PHOSPHOLIPID RENIN INHIBITOR FROM KIDNEY. Subha Sen, R. R. Smeby, and F. M. Bumpus (Res. Div., Cleveland Clinic Found., Cleveland, Ohio 44106). *Biochemistry* 6, 1572–81 (1967). The reactivity of renin added to plasma from nephrectomized dogs increases independent of increase in renin substrate concentration. Addition of plasma proteins from normal dogs to plasma from a nephrectomized dog reduces the reactivity of renin. This suggests the presence of a renin inhibitor in normal dog's plasma of renal origin. The inhibitor was isolated from dog's kidney and shown to be a phospholipid similar to bovine phosphatidylserine but differs in fatty acid content and the structure of the amino acid. The phospholipid completely inhibits the reaction of dog renin with dog renin substrate *in vitro* and single, daily intramuscular injections of the compound reduces the blood pressure of chronic renal hypertensive rats.

THE USE OF ROASTED SOYBEAN MEAL AS ANIMAL FEED AND EQUIPMENT FOR ITS PRODUCTION. F. Gaimari (Bühler Co., Milan, Italy). *Riv. Ital. Sostanze Grasse* **44**, 169–71 (1967). Equipment used to manufacture soybean meal is reviewed.

INSULIN-LIKE ACTIVITY OF A MICROBIAL PROTEASE ON ISOLATED FAT CELLS. J. F. Kuo, C. E. Holmlund, I. K. Dill and N. Bohonos (Lederle Lab.). *Arch. Biochem. Biophys.* **117**, 269–74 (1966). A protease produced by *Streptomyces griseus* has been found to display insulin-like effects on the metabolism of isolated fat cells from rat epididymal tissue. These effects include enhanced conversion of glucose to carbon dioxide and lipid, and repression of the lipolysis stimulated by corticotropin and norepinephrine. Greater than 95% of the proteolytic activity could be abolished without significantly altering the insulin-like activity of the protease. The significance of these observations is discussed.

STUDIES ON LIPOGENESIS IN VIVO. COMPARISON OF CHOLESTEROL AND FATTY ACID SYNTHESIS IN RATS AND MICE. G. R. Jansen, M. E. Zanetti and C. F. Hutchison (Merck Inst. for Therap. Res.). *Biochem. J.* **102**, 864–9 (1967). The importance of fatty acid synthesis as a pathway for the disposal of ingested glucose has been evaluated in rats and mice given a purified high-glucose, low-fat diet. Under the conditions employed fatty acid synthesis appeared to be a more important pathway for glucose disposal in mice than in rats. In mice 15.3% of ingested glucose-U-$^{14}$C was converted into fatty acid and in rats the corresponding value was only 8.6%. In contrast, the conversion of glucose-U-$^{14}$C into cholesterol, as a percentage of dose, was twice as high in rats as in mice. Mice given diets containing 1% or 20% of corn oil converted 14.5% or 7.0% respectively of dietary glucose-U-$^{14}$C into fatty acid over a 24-hr period. There was no effect of fat on the incorporation of the isotope into cholesterol. In mice given diets containing 1% or 20% of corn oil approx. 10% and 2%, respectively, of newly synthesized fatty acids were found in the liver. Hepatic fatty acid synthesis appears to be more sensitive to dietary fat than is extrahepatic synthesis.

STUDIES ON LIPOGENESIS IN VIVO. FATTY ACID AND CHOLESTEROL SYNTHESIS IN HYPERGLYCEMIC-OBESE MICE. Ibid, 870–7. Lipogenesis has been studied in intact genetically obese mice by measuring the incorporation of a single oral dose of 250 mg of glucose-U-$^{14}$C into fatty acid and cholesterol in the liver and extrahepatic tissues. Studies were also carried out with labelled glucose added to the diet and fed for 24 hr. With either method, the conversion into fatty acid was greatly elevated in the livers of the obese mice. By contrast, conversion of the single dose of glucose into fatty acid in extrahepatic tissues of obese mice was only half that occurring in the non-obese litter mates. Conversion of the single dose of glucose-$^{14}$C into liver cholesterol was comparable in obese and non-obese mice fed on a purified low-fat diet. However, obese mice given this diet for 12 weeks accumulated 1.54% cholesterol in the liver vs. 0.29% in the non-obese litter mates. This accumulation apparently resulted from a decrease in removal of cholesterol from the liver, rather than an increased synthesis. Conversion of the glucose into extrahepatic fatty acid was decreased by 18-hr starvation, proportionately as much in obese as in non-obese mice. The decrease in liver fatty acid synthesis caused by starvation also was considerable in obese mice, although somewhat less marked than in the non-obese.

THE OXIDATION AND UTILIZATION OF PALMITATE, STEARATE, OLEATE AND ACETATE BY THE MAMMARY GLAND OF THE FED GOAT IN RELATION TO THEIR OVERALL METABOLISM. E. F. Annison, J. L. Linzell, S. Fazakerley and B. W. Nichols (Unilever Res. Lab., Sharnbrook, England). *Biochem. J.* **102**, 637–47 (1967). Measurements were made of milk yield, mammary blood flow and arteriovenous differences of each plasma lipid fraction, and their specific radioactivities, during the infusion of stearate-U-$^{14}$C, oleate-U-$^{14}$C, palmitate-U-$^{14}$C and acetate-1-$^{14}$C into fed lactating goats. Acetate accounted for 23% of the total $CO_2$ produced by the animal and contributed to the metabolism of the mammary gland to about the same extent. Corresponding values for each of the long chain acids were less than 1%. There were no significant arteriovenous differences of phospholipids, sterols or sterol esters, and their fatty acid composition showed no net changes during passage through the mammary gland. There were large arteriovenous differences of plasma triglycerides and their acid composition changed markedly across the gland. The levels of palmitate and stearate fell, and that of oleate increased. Arteriovenous differences of plasma FFA were small and variable, but a large fall in the specific radioactivity of each of the long chain acids indicated a substantial uptake of plasma FFA, accompanied by roughly equivalent FFA release from mammary tissue. The uptake of FFA was confirmed by the extensive transfer of radioactivity into milk. Results confirmed that $C_4$-$C_{14}$ milk fatty acids arise largely from blood acetate, while palmitate is derived partly from acetate and partly from plasma triglyceride, the latter fraction being almost the sole precursor of oleate and stearate.

INHIBITION OF LIPOXYGENASE BY SATURATED MONOHYDRIC ALCOHOLS THROUGH HYDROPHOBIC BONDINGS. H. Mitsuda, K. Yasumoto and A. Yamamoto (Kyoto Univ., Kyoto, Japan). *Arch. Biochem. Biophys.* **118**, 664–9 (1967). A series of saturated monohydric alcohols has been examined in search of evidence pertaining to hydrophobic bondings during the reaction of lipoxygenase from defatted soybean meal. The alcohols produce a reversible inhibition of the enzymic reaction, the degree of which increases with increasing chain length of the alcohols. Van't Hoff plots for the inhibition indicate a positive entropy change for the combination of the alcohols with the enzyme. Hydrophobic bond formation between alcohols and enzyme is not only accounted for by these facts but also anticipated from close relationships established between the inhibitory activity of the alcohols and their physicochemical properties. From Lineweaver-Burk plots it follows that the inhibition is of a mixed type. The alcohols are unable to prevent the enzyme from the inactivating action of hydrogen peroxide, which destroys the catalytic site in the enzyme. The possibility that the alcohols combine with the enzyme at a hydrophobic region which serves as binding site for the substrate is discussed.

OXIDATION OF FATTY ACIDS IN GUINEA PIG EPIDERMIS. J. H. Herndon and J. S. McGuire (Yale Univ. School of Med.). *Arch. Biochem. Biophys.* **119**, 583–5 (1967). Evidence is presented to the effect that both short and long chain fatty acids are rapidly oxidized in guinea pig epidermis and that the rates of glucose and palmitate oxidation are similar. Concentrations of fatty acids insufficient to produce toxic surface effects reduce the rate of glucose oxidation, while fatty acid oxidation is itself depressed by glucose. Addition to the incubation medium of *dl*-carnitine, a substance whose regulatory role in lipid oxidation in other tissues has been demonstrated, stimulates fatty acid oxidation in epidermis. The evidence suggests that the oxidative capacity of epidermis is at least as great for fatty acids as it is for glucose.

CHANGES IN LIPID SYNTHESIS IN RAT LIVER DURING DEVELOPMENT. F. J. Ballard and R. W. Hanson (Temple Univ. School of Med.). *Biochem. J.* 102, 952–8 (1967). Lipogenesis, as measured by the incorporation of glucose-$^{14}$C or acetate into fatty acids in liver slices, is high in foetal and adult rat liver but is low in the liver of the suckling rat, especially with glucose as substrate. The rate of synthesis of non-saponifiable lipids from glucose is about 15 times as great in the liver of the 18-day foetus as in adult liver. Activity in the newborn is negligible. Glucose incorporation into fat is strongly concentration-dependent in liver slices from the adult and the 2-week old rat, but less markedly so in liver slices from the foetus. Changes in the activity of hepatic citrate-cleavage enzyme occur in parallel with the changes in the extent of fatty acid formation, supporting the participation of this enzyme in lipogenesis.

THE MEMBRANE SYSTEMS OF THE MITOCHONDRION, IV. THE LOCALIZATION OF THE FATTY ACID OXIDIZING SYSTEM. D. W. Allmann, L. Galzigna, R. E. McCaman and D. E. Green (Univ. of Wisconsin, Madison, Wisc.). *Arch. Biochem. Biophys.* 117, 413–22 (1966). The localization of the enzymes concerned in the various steps of fatty acid oxidation has been determined by the enzymic analysis of the isolated inner and outer membrane fractions of beef heart mitochondria. The enzymes that activate fatty acids, the carnitine-long chain acyl transferase, and the enzymes of the $\beta$-oxidation, have been found to be localized exclusively in the outer membrane. None of the activities associated with these enzymes could be detected in the preparation of the inner membrane. The enzymes for the complete oxidation of palmitate are localized in the outer membrane. The requirement for the carnitine-mediated transfer of the acyl group across the outer membrane from exterior to interior was also demonstrated. This finding established the outer membrane as the carnitine "barrier." Atractyloside (an inhibitor of several mitochondrial reactions) is a potent inhibitor of fatty acid oxidation. This inhibition is exerted on enzymes associated with the membrane-forming sector of the outer membrane. The atractyloside "barrier" for fatty acid oxidation has been established as the outer membrane.

LIPID COMPOSITION OF AORTIC INTIMA PLUS INNER MEDIA AND OTHER TISSUE FRACTIONS FROM FETAL AND ADULT RHESUS MONKEYS. O. W. Portman and M. Alexander (Univ. of Oregon Med. School). *Arch. Biochem. Biophys.* 117, 357–65 (1966). Lipids of the intima and inner media of aortas from adult rhesus monkeys and from a series of fetuses of about 75, 125 and 150 days of gestational age were characterized as to major lipid classes, types of phospholipids and fatty acid spectra of the lipid classes and subclasses. Plasma lipids and the types of phospholipids of erythrocytes, total liver and of hepatocytic organelles were also studied. The free and ester cholesterol concentrations of adult aorta were higher than comparable fractions in the fetuses. Triglyceride and total phospholipid concentrations of fetal and adult aorta were not different. The sphingomyelin concentration of adult aorta was three times that of the fetal aorta. The phosphatidyl serine was also higher and phosphatidyl choline lower in the adult aortas. The distributions of different phospholipids were highly specific to the other tissues or subcellular organelles in question, but these patterns were much less affected by age of the donor animal than were the phospholipids of aorta. The hepatocytic organelles had low concentrations of sphingomyelin and phosphatidyl serine while these phospholipids were prominent in the erythrocytes. Fatty acid distributions were specific as to lipid classes and subclasses of aorta, although there were also differences between comparable fractions from the fetal and adult series.

REASSOCIATION OF PURIFIED LIPOPOLYSACCHARIDE AND PHOSPHOLIPID OF THE BACTERIAL CELL ENVELOPE: ELECTRON MICROSCOPIC AND MONOLAYER STUDIES. L. Rothfield and R. W. Horne (Dept. of Molec. Biology, Albert Einstein Coll. of Med., Yeshiva Univ., New York, N.Y.). *J. Bacteriol.* 93, 1705–1721 (1967). Phosphatidyl ethanolamine (PE) and lipopolysaccharide (LP) were purified from *Escherichia coli* and *Salmonella typhimurium* cell envelopes. By electron microscopy LP fractions showed uniform hollow spheres (diameter 500 to 1000Å) bounded by a continuous leaflet (30Å thick); PE fractions showed a regular lamellar structure. When LP and PE were mixed the leaflet of lipopolysaccharide spheroids extended directly into the PE structure. Monolayer experiments indicated that LP penetrated a monomolecular film of PE at an air-water interface. The results indicate a common leaflet containing PE and LP may be formed *in vitro* and a similar leaflet may exist in the intact cell envelope.

FATTY ACID SYNTHETASE OF SACCHAROMYCES CEREVISIAE. H. P. Klein, Carol M. Volkmann and F. Chao (Exobiology Div., Ames Res. Center, N.A.S.A., Moffett Fld., Calif. 94035). *J. Bacteriol.* **93**, 1966 (1967). A light particle fraction of crude ribosomal material from *Saccharomyces cerevisiae* contained the fatty acid synthetase. By use of gradient density analysis this enzyme was located in the 47 *S* component. The particles were 300Å in diameter, were considerably flatter than ribosomes and consisted entirely of protein.

INFLUENCE OF CULTURE CONDITIONS ON THE GLYCERIDE COMPOSITION OF FATS OBTAINED FROM THE MOLD FUSARIUM. J. Salmonowicz, J. Marcinkiewicz and H. Niewiadiowski (Polytechnical School of Gdansk, Poland). *Rev. Franc. Corps Gras* **14**(5), 311–314 (1967). *Fusarium culmorum* E54 was grown upon identical media except for the source of carbon. One culture was grown on a media using glycerine as the carbon source, the other using lactose. A difference exists between the two cultures not only in the biosynthesis of fatty acids but also in the composition of the triglycerides formed. The culture grown with glycerine produced fatty acids with less unsaturation than the culture grown on lactose. From 30 to 40% of the unsaturated fatty acids of the culture grown on glycerine were C20:2, while the culture grown on lactose had C18:1 and C18:2 fatty acids at levels of 40 to 50%.

ABOUT THE FATE OF AFLATOXIN DURING REFINING BY DISTILLATION OF PEANUT OIL. N. Velan and J. Reynard (Lab. of Res. of the Society Salador). *Rev. Franc. Corps Gras* **14**(5), 305–310 (1967). Aflatoxin is removed during the alkali refining of peanut oil. It is shown in this study that continuous refining followed by a neutralization distillation or steam refining is also effective in removing aflatoxin.

EFFICIENT ELUTION OF RABBIT LIVER AND PLASMA PHOSPHOLIPIDS FROM THIN-LAYER PLATES. J. J. Biezenski (Depts. of Obstetrics and Gynecology, Maimonides Med. Center, and State Univ. of New York, Downstate Med. Center, Brooklyn, N. Y. 11219). *J. Lipid Res.* **8**, 409–10 (1967). The efficient recovery (96.3—99.6%) of phospholipids by elution from thin-layer plates is documented. The composition of phospholipids from rabbit liver and plasma is reported.

1,2-$^{3}$H-CHOLESTEROL AS A TRACER IN STUDIES OF HUMAN CHOLESTEROL METABOLISM. P. D. S. Wood, D. Myers, Yuen-Ling Lee, Ryuzo Shioda and L. W. Kinsell (Inst. for Metabolic Res., Highland General Hosp., Oakland, Calif. 94606). *J. Lipid Res.* **8**, 406–8 (1967). 1,2-$^{3}$H-Cholesterol was fed to a subject together with 4-$^{14}$C-cholesterol at a known $^{3}$H/$^{14}$C ratio. The ratio was satisfactorily preserved in cholesterol recovered from plasma, red cells, and bile, and in acids of bile. Isotopic fractionation was seen during thin-layer chromatographic isolation of cholesterol. In work with 1,2-$^{3}$H-cholesterol or its metabolites care should be taken to recover chromatographic bands in their entirety.

COMPOSITION OF NEUTRAL LIPIDS FROM ERYTHROCYTES OF COMMON MAMMALS. G. J. Nelson (Bio-Medical Div., Lawrence Radiation Lab., Univ. of Calif., Livermore, Calif. 94550). *J. Lipid Res.* **8**, 374–9 (1967). The neutral lipids of the erythrocytes were investigated in several common mammals: cow, dog, goat, horse, pig, rabbit, rat and sheep. Cholesterol content was determined by gas-liquid, thin-layer and column chromatography the last in conjunction with the IR spectrophotometry. The three methods yielded similar results. In every species investigated, cholesterol was the major neutral lipid; cholesteryl esters, triglycerides and free fatty acids were detected only in trace amounts. It is concluded that these substances may have been contaminants from plasma lipoproteins or leukocytes rather than true constituents of the erythrocyte. In the erythrocytes of all species, cholesterol content was close to 30% of the total lipids extracted from the cells, and the molar ratio of cholesterol to phospholipid was approximately one. The significance of the data is discussed in relation to current concepts of the structure of the cell membrane involving cholesterol-polar lipid complexes.

METABOLISM OF LYSOPHOSPHATIDYL ETHANOLAMINE AND LYSOPHOSPHATIDYL CHOLINE BY HOMOGENATES OF RABBIT POLYMORPHONUCLEAR LEUKOCYTES AND ALVEOLAR MACROPHAGES. P. Elsbach (Dept. of Med. of New York Univ. School of Med., New York 10016). *J. Lipid Res.* **8**, 359–65 (1967). A comparison has been made between the conversion of $^{32}$P-labeled lysophosphatidyl ethanolamine (LPE) and lysophosphatidyl choline (LPC) to their respective acylated and deacylated derivatives by homogenates of rabbit polymorphonuclear leukocytes and alveolar macrophages. Synthesis of PE by both homogenates and of PC by macrophage homogenates proceeded to about the same extent and is attributed to direct acylation of the lyso compounds. At higher LPC concentrations formation of PC by leukocytes is far greater than by macrophages. The mechanism of this enhanced synthesis of PC, which is brought out by higher substrate concentrations, is believed to be a transfer of the acyl group of one LPC molecule to another. Under optimal conditions macrophage homogenates deacylated LPE to a greater extent than LPC, while the reverse was true for leukocyte homogenates. Albumin inhibited deacylation of LPC and its conversion to PC by leukocytes, perhaps by binding the substrate (2 moles of LPC per mole of albumin). Other effects of albumin—stimulation of deacylation and acylation of LPE by macrophages, inhibition of deacylation and acylation of LPE by leukocytes—remain unexplained.

PROPERTIES AND METABOLISM OF 2-ALKYLALKANOATES. III: ABSORPTION OF METHYL AND ETHYL 2-METHYLPALMITATE. T. A. Saladin and E. A. Napier, Jr. (Dept. of Internal Med. Univ. of Mich. Med. School, Ann Arbor, Mich.). *J. Lipid Res.* **8**, 342–9 (1967). The recovery from rat and rabbit tissues of fed methyl-$^{14}$C and ethyl-2-$^{14}$C 2-methylpalmitate with unaltered specific activity has demonstrated the existence of mechanisms for the absorption and deposition of both methyl and ethyl esters of fatty acids, at least for 2-methylpalmitate. In thoracic duct-cannulated rats, approximately 9% of the fed compounds was recovered from the lymph during the first 24 hr, the rate of recovery reaching a maximum between 6 and 8 hr. In the rabbit, the fed, unaltered esters in plasma were transported principally by means of the low density lipoproteins. Only trace amounts of the unaltered esters were subsequently detected in the blood and tissue lipids after feeding, however, even during the period of maximal absorption; moreover, in contrast to at least one report by others, further analyses for methyl or ethyl esters of other fatty acids has shown that such esters of short-chain alcohols constitute no more than a trace amount (0.004–1.03%) of the lipids extracted from a wide variety of mammalian tissues. The possibility remains that even these trace amounts of esters arose as artifacts of autolysis, extraction, or assay.

INCORPORATION OF ACETATE INTO FATTY ACIDS AND LECITHIN BY LUNG SLICES FROM FETAL AND NEWBORN LAMBS. N. Chida and F. H. Adams (Div. of Cardiology, Dept. of Pediatrics, Univ. of Calif. at Los Angeles, School of Med., Los Angeles, Calif. 90024). *J. Lipid Res.* **8**, 335–41 (1967). Incorporation of acetate-1-$^{14}$C into phospholipids and fatty acids by lung slices from fetal and newborn lambs and from ewes was studied *in vitro*. The distribution of radioactivity in the fatty acids of neutral lipids, phospholipids, and lecithin was determined. Acetate-1-$^{14}$C was incorporated into myristic, palmitic, and $C_{18}$ fatty acids. Of the lecithin fatty acids, myristic and palmitic were the major radioactive fatty acids. The results indicate that the lung of fetal lambs is able to synthesize lecithin containing saturated fatty acids, a major constituent of pulmonary surfactant. A marked increase in the rate of acetate incorporation into lecithin was observed during maturation, and these rates were higher than those obtained in the ewes. A possible relationship between developmental changes in lecithin biosynthesis and pulmonary surfactant is discussed.

DISTRIBUTION OF RADIOACTIVE GLYCEROL AND FATTY ACIDS AMONG ADIPOSE TISSUE TRIGLYCERIDES AFTER ADMINISTRATION OF GLUCOSE-U-$^{14}$C. C. H. Hollenberg (McGill Univ. Med. Clinic, Montreal Gen. Hosp., Montreal, Quebec, Canada). *J. Lipid Res.* **8**, 328–34 (1967). Adipose lipid obtained from fed rats 15 or 60 min after injection of radioactive glucose was separated into 10 triglyceride classes of differing fatty acid compositions. The distribution among these classes of total and radioactive triglyceride-glycerol was determined and found to be the same. Thus newly synthesized adipose triglycerides resemble in kind and proportion the triglycerides which exist in the tissue. This finding is in accord with the concept that the structures of adipose triglycerides are stable over long periods and that the turnover rate of the several triglyceride species are similar. After administration of radioactive glucose, the specific activity of saturated fatty acids was higher in the more saturated triglyceride species. These data indicate that newly formed saturated acids do not mix completely with all adipose tissue fatty acids available for esterification. Fatty acids derived from plasma triglyceride influenced the composition of newly synthesized adipose tissue triglyceride and thus constitute an important source of adipose tissue lipid.

LIPID COMPOSITION OF THE VASCULAR SYSTEM DURING INFANCY, CHILDHOOD, AND YOUNG ADULTHOOD. Hilda F. Wiese, E. Coon, W. Yamanaka, Shirley Barber, and P. Johnson (Bruce Lyon Memorial Res. Lab., Children's Hosp. Med. Center, Oakland, Calif. 94609). *J. Lipid Res.* 8, 312–20 (1967). The object of this study was to determine the changes in lipid composition that occur in blood vessels from infancy to young adulthood. Analyses included levels of total cholesterol, total triglyceride, phospholipid and cholesteryl ester fatty acids, and the distribution of saturated and unsaturate fatty acids. Triglyceride, total and monoenoic fatty acids, and linoleic acid were lower in the ascending, thoracic, and abdominal aorta than in the pulmonary artery and inferior vena cava. Phospholipids and arachidonic acid were higher in aortic segments than in the other two vessels. Aortic lipids showed significant changes with increasing age: total cholesterol and total fatty acids decreased from 1 wk to 5 yr, then increased to 22 yr of age. Triglycerides decreased whereas cholesteryl esters increased from 10 to 22 yr of age. Saturated fatty acids decreased from 1 wk to 10 yr, then remained relatively constant. Linoleic acid (3.7–9.8% of total fatty acids) and arachidonic acid (15.8–21.7%) both increased with age; the increase in cholesteryl linoleate was highly significant. After 10 yr of age, total cholesterol and total fatty acids were significantly higher in abdominal than in ascending and thoracic segments of aorta.

OCCURRENCE OF POSITIONAL ISOMERS OF OCTADECENOIC AND HEXADECENOIC ACIDS IN HUMAN DEPOT FAT. J. Jacob and G. Grimmer (Univ. Hamburg, Hamburg, Germany). *J. Lipid Res.* 8, 308–11 (1967). Positional isomers of hexadecenoic and octadecenoic acids of human adipose tissue have been separated by gas-liquid chromatography and their amounts determined by oxidative cleavage ($MnO_4$ and $IO_4$). The following isomeric octadecenoic acids were present: 7-octadecenoic acid (0.4%), 8- (1.9%), 9- (73.0%), 10- (2.5%), 11- (19.0%) and 12- (3.2%). The hexadecenoic acids have also been shown to be a mixture of positional isomers, in which the *cis* 9-isomer predominates. 10-Hexadecenoic and 12-octadecenoic acids could conceivably be precursors of linoleic acid. The following branched fatty acids have also been determined in human depot fat: 13-methylpentadecanoic, 12-methyltetradecanoic, 14-methylpentadecanoic, 14-methylhexadecanoic, and 16-methylheptadecanoic acid. They were present in percentages of 0.02–0.6% and their identification rests solely on comparison of their gas-liquid chromatographic retention times with those of synthetic compounds.

KINETIC ANALYSIS OF THE OXIDATION OF PALMITATE-1-$^{14}$C IN MAN DURING PROLONGED HEAVY MUSCULAR EXERCISE. R. J. Havel, L. G. Ekelund, and A. Holmgren (Dept. of Clin. Phys. and the King Gustav V Res. Inst., Karolinska Inst. Stockholm, Sweden). *J. Lipid Res.* 8, 366–73 (1967). Two healthy men with high working capacities were injected intravenously with palmitate-1-$^{14}$C and $NaH^{14}CO_3$ on two occasions while they were performing strenuous exercise on a bicycle ergometer. From analysis of $^{14}CO_2$ in expired air after injection of $NaH^{14}CO_3$, rate constants and compartment size describing a three-compartment system for $CO_2$ were determined algebraically. These data were combined with those of a separate study in which $^{14}$C in free fatty acids of arterial blood plasma and in expired $CO_2$ were measured after injection of palmitate-1-$^{14}$C to construct an eight-compartment model with an analogue computer that described precisely the observed data in each subject. The results indicate that under these conditions almost half of the free fatty acids leaving the blood are oxidized directly (i.e., are transferred to mitochondrial oxidative sites through small intermediate compartments). The remainder enters larger compartments apart from the direct pathway; most of these fraction reenter the direct oxidative pathway within 30 min.

LIPIDS OF HUMAN LEUKOCYTES: RELATION TO CELL TYPE. E. L. Gottfried (Dept. of Med. and the Unit for Res. in Aging, A. Einstein College of Med., Yeshiva Univ., Bronx, N. Y. 10461). *J. Lipid Res.* 8, 321–7 (1967). Significant differences in lipid composition have been found between normal human lymphocytes and polymorphonuclear leukocytes, abnormal leukocytes from patients with acute and chronic leukemia, and leukocytes from peritoneal exudates. Lipid extracts of isolated leukocytes were analyzed for total lipid, phosphorus, cholesterol, and plasmalogens. Individual phospholipids and neutral lipids were separated by thin-layer chromatography. The major phospholipids and neutral lipids were separated by thin-layer chromatography. The major phospholipids were phosphatidyl choline, ethanolamine, glycerophosphatides, sphingomyelin, phosphatidyl serine, and phosphatidyl inositol. Plasmalogen was found mainly as phosphatidal ethanolamine. The neutral lipid fractions contained free cholesterol and various amounts of triglyceride, but little esterified cholesterol. Normal lymphocytes contained about half as much total lipid per cell as normal polymorphonuclear leukocytes, with a similar cholesterol:-lipid-P ratio but relatively more lecithin and less ethanolamine glycerophosphatide. Normal mature leukocytes, compared with immature cells of the same morphological series, had a higher total lipid content per cell, more cholesterol and a higher ratio of cholesterol to lipid-P. Little difference was found in total lipid-P per cell, but mature cells contained relatively less lecithin and more sphingomyelin.

DETERMINATION OF MOLECULAR SPECIES OF LECITHIN FROM ERYTHROCYTES AND PLASMA. L. M. G. Van Golde, V. Tomasi and L. L. M. Van Deenen (Lab. Organic Chem., Dept. of Biochem., Univ. of Utrecht, Utrecht, The Netherlands). *Chem. Phys. Lipids* 1, 282–93 (1967). The molecular species of lecithin from erythrocyte and plasma of man and rabbit were determined after conversion of the lecithins into diglycerides by means of hydrolysis with phospholipase C. The resultant diglycerides were separated by thin-layer chromatography on silica impregnated with silver nitrate into 6 or 7 fractions differing with respect to their degree of unsaturation. The positional distribution of the fatty acids in these fractions was determined by hydrolysis with pancreatic lipase and was found to be in agreement with the positional distribution of the fatty acids in the lecithin as ascertained by means of phospholipase A hydrolysis. Using these techniques about 20 molecular species accounting for about 90% of the total lecithin, could be evaluated in the erythrocyte and plasma of man and rabbit. It became clear that qualitatively the molecular species of lecithin in the red blood cell and the plasma are similar. Quantitatively, however, there were some striking differences to be noted: in man the amount of (dipalmitoyl)- and (di-oleoyl)-lecithin was higher in the corpuscles when compared with plasma. On the other hand (1-palmitoyl-2-linoleoyl)- and (1-palmitoyl-2-arachidonoyl)- lecithin were more abundant in plasma. In rabbit similar differences were found in the make-up of the molecular species of lecithin between the erythrocyte membrane and the surrounding plasma.

THE ISOLATION AND CHARACTERIZATION OF PHOSPHATIDYLGLYCEROL AND A STRUCTURAL ISOMER FROM PIG LUNG. D. R. Body and G. M. Gray (Lister Inst. of Preventive Medicine, London, England). *Chem. Phys. Lipids* 1, 254–63 (1967). Two minor phospholipid components were isolated from a lipid extract of pig lungs. One was identified as phosphatidylglycerol. The results of alkaline hydrolysis, periodate oxidation and acetolysis showed that the other was a structural isomer of phosphatidylglycerol with the structure of a lyso-bis-phosphatidic acid. Its chromatographic characteristics on thin-layer plates of silica gel and on silicic acid-impregnated paper were quite distinct from those of phosphatidylglycerol. Both of these phospholipids were also present in lipid extracts of rat lungs and rabbit lungs.

OSMOTIC PROPERTIES AND WATER PERMEABILITY OF PHOSPHOLIPID LIQUID CRYSTALS. A. D. Bangham, J. De Gier and G. D. Greville (Agricultural Res. Council Inst. of Animal Physiology, Babraham, Cambridge, England). *Chem. Phys. Lipids* 1, 225-246 (1967). A smectic mesophase (myelin-like structure, layer-latticed liquid crystal) of charged phospholipid behaves as an almost perfect osmometer when alkali metal salts, glucose, sucrose or mannitol are used as solutes. Other solutes show graded permeabilities (ethyl-urea, methylurea, ethylene glycol, ammonium acetate, propionamide, glycerol > urea > malonamide > erythritol). Osmotically driven swelling and shrinkage were followed by means of the changes in optical extinction; the validity of this was confirmed by determination of the volumes and interstitial spaces of centrifuged pellets. The rapid volume changes, determined optically, combined with the measured total external surface areas of the phospholipid dispersions, were used to calculate osmotic water permeability coefficients (0.8–16 $\mu sec^{-1}$). The complementary effects of surface charge and electrolyte concentration on the equilibrium volumes of smectic mesophases were examined optically and by centrifugation. The volume of the particles decreased with increasing concentration of the electrolyte solution in which they formed. The intramellar spacings were not consistent with a single Hamaker constant over the range of the electrolyte concentration and area-charge ratio studied. The constant was high ($10^{-11}$ ergs) with low electrolyte concentrations and lower by a factor of about 100 with a high electrolyte concentration.

THE SOLUBILIZATION OF SOME STEROIDS BY PHOSPHATIDYL CHOLINE AND LYSOPHOSPHATIDYL CHOLINE. I. W. Kellaway and L. Saunders (Phys. Chem. Labs. The School of Pharmacy, The Univ. of London, England). *Biochim. Biophys. Acta* **144**, 145–8 (1967). Quantitative estimations of the amounts of some steroids solubilized by ultrasonic dispersion with phosphatidyl choline in water, have indicated that monopolar steroids are solubilized to a greater extent than multipolar steroids. Also, of the monopolar steroids studied, those possessing a 5-en structure, were solubilized to a lesser extent than the 4-en-3-one steroids and those with a saturated nucleus. The effect of chain length of the acid present in a series of cholesterol esters on the quantity solubilized by phosphatidyl choline was examined. It was found that as the series was ascended so the quantity solubilized decreased, although the trend was reversed for higher members of the series. Dispersion with lysophosphatidyl choline in the presence of phosphatidyl choline resulted in an increase in the quantity of progesterone solubilized in ultrasonically irradiated aqueous sols.

MECHANISM OF SIDE-CHAIN DEGRADATION OF $C_{21}$ STEROIDS BY SPORES OF SEPTOMYXA AFFINIS. K. Singh and S. Rakhit (Ayerst Laboratories, Montreal, Canada.) *Biochim. Biophys. Acta* **144**, 139–144 (1967). Side chain cleavage of $C_{21}$ steroids by spores of *Septomyxa affinis* has been investigated. The spores transformed 17α-deuteroprogesterone to 17α-deuterotestosterone indicating that the side chain was degraded via a pathway analogous to the non-enzymic Bayer-Villager oxidation of ketones by peracids. 20α-Hydroxypregn-4-en-3-one was probably transformed by an alternative pathway. The possibility of 20β-hydroxypregn-4-en-3-one being an intermediate in the side-chain cleavage reaction is ruled out since the spores were incapable of cleaving its side chain and the only product obtained from this steroid was the corresponding 1-dehydro analog.

OXIDATION OF THE GEOMETRIC ISOMERS OF $\Delta^9$-OCTADECENOIC ACID BY RAT-LIVER MITOCHONDRIA. R. L. Anderson (The Procter and Gamble Co., Miami Valley Labs., Cincinnati, Ohio, USA). *Biochim. Biophys. Acta* **144**, 18–24 (1967). The oxidation of the geometric isomers of $\Delta^9$-octadecenoic acid by rat-liver mitochondria was examined using the acids labeled at C-1 or C-10 or uniformly labeled with $^{14}C$. The mitochondria oxidized these acids to $CO_2$, acetoacetic acid and β-hydroxybutyric acid, thus establishing the functioning of the β-oxidation sequence in the oxidation of both isomers. The oxidation of uniformly $^{14}C$-labeled oleic acid exceeded that of uniformly $^{14}C$-labeled elaidic acid at all substrate concentrations ($4 \cdot 10^{-5}$ to $40 \cdot 10^{-5}$ M) and at all incubation times (5 to 160 min) examined. Data obtained with the specifically labeled acids demonstrated that the difference in oxidation rates was due to a slower oxidation of the alkyl chain on the methyl side of the *trans* double bond of elaidic acid.

DETERMINATION OF MUSCLE LIPIDS. S. O. Froberg (King Gustaf Vth Res. Inst., Stockholm, Sweden). *Biochim. Biophys. Acta* **144**, 83–93 (1967). Methods have been devised to separate red muscle tissue from white in the rat gastrocnemius muscle and to determine the content of cholesterol, phospholipids and triglycerides in these muscle types. No difference was observed in the concentration of cholesterol, phospholipids or triglycerides between right and left gastrocnemii of either muscle type. In fed animals cholesterol and phospholipid concentrations were about 50% higher in red muscle, whereas the amount of triglycerides was only slightly higher.

THE LIPIDS OF SOME RUMEN HOLOTRICH PROTOZOA. I. Katz and M. Keeney (Dept. of Dairy Sci., Univ. of Maryland, College Park, Md. USA). *Biochim. Biophys. Acta* **144**, 102–112 (1967). The lipids from rumen holotrich protozoa were isolated and partially identified. The lipid consisted of 70% phospholipids and 30% non-phospholipids. The phospholipids contained phosphatidyl ethanolamine (21%), phosphatidyl ethanolamine plasmalogen (22%), phosphatidyl choline (28%), and unknown phospholipids (29%). All the phospholipid fractions contained significant amounts of branched chain and unsaturated fatty acids. Degradation of the phosphatidyl ethanolamine and phosphatidyl choline with phospholipase A revealed that the branched chain and unsaturated acids were located in the beta position. Chemical degradation of the phosphatidyl ethanolamine plasmalogen indicated that the vinyl ether linkage was in the alpha position. The non-phospholipids consisted of a mixture of waxes, hydrocarbons, aliphatic alcohols, diglycerides, monoglycerides, hydroxyacids, unesterified fatty acids and sterols. The sterols and unesterified fatty acids comprised 50% of the fraction. The low concentration of stearic acid in the unesterified fatty acids (8.3%) raises a question as to the quantitative importance of holotrich protozoa in rumen hydrogenation.

FAT FEEDING AND CHOLESTEROL SYNTHESIS. W. M. Bortz (Div. of Res., The Lankenau Hosp., Philadelphia, Pa., USA). *Biochim. Biophys. Acta* **137**, 533–9 (1967). The feeding of fat has previously been shown to result in a decrease in fatty acid synthesis and an increase in cholesterol synthesis by the liver. Furthermore, it has been proposed that fatty acids synthesis is controlled by the inhibition of the rate-limiting acetyl-CoA carboxylase by long-chain fatty acyl CoA derivatives with a consequent build-up of acetyl CoA in the liver. The present experiment measures the effect of fat feeding on acetate-1-$^{14}C$ conversion to $^{14}CO_2$, fatty acids, cholesterol, and acetoacetate by rat-liver slices. The remainder of the liver was assayed for levels of the fatty acyl-CoA derivatives, acetyl-CoA, and α-glycerophosphate. It was shown that fat feeding produces an early accumulation of the acyl-CoA derivatives and acetyl-CoA with a decreased fatty acids synthesis and increased ketone body synthesis. No alteration in cholesterol synthesis was seen until a later time interval, however.

CHOLESTEROL ESTERIFICATION IN RAT-LIVER CELL SAP. Masako Akiyama, Osamu Minari and Toshio Sakagami (Dept. of Chem. Sapporo Medical College, Sapporo, Japan). *Biochim. Biophys. Acta* **137**, 525–532 (1967). The existence of a cholesterol-esterifying enzyme was investigated with sap from liver cells. After subfractionation of liver homogenates, cholesterol esterification was checked with particulate and cell sap fractions and compared with the activity in plasma. Cholesterol was esterified on incubation with cell sap. The enzyme of cell sap esterified cholesterol in the same manner as that of plasma; it did not require ATP, CoA or $Mg^{2+}$. The fatty acids esterified were derived from the added phospholipids, lecithin and cephalin. Pretreatment with phospholipase A or the addition of N-ethylmaleimide caused a marked lowering of the esterification. The optimal pH (6.5) was lower than that (7.3) of plasma. Free linoleic acid-1-$^{14}C$ added to reaction mixtures was not incorporated into cholesterol ester whether or not ATP, CoA and $Mg^{2+}$ were present. It is concluded that, in cell sap, cholesterol ester was synthesized by a transfer of the fatty acids from lecithin, and in the particulates by a transfer of the fatty acids from acyl-CoA.

PORTAL ABSORPTION OF FATTY ACIDS IN LYMPH- AND PORTAL VEIN-CANNULATED RATS. S. A. Hyun, G. V. Vahouny and C. R. Treadwell (Dept. of Biochem. School of Med. The George Washington Univ., Washington, D.C.). *Biochim. Biophys. Acta* **137**, 296–305 (1967). The route and the rate of the intestinal absorption of oleic-1-$^{14}$C, caprylic-1-$^{14}$C and 2-ethyl-$^{14}$C-n-caproic acids have been studied using lymph and portal vein-cannulated rats. It was found that 85% of absorbed oleic acid was transported directly *via* the portal system. With short-chain fatty acids, between 94–98% of the absorbed acids were transported *via* the portal system. Studies on the rate of the intestinal absorption of these acids indicated that 2-ethyl-n-caproic acid was absorbed less completely and subsequently metabolized less effectively than the corresponding straight-chain fatty acid, caprylic acid. Studies on the distribution of radioactivity in lymph lipids showed that most of the radioactivity (85%) was present as triglycerides when oleic acid-$^{14}$C was administered to lymph and portal vein fistula rats. However, when the $^{14}$C-labeled short-chain fatty acids were given, 96–102% of the radioactivity was present as free fatty acids. Studies on the distribution of radioactivity in lipid fractions of portal vein blood showed that 50 and 98–100% of the radioactivity present were in the form of free fatty acids when oleic acid-$^{14}$C and $^{14}$C-labeled short-chain fatty acids, respectively, were administered to lymph and portal vein fistula rats.

MECHANISM OF STIMULATION OF CHOLESTEROL ABSORPTION BY 2-ETHYL-N-CAPROIC ACID IN VIVO. *Ibid.*, 306–14. Studies on the mechanism of stimulation of (7 $\alpha$-$^{3}$H) cholesterol absorption of 2-ethyl-n-caproic acid have been carried out in lymph and portal-vein cannulated rats. About 15% of administered cholesterol was absorbed in 8 h when the sterol was given with oleic acid alone. The administration of 2-ethyl-n-caproic acid together with oleic acid and cholesterol significantly increased the absorption of cholesterol to 23%. Simultaneous determination of fatty acid absorption and esterification showed that 44% of the fed oleic acid-1-$^{14}$C was recovered in thoracic duct lymph in 8 h, and about 15% of the long-chain acid was transported directly via portal blood. However, in the presence of 2-ethyl-n-caproic acid, only 22% of the administered oleic acid-1-$^{14}$C was recovered in lymph, while 40% was transported directly into portal system. This effect of the branched-chain fatty acid was most pronounced 4–8 h after feeding. In this group there was a reduction in total lymph triglycerides and a slight increase in lymph free fatty acids. These data support the earlier suggestion that the primary effect of 2-ethyl-n-caproic acid is inhibition of triglyceride synthesis in intestinal mucosa, resulting in increased transport of free fatty acids via portal blood and increased availability of fatty acids for cholesterol esterification and absorption.

THE ROLE OF PLACENTA IN LYSOLECITHIN METABOLISM IN RATS AND MICE. S. Eisenberg, Y. Stein and O. Stein (Dept. of Medicine B and Lipid Research Laboratory, Hadassah Univ. Hospital, Jerusalem (Israel)). *Biochim. Biophys. Acta* **137**, 115–20 (1967). In 16–20-days pregnant rats a 50% fall in serum lysolecithin level was found. Following intravenous injection into pregnant rats and mice there was an extensive uptake of palmitoyl-1-$^{14}$C-lysolecithin by the placenta followed by a rapid conversion of the labeled lysolecithin to lecithin. During the first 10 min after injection of palmitoyl-1-$^{14}$C-lysolecithin-$^{32}$P, the $^{14}$C/$^{32}$P ratio in the newly formed lecithin was the same as the injected lysolecithin, indicating that the conversion of lysolecithin to lecithin in the placenta was accomplished through the acylation pathway. It is concluded that the fall in serum lysolecithin is due to a selective uptake of lysolecithin by the placenta and this additional source of placental lecithin could be of importance in an organ with a pronounced tronsport function.

THE RESOLUTION OF (±)-CARNITINE AND THE SYNTHESIS OF ACYLCARNITINES. K. Brendel and R. Bressler (Dept. of Biochem. and Med., Duke Univ. Medical Center, Durham, N.C.). *Biochim. Biophys. Acta* **137**, 98–106 (1967). Procedures are described for the resolution of (±)-carnitine nitrile chloride into its optical isomers by salt formation with (+)-10-camphorsulfonic acid and (+)-dibenzoyltartaric acid. Procedures for the acylation of carnitine are described employing large excesses of the acylating agent in a homogenous reaction. The acylation of the carnitine benzyl ester can be carried out using lower ratios of acylating agent to carnitine.

METABOLISM OF 1-PALMITOYL DIOLEIN AND 3-PALMITOYL DIOLEIN BY ADIPOSE TISSUE. W. R. Wright and S. B. Tove (Depts. of Biochem. and Animal Sci., North Carolina State Univ.,

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# Swedish Symposium on Metal Catalyzed Lipid Oxidation

The Swedish Institute of Food Preservation Research (SIK) in Göteborg is organizing a symposium on Metal Catalyzed Lipid Oxidation on Oct. 9 and 10, 1967.

Metal catalyzed lipid oxidation—as metal catalysis in general—plays an important role in terms of quality and stability in various branches of food technology. It therefore appeared desirable to gather experts with different lines of interest within this sphere at a symposium in order to promote scientific research and technical development.

Invitations were mainly sent to scientists engaged in research within this complex of problems and prepared to take an active part in the symposium.

The idea of this symposium has been accepted with great interest and scientists representing 15 countries were represented at SIK.

The symposium will be introduced by Dr. Ingold from the National Research Council, Ottawa, Canada, who will deliver a review on the subject in question. There was a section on analytical techniques, a section on fundamental research, and a section on the problems in various sectors of food technology and industry. Finally packaging problems were discussed.

Organizing secretary of the symposium was Dr. Reinhard Marcuse, SIK, Göteborg.

# Basic Statistics and Evolutionary Operation Courses

## Basic Statistical Methods for the Chemical and Process Industries

A two-day short course will be co-sponsored by the Chemical Division of ASQC and the Section on Physical and Engineering Sciences of ASA. This course will cover two days of practical, easy-to-learn statistical methods for the engineer and the applied scientist in industry—in the plant or in the laboratory. Principal topics to be covered are concepts, frequency distributions, control charts, comparison of means, comparison of variances, test precision and analysis of variance, regression, experimental design and evolutionary operation.

The instructors are D. S. Chambers, Professor of Statistics at the University of Tennessee, and Mr. H. O. Hehner, Manager of Quality Control of Monsanto's Organic Chemicals Division.

The registration fee is $100, dates are November 3 and 4, and place is the Midland Hotel in Chicago. For further information and application forms, contact Mr. Charles Ferczok, Operations Research Department, Swift & Company, 115 W. Jackson Blvd., Chicago, Illinois 60604. Telephone number is 312–431–2777.

## Evolutionary Operation

A three-day short course on Evolutionary Operation will be co-sponsored by the Chemical Division of ASQC and the Section on Physical & Engineering Sciences of ASA.

Cost reduction, quality improvement and increased capacity are demonstrated results of EVOP. This method of process improvement has been so successful because it is applied directly to operating processes and designed to be used by regular plant personnel. This method of process improvement does not interfere with normal production.

The registration fee is $140, which includes all course materials and lunches. Dates are November 16, 17 and 18, in the Midland Hotel, Chicago, Ill. For further information and application forms, contact G. R. Wagner, Operations Research Dept., Swift & Company, 115 W. Jackson Blvd., Chicago, Illinois 60604, Telephone 312–431–2777.

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Raleigh, N.C.). *Biochim. Biophys. Acta* **137**, 54–8 (1967). Stereospecific metabolism of triglycerides was investigated by incubating homogenates of adipose tissue with 1-palmitoyl diolein and 3-palmitoyl diolein, each labeled with $^{14}C$ at the carboxyl group of the palmitic acid. No evidence for stereospecific hydrolysis was obtained from the specific activity of the fatty acids, monoglycerides and diglycerides. However, approximately twice as much label was incorporated into the 2-position of the tissue triglycerides from 1-palmitoyl diolein as from 3-palmitoyl diolein, suggesting a stereospecific transfer of a fatty acid from the 1-position of a triglyceride to the 2-position of a triglyceride precursor.

STUDIES ON THE PHOSPHOLIPIDS OF RAT BRAIN WHICH CONTAIN GLYCERYL ETHERS. L. A. Horrocks and G. B. Ansell (Dept. of Exptl. Neuropharmacology, The Med. School, Birmingham, Great Britain). *Biochim. Biophys. Acta* **137**, 90–7 (1967). The phospholipids of rat brain which are stable to mild alkaline and acid hydrolysis were examined quantitatively. The glyceryl ether form of phosphatidyl ethanolamine (acyl alkyl glyceryl-phosphorylethanolamine) contains 3.1% of the rat-brain lipid phosphorus and accounts for most of the glyceryl ethers present in the phospholipids. The presence of the acyl group was confirmed by acetolysis of the purified ethanolamine phospholipids. Some evidence for the presence of dialkyl glycerylphosphoryl-ethanolamine and alkyl glycerylphosphorylcholine in small amounts was also obtained. The methods used for mild hydrolysis in these studies are suitable for determination of labelled phosphorus, ethanolamine or choline incorporation into diacyl, acyl alkyl types of glycerophospholipids.

THE BIOSYNTHESIS OF GLYCERIDES AND GLYCEROPHOSPHATIDES BY RABBIT RETICULOCYTES. H. A. Sloviter and S. Tanaka (Harrison Dept. of Surgical Res. School of Medicine, Univ. of Penn., Phil., Pa.). *Biochim. et Biophys. Acta* **137**, 70–9 (1967). When rabbit reticulocytes were incubated with glycerol-1-$^{14}C$, radioactivity was incorporated into glycerides and glycerophosphatides but no radioactivity was present in their fatty acid moieties or in cholesterol. Lecithin and ethanolamine phosphatide together contained about 70% and the neutral lipids about 20% of the total radioactivity. The triglyceride, which comprised less than 2% of the lipids, had the highest specific activity of all the lipids. Experiments with other radioactive precursors of the phosphatides gave results which indicate that the minor phosphatides are metabolically much less active than lecithin and that the formation of lecithin from serine phosphatide or ethanolamine phosphatide is quantitatively unimportant in these cells. Incubation of rabbit reticulocytes with inositol-2-$^{3}H$ resulted in the formation of radioactive phosphoinositides. Most of this radioactivity was present in a monophosphoinositide.

CHOLESTERIN IN STREPTOMYCES OLIVACEUS. K. Schubert, Rose and Clare Horhold (Deutsche Akademie der Wissenschaften zu Berlin, Institut fur Mikrobiologie und experimentelle Therapie, Abteilung fur Steroidforschung, Jena). *Biochim. Biophys. Acta* **137**, 168–71 (1967). Cholesterol has been isolated as the only sterol present in *Streptomyces olivaceus*, a species of the order Actinomycetales—which belongs to the bacteria. The demonstration of the occurrence of sterols in bacteria by means of adsorption chromatography, gas-liquid chromatography and by mass spectrometric and infrared spectral photometric methods, refutes the general assumption according to which bacteria are incapable of synthesizing sterols. *S. olivaceus* synthesized cholesterol and also has the capacity of degrading it, $\Delta^4$-androstene-3, 17-dione and $\Delta^{1,4}$-androstadiene-3,17-dione occurring as intermediary products.

BIOPHYSICS OF LIPIDIC ASSOCIATIONS. II. THE TERNARY SYSTEMS CHOLESTEROL-LECITHIN-WATER. M. Bourges, D. M. Small and D. G. Dervichian (Service de Biophysique, Institut Pateur, Paris (France)). *Biochim. Biophys. Acta* **137**, 157–67 (1967). Mixtures containing different proportions of lecithin, cholesterol and water have been prepared and their separation into different phases has been determined. The structure of these systems has been analysed with the polarising microscope and by X-ray diffraction. A ternary triangular phase diagram has been constructed showing the regions of composition in which single phases and mixtures of 2 and 3 phases exist. A paracrystalline hydrated phase with a lamellar structure exists which can contain variable amounts of cholesterol up to a maximum of 1 molecule of cholesterol per molecule of lecithin. The maximum quantity of water in this phase varies from 45 to 35% according to the quantity of incorporated cholesterol. With larger quantities of water the paracrystalline phase is dispersed in the form of anisotropic particles in the excess of water.

ON THE SYNTHESIS OF PLASMALOGENS. A. J. Slotboom, G. H. De Haas and L. L. M. Van Deenen (Dept. of Biochem., Lab. of Organic Chem., Univ. of Utrecht, Utrecht, The Netherlands). *Chem. Phys. Lipids* **1**, 192–208 (1967). The chemical synthesis is described of (rac)-*trans*-1-(n-hexadec-1′-enyloxy)-2-oleoyl-glycerol-3-phosphorylcholine (plasmalogen). This synthesis made use of a specific degradation of (rac)-*trans*-1-(n-hexadec-1′-enyloxy), 2,3-dioleoyl glycerol with pancreatic lipase (EC 3.1.1.3). The latter compound was converted into a plasmalogen by a reaction with 2-bromoethyl-phosphoric acid dichloride and trimethylamine. A partial synthesis of *cis*-1-(n-alk-1′-enloxy)-2-oleoyl-glycerol-3-phosphorylcholine was developed by application of this method to *cis*-1-(n-alk-1′-enyloxy)-2,3-dioleoyl glycerol. The preparation of *cis*-1-(n-alk-1′-enyloxy)-2,3-dioleoyl glycerol was made by acylation of *cis*-1-(n-alk-1′-enyloxy) glycerol obtained from ox-heart plasmalogen after degradation with phospholipase C(EC 3.1.4.3) and alkaline hydrolysis. The I.R. spectra of both plasmalogens were completely identical with each other and differed from the spectra of lecithins only by the presence of a vinyl ether absorption at 1660 $cm^{-1}$. The N.M.R. spectrum of the acetylated synthetic (rac)-1-(n-hexadec-1′-enyloxy)glycerol as well as of the synthetic plasmalogen revealed a *trans* configuration of the vinyl ether linkage.

FACTORS INFLUENCING THE PATTERN OF FATTY ACIDS SYNTHESIZED BY CELL-FREE PREPARATIONS OF LACTATING RAT MAMMARY GLAND. J. C. Bartley, S. Abraham and I. L. Chaikoff (Dept. of Clinical Sci., School of Veterinary Med. Univ. of Calif., Davis). *Biochim. Biophys. Acta* **144**, 51–60 (1967). The pattern of fatty acids synthesized from acetate-1-$^{14}C$, acetyl-1-$^{14}C$-CoA, citrate-1,5-$^{14}C_2$ and malonyl-1,3-$^{14}C_2$-CoA by various homogenate preparations of mammary glands of lactating rats was studied with the aid of gas-liquid chromatography. Addition of microsomes to the 100,000 x g supernatant fraction significantly decreased the incorporation of labeled acetate into $C_{10}$ and $C_{12}$ fatty acids and increased that into $C_{16}$ and $C_{18}$ acids. When acetate-$^{14}C$ or acetyl-CoA were the substrates in experiments with the 100,000 × g supernatant fraction, the isotope was incorporated predominantly into $C_{10}$ fatty acid. The labeled malonyl-CoA was predominantly converted to $C_{16}$ fatty acid. The pattern of incorporation of the $^{14}C$ of citrate-1,5-$^{14}C_2$ was intermediate between these two. When an ammonium sulfate fraction of the 100,00 × g supernatant fluid, precipitating between 0 and 40% saturation, was used as the source of acetyl-CoA carboxylase (EC 6.4.1.2) and fatty acid synthetase, the pattern of conversion of all labeled substrates to fatty acids was the same, i.e., predominantly to $C_{16}$ acids. Addition of fractions precipitating at higher saturations of ammonium sulfate had no effect on the pattern of conversion.

ESTERIFICATION OF FREE FATTY ACIDS BY SUBCELLULAR PREPARATIONS OF RAT ADIPOSE TISSUE. D. A. K. Roncari and C. H. Hollenberg (McGill Univ. Med. Clin., Montreal General Hosp. Montreal, Quebec, Canada). *Biochim. Biophys. Acta* **137**, 446–463 (1967). The intracellular location of the enzymes responsible for catalyzing the esterification of palmitate-$^{14}C$ with α-glycerophosphate was studied with enzyme fractions prepared by centrifugation of adipose tissue homogenates. Esterifying activity was confined to mitochondrial and microsomal fractions, the mitochondria being the more active. ATP and CoA were obligatory requirements. With either particulate fraction, phospholipids were the principal ester products; phosphatidic acid was tentatively identified as being the major phospholipid formed. The soluble fraction (109,000 × g supernatant fluid) when used alone did not stimulate esterification. However, addition of this fraction to particulate preparations, produced a consistent alteration in ester products so that tri- and diglyceride became the major products, while net formation of ester bonds was only modestly increased. The soluble fraction was found to exert its effect after binding of free fatty acids to subcellular particles. The factor(s) responsible for the activity of the soluble fraction could also be bound by these particles. The soluble fraction activity persisted after heating to 58C and was slowly dialyzable. Its effect could not be replicated by a variety of proteins and ions. It is suggested that the effect of the soluble fraction was due to stimulation of particulate phosphatidate phosphohydrolase activity.

HEPATIC LIPID METABOLISM IN EXPERIMENTAL DIABETES. II. INCORPORATION OF PALMITATE-1-$^{14}C$ INTO LIPIDS OF THE LIVER AND OF THE D < 1.020 PERFUSATE LIPOPROTEINS. M. Heimberg, D. R. Van Harken, and T. O. Brown (Dept. of Pharmacol., Vanderbilt Univ. School of Med., Nashville, Tenn.). *Biochim.*

*Biophys. Acta* **137**, 435–45 (1967). Livers from normal rats, from rats treated 48 hours before use with alloxan, and from alloxan-diabetic animals treated with insulin, were perfused *in vitro* with a medium containing palmitic acid-1-$^{14}$C. It was observed under our experimental conditions that hepatic release of triglyceride, phospholipid, and cholesterol into the $d < 1.020$ lipoprotein was depressed by alloxan diabetes and was restored to normal by pretreatment of the animal with insulin. During these perfusions of livers from diabetic animals with small loads of palmitic acid, hepatic triglyceride concentration was diminished, whereas it appeared to be unchanged in livers from normal rats. Incorporation of $^{14}$C into triglycerides and phospholipids of the $d < 1.020$ lipoprotein was depressed by alloxan diabetes, perhaps, in part, a result of decreased release of these lipids into the lipoprotein. The rate of hepatic biosynthesis of phospholipid also appears to be inhibited in alloxan diabetes since the incorporation of $^{14}$C and the specific activity of liver phospholipid was depressed. Although the incorporation of $^{14}$C into hepatic triglyceride did not appear to be depressed in these experiments as a result of the alloxan diabetes, we can not say that rates of esterification of non-esterified fatty acid to triglyceride were normal; this reservation is necessary since these data were obtained at the termination of the perfusion experiment during which time the hepatic concentration of triglyceride was declining, fatty acid was being oxidized and triglyceride was not being released at normal rates.

INCORPORATION OF GLUCOSE-6-$^{14}$C AND PALMITIC ACID-9,10-$^{3}$H IN VITRO INTO LIPIDS OF ADIPOSE TISSUE FROM ESSENTIAL FATTY ACID-DEFICIENT RATS. A. Solyom, E. Muhlbachova and Lina Puglisi (Inst. of Pharmacology, Univ. of Milan, Milan, Italy). *Biochim. Biophys. Acta* **137**, 427–34 (1967). The simultaneous incorporation of labelled glucose and palmitic acid into lipids has been investigated *in vitro* in epididymal fat pads of rats fed essential fatty acid-deficient diet, in order to obtain information on possible metabolic differences brought about by essential fatty acid-deficiency in adipose tissue. It has been found that the incorporation of both precursors, but especially of glucose, is greater into adipose tissue lipids (mostly triglycerides) in rats fed essential fatty acid-deficient diet than in controls, indicating a greater triglyceride synthesis in these animals. Lipid synthesis in the adipose tissue of essential fatty acid-deficient animals, however, does not seem to differ qualitatively from that of controls. The distribution of radioactivity among the lipid components suggests that no change in the metabolic utilization of essential fatty acids for the synthesis of neutral lipids occurs. Also the incorporation of palmitic acid and glucose into glycerides is similarly affected in control and essential fatty acid-deficient animals during fasting or nicotinic acid or theophylline treatment.

THE STRUCTURE AND ABUNDANCE OF RAT TISSUE CARDIOLIPINS. S. Courtade, G. V. Marinetti and E. Stotz (Biochem. Dept., Univ. of Rochester School of Med., Rochester, N. Y.). *Biochim. Biophys. Acta* **137**, 121–134 (1967). Cardiolipins of rat tissues were isolated by column chromatography and analyzed. The P content ranged from 2.61% to 3.64%. The ester:P ratio varied from 1.63 to 2.09, and the glycerol:P ratios varied from 1.34 to 1.68. The fatty acid spectrum of the tissue cardiolipins showed some, like heart, kidney and liver to be highly unsaturated and others like brain, lung and testis to be highly saturated. Analysis of the fatty acids released by phospholipase A demonstrated that certain fatty acids are preferentially $\beta$-linked, but on the whole, the fatty acid distribution is much more random than that of other phospholipids, like the lecithins. All the rat tissue cardiolipins are degraded by hot acetic acid to yield diglycerides, very small amounts of monoglycerides, and other P-containing products. However, only with rat-liver cardiolipin, beef-heart cardiolipin, and a synthetic cardiolipin are appreciable amounts of water-soluble P released. On treatment with sodium methoxide at 0C all rat tissue cardiolipins gave rise to 4-6-lyso-derivatives resulting from the sequential loss of one or more fatty acids. All cardiolipins are eventually completely degraded to fatty acid methyl esters, a water-soluble P compound and smaller amounts of other products including free fatty acids and vitamin A. In the case of rat-liver cardiolipin, alkaline hydrolysis yields vitamin A but not in stoichiometric amount.

HYDROLYSIS OF PHOSPHOLIPIDS AND GLYCERIDES BY RAT-LIVER PREPARATIONS. M. Waite and L. L. M. van Deenen (Dept. of Biochem., Lab. of Org. Chem., The State Univ., Utrecht, The Netherlands). *Biochim. Biophys. Acta* **137**, 498–517 (1967).

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## • *New Literature*

BECKMAN INSTRUMENTS, INC., has released bulletin 7119, dealing with a complete ultraviolet-infrared "spectroscopy laboratory" in one compact unit. The unit includes Beckman's DB Ultraviolet Spectrophotometer and the Microspec Infrared Spectrophotometer with 7-speed recorder. (Technical Information Section, Scientific Instruments Division, 2500 Harbor Blvd., Fullerton, Calif. 92634.)

"Health Aspects of Castor Bean Dust" is a part of the Environmental Health Series, established to report the results of scientific and engineering studies of man's environment. Included are reviews of Agricultural and Commercial Aspects, Toxicity and Allergenicity, Occupational Illness, Community Illness and Control Measures. (Request PHS Publication No. 999-AP-36, from US Department of Health, Education and Welfare, Public Health Service, Bureau of Disease Presentional and Environmental Control, Cincinnati, Ohio 45202.

A new technical bulletin on a preset batch counter with start-stop controls for use with flowmeters of flow measuring devices has been prepared by BROOKS INSTRUMENTS DIVISION of Emerson Electric Co. Designated the Brooks Model 4801 Batch counter, this instrument has a maximum pulse rate of 600 counts/minute. (Bulletin DS-4801, Brooks Instrument Division, Emerson Electric Co., Hatfield, Pa., 19440.)

LACHAT CHEMICALS INCORPORATED has expanded their listing of pure chemicals, laboratory aids and testing services. Their Catalog No. 7 lists chemicals alphabetically, and again, by class of compound, usually according to ascending carbon content. Facilities for new gas chromatography analyses and other analytical services and laboratory aids, are shown following the alphabetical listing. Cross-indexing of compounds by the most commonly used synonyms is continued. (20200 Ashland Ave., Chicago Heights, Ill. 60411.)

DURKEE FAMOUS FOODS has prepared a guide to bulk handling of shortening and oils, from the planning of such facilities to their maintenance. An additional brochure details the technical and performance characteristics of high stability oils produced through Durkee's new Fractional Crystallization process. A new product sheet outlines the applications, advantages and other details of Durkee's Satina coating butter, which is designed specifically for use in pastel coatings. (Durkee Industrial Foods Division, 2333 Logan Blvd., Chicago, Ill. 60647.)

ALDRICH CHEMICAL COMPANY, INC., has published its most comprehensive catalog, adding about 1,500 new listings for a total of almost 9,000 different chemicals. These chemicals are in stock and available for immediate shipment. The new listings include chemicals listed through KARDINDEX SET No. 105, dated September 20, 1966. (Aldrich Chemical Company, Inc., 2371 N. 30th St., Milwaukee, Wis. 53210.)

VARIAN ANALYTICAL INSTRUMENT DIVISION is offering a new mass spectrometer/gas chromatograph interface. The V-5500 MS/GC Accessory transfers in real time, organic materials in gas chromatographic effluents from the GC flow stream to the source of a mass spectrometer while at the same time preventing any appreciable flow of carrier gas into the mass spectrometer. (611 Hansen Way, Palo Alto, Calif. 94303.)

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Rat-liver homogenates were found to hydrolyze phospholipids, giving rise to both the 1-acyl and 2-acyl lysoderivatives. Subcellular fractionation of the homogenate separated the phospholipase $A_1$ (specific for the 1-acyl ester), the phospholipase $A_2$ (specific for the 2-acyl ester) and the lysophospholipase(s) to a large extent. The phospholipase $A_1$ was found to be located mainly in the microsomes, the phospholipase $A_2$ in the mitochondria and the lysophospholipase(s) in the soluble fraction. Lipase activity, determined using sonicates of a triglyceride and phosphatidyl ethanolamine mixture, was found to be associated with the particulate fractions, mainly the mitochondrial fraction. The triglyceride on hydrolysis gave rise to free fatty and diglyceride.

SURFACE PROPERTIES AND HYSTERESIS OF DIPALMITOYLLECITHIN IN RELATION TO THE ALVEOLAR LINING LAYER. M. Galdston and D. O. Shah (Dept. of Med. New York Univ. School of Medicine, New York). *Biochim. Biophys. Acta* **137**, 255–63 (1967). Investigations using surface pressure and surface potential measurements and observations of changes in the film state were undertaken to account for the factors which determine the surface properties and hysteresis of L-α-dipalmitoyllecithin films which have been reported to resemble lung extract films and to be mainly responsible for the capacity of the alveolar lining to maintain lung stability. When a film of L-α-dipalmitoyllecithin is compressed intermittently to an area short of film collapse, hysteresis increases with the extent of film compression and it is associated with parallel changes in surface pressure and surface potential and is reproducible in successive cycles. Lecithin films are in the liquid state below surface pressure of 35 dynes/cm, in the gel state between 35 and 40 dynes/cm and in the solid state above 40 dynes/cm. When compression is continued beyond film collapse (about 44 dynes/cm), surface pressure rises sharply unaccompanied by a parallel increase in surface potential. Here hysteresis results from film solidification and loss of material from the surface and probable entrance of saline solution into gaps in the film during expansion. If the alveolar lining layer responds to compression and expansion during respiration as a L-α-dipalmitoyllecithin film responds in a film balance, then it's stable during expiration only when surface tension is above 32–28 dynes/cm. Below this surface tension level, the lining layer would collapse and the material displaced would have to return to the alveolar surface or be replenished during inspiration to maintain a healthy alveolar lining layer.

THE EFFECT OF $C_{18}$ UNSATURATED FATTY ACIDS ON METHANE PRODUCTION IN VITRO BY MIXED RUMEN BACTERIA. D. I. Demeyer and H. K. Henderickx (Dept. of Nutr., Faculty Agr. Sci., Ghent, Belgium). *Biochim. Biophys. Acta* **137**, 484–497 (1967). $C_{18}$ unsaturated fatty acids inhibit methane production from various substrates by mixed rumen bacteria *in vitro*. This inhibition is not due to a competition for available hydrogen, but to a toxic effect towards methanogenic bacteria. *Cis*-unsaturated fatty acids are much more active than *trans* isomers or saturated fatty acids. With *cis* isomers, toxicity increased with the number of double bonds. Various esters were inactive, indicating the importance of the free carboxyl group. These findings can be explained by assuming a physiochemical mechanism of inhibition. With pyruvate as substrate, inhibition of methane production is accompanied by stimulation of propionic acid production.

THE CONTROL OF FATTY ACID ESTERIFICATION IN A SUBCELLULAR PREPARATION OF RAT ADIPOSE TISSUE. Aubie Angel and D. A. K. Roncari (McGill University Medical Clinic, Montreal General Hospital, Montreal, Quebec, Canada). *Biochim. Biophys. Acta* **137**, 464–474 (1967). A cell-free preparation of rat adipose tissue fortified with ATP, CoASH, $Mg^{2+}$, $F^-$ and GSH was used to determine the kinetics of fatty acid esterification to L-α-glycerophosphate. The principal product was triglyceride. Reducing the incubation temperature to 20C permitted accurate measurement of initial velocity. The $K_m$ for α-glycerophosphate was found to be $8.6 \cdot 10^{-4}$ (pH 7.0, 20C) and that for palmitate $1.68 \cdot 10^{-4}$ M (pH 7.0, 20C). The activity of esterifying enzymes was reduced with fasting. Refeeding augmented esterification in the cell-free system to levels greater than control probably through the mechanism of enzyme induction. Adipose tissue is potentially capable of esterifying cholesterol since addition of cholesterol to the enzyme preparation resulted in incorporation of palmitic acid-1-$^{14}$C into cholesterol ester.

ABSORPTION AND METABOLISM OF LECITHIN AND LYSOLECITHIN BY INTESTINAL SLICES. Ake Nilsson and Bengt Borgstrom (Dept. of Physiol. Chem., Univ. of Lund, Lund, Sweden). *Biochim. Biophys. Acta* **137**, 240–54 (1967). Intestinal absorption and metabolism of lysolecithin and lecithin has been studied using hamster and rat intestinal slices and inverted sacs, and (choline-Me-$^3$H-(acyl-$^3$H) lysolecithin and lecithin as substrates. Lysolecithin is well absorbed and metabolized mainly to lecithin. The uptake and metabolism of lysolecithin is not influenced by the presence of sodium taurodeoxycholate in the medium. The absorption and metabolism of lysolecithin is the same in slices from all levels of the small intestine except the most distal part. No definite evidence could be obtained that lecithin is absorbed intact.

HEPATIC LIPASE IN THE RAT. J. R. Carter, Jr. (Lab. of Metabolism, Nat. Heart Inst., Nat. Inst. of Health, Bethesda, Md. USA). *Biochim. Biophys. Acta* **137**, 147–56 (1967). Whole homogenates of rat liver are capable of hydrolyzing artificial triglyceride emulsions *in vitro* at a pH of 7.4. The products of the reaction are primarily free fatty acids and glycerol. The lipolytic activity is progressively inactivated after 30 min at 37C. Hydrolysis is inhibited by divalent cations. The lipolytic activity studied differs in several respects from previously described intracellular lipases. Direct transesterification of triglyceride fatty acids to new complex lipids was not observed. The addition of ATP and COA promoted incorporation of the hydrolyzed triglyceride fatty acids into phospholipids; under the conditions of the experiment significant reincorporation into new triglycerides was not seen. Microsomes, mitochondria and soluble fraction all contain some "triglyceride lipase" activity with the highest specific activity in the microsomes. Partial glycerides are hydrolyzed more rapidly than triglycerides. Maximal rates of hydrolysis for mono-, di- and triolein are given for each of the subcellular fractions. In the soluble fraction, triglyceride and monoglyceride lipases are separable on the basis of heat inactivation and DFP inhibition. Intracellular hydrolysis is probably the first step in the metabolism of triglycerides taken up by the liver. The exact site at which this occurs is not certain.

THE PROPERTIES OF THE LIPOPROTEIN LIPASES OF RAT HEART, LUNG AND ADIPOSE TISSUE. Margaret Brady and Joan A. Higgins (Biochem. Dept. Univ. of Liverpool, Liverpool, Great Britain). *Biochim. Biophys. Acta* **137**, 140–6 (1967). A study of the properties of lipoprotein lipases of rat heart, lung and adipose tissue has been made, using enzymes prepared by extraction of acetone powders with 0.025 M $NH_4OH$, and by induction from the fresh tissue with heparin. Lipase activity was not released from fresh heart tissue by heparin, although activity was found in extracts of acetone powders of the tissue. The enzyme preparations have similar "$K_m$" values in the range $4.28 \times 10^{-4}$—$4.8 \times 10^{-4}$ M, and pH optima in the range 8.2–8.4. However, differences were found in the "activation energies," the enzyme from heart having a value of 13.5 kcal compared with 19.1 and 18.9 kcal for those from adipose tissue and lung.

SEX DIFFERENCES IN THE METABOLISM OF PHOSPHATIDYL CHOLINES IN RAT LIVER. R. L. Lyman, J. Tinoco, P. Bouchard, G. Sheehan, R. Ostwald and P. Miljanich (Dept. of Nutritional Sciences, Univ. of Calif., Berkeley, USA). *Biochim. Biophys. Acta* **137**, 107–114 (1967). Mature male and female rats were injected intraperitoneally with tracer doses of methionine-Me-$^{14}$C, then were killed 20, 40, 60 and 120 min afterwards. Liver phosphatides from both sexes were separated by thin-layer chromatography and the phosphatidylcholine (PC) divided into 3 subfractions. Determinations of fatty acid composition and measurements of radioactivity of the phosphatide fractions were made. The fatty acid composition of the fastest-moving PC subfraction resembled that of the phosphatidylethanolamine fraction and had a higher proportion of stearic and arachidonic acids than did the other slower moving fractions. Female rats had a higher proportion of stearic and arachidonic acids in their fast moving PC than did males and the specific activity of this fraction was also higher in females. The results indicated that methylation of phosphatidylethanolamine produced PC having a high proportion of stearic and arachidonic acids. The sex difference in these fatty acids in the liver PC appeared to have resulted from the higher rate of PC synthesis via methylation in female rats than in males.

CONTROLLING EFFECTS OF ATP, $Mg^{2+}$ AND CTP IN THE BIOSYNTHESIS OF LIPIDS. J. F. Erbland, M. Brossard and G. V. Marinetti (Dept. of Biochem., School of Med. and Dentistry, The Univ. of Rochester, Rochester, N. Y.). *Biochim. Biophys. Acta* **137**, 23–32 (1967). The main aim of this work was to test the controlling effects of essential cofactors on lipid biosynthesis. The effects of ATP, $Mg^{2+}$, CTP, CMP, phosphoryl choline and cytidine diphosphate choline on the incorporation of glycerol-$^{14}$C into lipids of rat-liver homogenates have been

studied. ATP promotes glycerol-$^{14}$C incorporation into all lipids and this incorporation is preferentially directed into phosphatidyl ethanolamine and lecithin when $Mg^{2+}$ is added. The effect of CTP, in the presence of ATP and $Mg^{2+}$, is concentration dependent; 0.001 M CTP does not affect phosphatidyl ethanolamine and lecithin labeling but stimulates incorporation into diglycerides and triglycerides, whereas 0.01 M CTP supresses phosphatidyl ethanolamine and lecithin labeling and promotes incorporation into diglycerides and triglycerides. The effects of 0.01 M CTP are $Mg^{2+}$-dependent. CMP has effects similar to those of CTP. Phosphoryl choline and cytidine diphosphate choline inhibit the labeling of phosphatidyl ethanolamine and lecithin in the rat-liver system studied.

RETROCONVERSION OF POLYUNSATURATED FATTY ACIDS IN VIVO BY PARTIAL DEGRADATION AND HYDROGENATION. H. Schlenk, Joanne L. Gellerman and D. M. Sand (Hormel Inst., Austin, Minn.). *Biochim. Biophys. Acta* **137**, 420–6 (1967). 4,7,10,13,16-Docosapentaenoate, randomly labelled with $^{14}$C, was given to fat deficient rats. After 10 hours about 13% of the radioactivity of all liver fatty acids was located in 5,8,11,14-eicosatetraenoic (arachidonic) acid. Degradation of the arachidonic acid by decarboxylation and by ozonization showed that random labelling has been maintained in the course of the conversion. Therefore, the rectroconversion of the pentaenoic into the tertaenoic acid must imply, besides degradation by not more than two carbon atoms, the biohydrogenation of the double bond closest to the carboxyl group.

THE EFFECT OF TUBE FEEDING OF GLUCOSE CORN OIL ON ADIPOSE TISSUE LIPOPROTEIN LIPASE ACTIVITY AND UPTAKE OF $^{14}$C-LABELED PALMITIC ACID OF CHYLE TRIGLYCERIDES IN VITRO. N. Pokrajac and W. J. Lossow (Dept. of Physiol. Univ. of Calif. Berkeley, Calif.). *Biochim. Biophys. Acta* **137**, 291–5 (1967). The feeding of pure glucose or fat loads to fasted rats increased both the amount of lipoprotein lipase released from adipose tissue by heparin and the uptake *in vitro* of the $^{14}$C of triglycerides of very low-density chyle lipoproteins by that tissue. In both instances feeding glucose had a greater effect than feeding fat. Feeding a combination of glucose and fat had an effect similar to feeding glucose alone.

SITE SPECIFICITY OF BOVINE ADRENAL 3$\beta$-HYDROXYSTEROID DEHYDROGENASE AND $\Delta^5$-3-KETOSTEROID ISOMERASE. Sarah G. Cheatum, A. W. Douville and J. C. Warren (Univ. of Kansas School of Med., Kansas City, Kan.). *Biochim. Biophys. Acta* **137**, 172–8 (1967). The 3$\beta$-hydroxysteroid dehydrogenase and $\Delta^5$-3-ketosteroid isomerase activities from the microsomal fraction of bovine adrenal cortex have been studied with emphasis on the site specificity for dehydrogenation and isomerization of the natural $C_{19}$ and $C_{21}$ steroid substrates. The data indicate a distinct isomerase site each of which is capable of utilizing both $C_{19}$ and $C_{21}$ substrates as shown by the following parameters: activity ratios during purification, pH curves, inactivation rates, and the kinetics of equimolar mixtures. These observations are similar to results with the same activities from bovine corpora lutea.

INHIBITION OF HEPATIC STEROL OXIDATION BY CHOLANIC (BILE) ACIDS AND THEIR CONJUGATES. P. D. G. Dean and M. W. Whitehouse (Dept. of Biochem., Univ. of Oxford, Oxford, Gr. Brit.). *Biochim. Biophys. Acta* **137**, 328–334 (1967). Evidence is presented that conjugated bile acids (50–200 $\mu$M) inhibit each of the following steps in sterol oxidation *in vitro* by rat- and mouse-liver preparations: (i) Transformation of cholesterol to trihydroxycoprostane. Oxidation of 26-hydroxycholesterol to the corresponding $C_{26}$-carboxylic acid. Catabolism of 3$\beta$-hydroxycholest-5-en-26-oic acid to 3$\beta$-hydroxy-chol-5-en-24-oic acid and propionate. These bile salts did not inhibit the oxidation of propionate of an aliphatic analogue of a sterol $C_{26}$-carboxylic acid, namely 2-methyloctanoate, when added in concentrations smaller or equal to concentrations which inhibit mitochondrial ATP biosynthesis. The results are discussed in relationship to current theories of negative feedback control of hepatic cholesterol oxidation by bile salts in the enterohepatic circulation. It is suggested that bile salts may exert control at multiple sites, rather than at a unique site, in the overall sequence of sterol oxidation and bile acid formation.

COMPARATIVE STUDIES ON THE TURNOVER AND FATE OF PLASMA CHOLESTEROL IN THE CHICKEN. Michihiro Sugano and Masafuto Wada (Lab. Nutr. Chem., Dept. of Food Sci. and Techn., Kyushu Univ. School Agr., Fukuoka, Japan). *Biochim. Biophys. Acta* **137**, 315–327 (1967). Differences in the rates of turnover and excretion of plasma cholesterol between male and

(Continued on page 526A)

# Call for Papers for Microwave Symposium

The 1968 Symposium on Microwave Power, sponsored by the International Microwave Power Institute, will be held at the Statler Hilton Hotel in Boston, Mass., March 21–23, 1968.

The Symposium will be concerned with the application of microwave power to processes within the food, agricultural forest product, textile, chemical, and other industries and to advanced concepts in scientific apparatus and power transmission systems.

Papers are being solicited. To be considered, abstracts should be submitted not later than January 1, 1968. Abstracts should be approximately 250 words in length and should be mailed to: 1968 Symposium on Microwave Power, Box 342, Weston, Massachusetts 02193.

# Canadians Plan First Sessions on Biological Engineering

The first Canadian technical sessions dealing with biochemical engineering will be presented during the 17th Canadian Chemical Engineering Conference in Niagara Falls, Ontario, Oct. 16–18, 1967.

This new frontier on chemical engineering is particularly important to the beverage, food, and metallurgical industries. Progress in the field will be explored in 11 papers at the Conference.

An invited lecture, "Engineering Problems Associated with the Fermentation of Hydrocarbons" will be given by A. E. Humphrey, University of Pennsylvania.

The current and future needs of Canadian industry for biochemical engineers will be estimated by M. Moo Young, University of Waterloo, Waterloo, Ont., who arranged the Biochemical Engineering sessions.

In addition to these sessions on Biochemical Engineering, the Conference will include a total of 116 other papers covering the entire range in chemical engineering.

Program details can be obtained from The Canadian Society for Chemical Engineering, 151 Slater Street, Ottawa 4, Ontario, Canada.

# Found—One Author!

*The writer of "The Chromatographer's Lament," published in the July JAOCS, has been found, and all of those who, grimly or good-naturedly, identified with him in his sentiments, now know whom to thank for putting their own reflections into verse.*

*The author's letter follows:*

*Dear Sir:*

I was both surprised and pleased to find my poem "The Chromatographer's Lament" in the July issue of your journal. However, since it is signed as "Author Unknown," I felt prompted to write you something as to its origin.

These verses were first written in May, 1966, while I was still employed by Shell Development Co., Houston, Texas. At that time, I was working on a "Special Analytical Problems" project under Dr. R. D. Schwartz, now with United Gas Corp., Shreveport, La., with whom I spent many pleasant hours probing the intracacies of capillary column GC.

I am currently a staff member of the Chemistry Department, University of Houston, where I am still engaged in GC research under Prof. Albert Zlatkis.

Thank you again for printing my verse and for your kind words.

RODERIC G. MATHEWS
Research Assistant

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laying chickens have been studied using cholesterol-4-$^{14}$C in lipoproteins as tracer substance. In the plasma of laying hens, free cholesterol was removed from the blood stream more rapidly than in male birds. The half-life for the laying hen was 24.1–33.1 hours, and that for the male birds was 45.5–58.2 hours. The laying also incorporated considerable amounts (up to 54% of the dose) of the cholesterol-4-$^{14}$C into egg yolk, and the excreted radioactivity was twice that observed in the males. The body pools of cholesterol which were most rapidly equilibrated with plasma cholesterol appeared to be of similar magnitude in both the laying hen and the male bird. The differences between male and female birds appeared to be greater than could be accounted for on the basis of cholesterol transport into the egg yolks of the laying hen. The hormonal action of estrogens on cholesterol transport may have been a contributing factor in these phenomena.

SUBCELLULAR SITES INVOLVED IN LIPID SYNTHESIS IN SACCHAROMYCES CEREVISIAE. H. P. Klein, Carol M. Volkmann and M. A. Leaffer. (Exobiol. Div., Ames Res. Center, NASA, Moffett Field, California 94034). *J. Bacteriol.* **94**, 61–65 (1967). The crude ribosomal fraction of *Saccharomyces cerevisiae* was separated into light and heavy fractions by centrifugation. The light fraction contained the fatty acid synthetase activity, the heavy fraction the acetyl-Coenzyme A synthetase, fatty acid desaturase and squalene oxidocylase activities. The authors conclude that the fatty acid synthetase particles are freely suspended; that the fatty acid desaturase system is a lipoprotein complex bound to the ribosomes; that the acetyl-CoA synthetase and squalene oxidocyclase are attached to or part of the internal membrane systems.

# • Drying Oils and Paints

A CONTRIBUTION TO THE STUDY OF THE CREATION OF CONJUGATED SYSTEMS IN FATS BY INDIRECT DEHYDROGENATION. J. Denise (Univ. of Besancon). *Oleagineux* 22(6), 389–394 (1967). When safflowerseed oil is reacted with tertiary butyl hypochlorite, then dehydrohalogenised, dienic, trienic and tetraenic conjugated systems are obtained. Best results are obtained when the quantity of tertiary butyl hypochlorite is equivalent to 0.7 to 1.0 equivalent per unsaturated fatty acid, the reaction performed at 20C and protected from light. Lime plus heat is used to dehydrochlorinate the chlorinated oil. The end product contains more than 37% of conjugated acids.

THIN LAYER CHROMATOGRAPHIC IDENTIFICATION OF FATTY ACIDS OF OIL COMPONENTS OF ALKYD RESINS AND PAINTS. M. F. P. Lopes de Castro (Nat. Lab. of Civil Eng., Portugal). *Paint Technol.* **31**, No. 6, 12–16 (1967). A method has been developed for the identification of oil components of alkyd resins and paints based on the thin-layer chromatography of their fatty acids on silicic acid and plaster of Paris. The spots are made visible with a 70% aqueous solution of sulfuric acid saturated with potassium dichromate. After spraying the plates are heated to 180C to visualize the spots.

COLOUR STABILITY OF FILMS FROM CONVENTIONAL AND EMULSION PAINTS CONTAINING LINSEED OIL. G. E. McManis, L. E. Gast and J. C. Cowan. *J. Paint Tech.* **38**, No. 503, 740–5 (1966). Films of white emulsion paints prepared from 5 bodied linseed oils, semi-gloss and flat oil paints and acrylic latex paints have been aged at three different indoor sites for 18 months and the degree of yellowing measured. Films from the linseed emulsion paints showed better colour stability than those from the oil paints and were sometimes as good as the latex paints. Addition of a wide variety of chemicals affected the yellowing rate but none gave an overall improvement under all conditions. Thus, a trialdehyde oil (triglyceride of azela-aldehydic acid), 5–10%, increased the yellowing of the oil paints but at 1% reduced that of the emulsion paints. Acetaldehyde, acetone and acetonitrile improved the oil paints, ethanolamines generally increased yellowing, and aldehydes and ketones had variable effects. (Rev. Current Lit. Paint Allied Ind. No. 300.)



# • Detergents

DETERGENT COMPOSITION. R. H. Chaffee and L. E. Meyer (Procter & Gamble Co.). *U.S. 3,324,038.* A quick-dissolving detergent tablet consists essentially of a core of compressed detergent particles inside a substantially uniform coating. The coating material is either a solidifed melt or a dried aqueous mixture of urea and either a polyethylene glycol or a water soluble surfactant, with a ratio of urea to surfactant of from 1:1 to 9:1, and a ratio of water to urea + surfactant from 3:1 to 1:2.5. The aqueous mixture is dried while present on the surface of the detergent tablet in an amount to give a coating of from about 0.005 to about 0.1 grams per square centimeter of tablet surface on an anhydrous basis.

PROCESS FOR PRODUCTION OF SODIUM PERBORATE. W. Kegelart (Solvay & Cie). *U.S. 3,311,446.* An improvement is claimed in the process for the manufacture of sodium perborate stabilized by an alkaline earth metal silicate by crystallization of a supersaturated solution of sodium perborate produced by contacting sodium metaborate and hydrogen peroxide and in which the ratio between the weight of sodium perborate present and that which would normally be soluble at 20C is between 4 and 12. The improvement consists in mixing the damp crystallized perborate obtained by separation from the reaction medium and which contains, besides water of crystallization, 40–60% by wt. of mother liquor, with 40 to 150% by wt. of dry sodium perborate, and drying the resulting mixture in a fluidized bed drier.

DETERGENT COMPOSITIONS. G. J. McEwan (Monsanto Co.). *U.S. 3,311,563.* A detergent composition having synergistically enhanced detergency is claimed, consisting essentially of an alkali metal mono hexene dimer alkylaromatic sulfonate and an alkali metal mono hexene trimer alkylaromatic sulfonate, in which the alkyl portion of the first material is straight chain in character with branching on 25–50% of its alpha C atoms and the alkyl portion of the second material is also straight chain with branching on 5–50% of its alpha C atoms. The amount of the dimer material is 20–80% by wt. based on the total weight of the detergent mixture.

DETERGENT COMPOSITION. E. W. Lang and H. W. McCune (Procter & Gamble Co.). *U.S. 3,313,734.* An aqueous detergent composition especially adapted for use in shampooing hair consists essentially of (a) 0.1 to 7.0% of a water-soluble polymer having a molecular weight from about 1,000 to about 5,000,000, at least 30% of whose molecular structure is composed of monomeric units consisting of quaternized vinylimidazole, quaternized dimethylaminoethyl methacrylate, quaternized diethylaminoethyl methacrylate or quaternized p-dimethylaminomethylstyrene, the balance of the polymer being composed of monomeric units derived from monoethylenically unsaturated groups; (b) 0.1 to 10% of a water-soluble salt of a higher fatty acid or an anionic organic sulfuric reaction product containing an alkyl group with 8 to 20 C atoms and a sulfuric acid or sulfonic acid ester radical; (c) 5 to 20% of certain nitrogen containing polar nonionic or ampholytic detergents; and the balance (d) water. The weight ratio of component (b) to component (a) should be no greater than about 10 to 1.

SHAMPOO COMPOSITION. H. W. McCune (Procter & Gamble Co.). *U.S. 3,313,735.* A shampoo composition is claimed, consisting essentially of (1) 10–30% of a water-soluble detergent salt of organic sulfuric reaction products containing an alkyl group with 8 to 18 C atoms and a sulfonic acid or sulfuric acid ester radical, and acyl sarcosinates with from 10 to 18 C atoms in the acyl group; (2) 0.2 to 5% of at least one phosphono compound having the formula $RN(CH_2PO_3M_2)_2$, or the formula $RC(X)(Z)PO_3M_2$, where R is an alkyl radical with 6 to 18 C atoms, X is either H or $CH_3$, Z is either OH, COOM or $PO_3M_2$ and M can be H, Na, K, $NH_4$, mono-, di- or triethanolammonium; (3) the balance is substantially water. The shampoo composition has a pH in the range between 6.0 and 10.0.

DETERGENT COMPOSITIONS. H. M. Priestley and J. H. Wilson (Lever Brothers Co.). *U.S. 3,317,430.* An improved detergent composition comprises an organic synthetic detergent selected from the group consisting of anionic non-soap detergents and nonionic detergents and, as a foam stabilizer, an amine oxide selected from the group consisting of N,N-bis (2-hydroxyethyl) dodecylamine oxide and N-benzyl-N-methyl-dodecylamine oxide, the amine oxide being present at a level ranging from 2 to 100% by wt. of the synthetic detergent.

SOME NOTES ON AMINE OXIDES AND AMINO POLYCARBOXYLIC ACIDS. A. Coeur and J. Alary (Univ. of Grenoble, France). *Tenside* 4, 65–9 (1967). The sequestering properties of amino polycarboxylic acids have long been known and used to neutralize the undesirable effects due to the presence of alkaline earth and heavy metal salts in aqueous solutions, as well as to stabilize hydrogen peroxide and persalts. These sequestering agents can be oxidized by the hydrogen peroxide, especially at high temperatures. The mechanism of the reaction between hydrogen peroxide and amino polycarboxylic acids is discussed, and the changes in the sequestering properties of these acids, through their transformation into amine oxides, are explained. Methods are given for the preparation of these amine oxides in both alkaline and acid media, as well as analytical methods for their detection. The decomposition of amine oxides in aqueous solutions is also examined.

GERMICIDAL DETERGENT COMPOSITIONS CONTAINING AMIDES AND HALOGENATED AMIDES OF SULFUR-CONTAINING PHENOL CARBOXYLIC ACIDS. H. C. Stecker. *U.S. 3,311,562.* A germicidal detergent composition consists essentially of an anionic, cationic, non-ionic or ampholytic surfactant, and about 0.01 to 1.0% by wt. of a sulfur-containing compound having the general formula: $R(AH)X_aC=ANH—RX_b$, where: R is a phenyl or naphthyl group, A is oxygen or sulfur, X is F, Cl, Br or I, a is a numeral between 0 and 2 and b is a numeral between 0 and 3.

THE USE OF FLUORESCENT BRIGHTENERS IN MODERN DETERGENTS, THEIR INCORPORATION AND WHITENESS MEASUREMENT. E. E. Lindermer (Ciba S.p.A., Basel, Switzerland). *Riv. Ital. Sostanze Grasse* 44, 79–85 (1967). Current developments are reviewed on the use of fluorescent dyes in detergent products.

THE POSITION OF THE DETERGENT PROBLEM IN EUROPE. H. Spohn (Sunlicht G.m.b.H., Hamburg, Germany). *Tenside* 4, 74–9 (1967). The current status is reviewed of affairs in 22 European countries with regard to the problem of detergent degradability in water systems.

THE USE OF CATIONIC SURFACTANTS IN INDUSTRY, I. A. Chwala. *Tenside* 4, 69–74 (1967). A review is given of the various types of cationic surfactants currently available and their industrial uses in road construction and the protection of buildings, in corrosion protection, flotation, leather finishing, in paints and varnishes, in disinfectants, in the preparation of polishes and in other applications.

THE USE OF DETERGENTS IN COMMERCIAL LAUNDRIES. A. Lusetti (Milan, Italy). *Riv. Ital. Sostanze Grasse* 44, 86–8 (1967). The technical and economical principles of operation of commercial laundries are reviewed.

THE TESTING OF DETERGENTS AND WASHING PROCESSES BY MEANS OF ARTIFICALLY SOILED AND UNSOILED TEST FABRICS. H. Bruschweiler (Empa Co., St. Gallen, Switzerland). *Riv. Ital. Sostanze Grasse* 44, 25–33 (1967). Soiled and unsoiled test fabrics can be used for the evaluation of detergents and washing processes. Artifically soiled Empa fabrics and suitable optical measurements enable studies to be carried out on washing and bleaching effects, as well as soil redeposition. Since each type of soil exhibits characteristic washing and bleaching behavior, it is suggested that tests be carried out with several types of artifically soiled cloths. Mechanical and chemical damage to fabrics can also be evaluated by using unsoiled test fabrics subjected to repeated washings.

STANDARD PROCEDURES FOR TESTING LAUNDRY DETERGENTS. K. J. Nieuwenhuis (Inst. for Text. Cleaning, Delft, Netherlands). *Riv. Ital. Sostanze Grasse* 44, 13–24 (1967). The general concepts used in testing detergents for both home and institutional use are discussed in detail, with special reference to: mechanisms of soil and stain removal; effects on cloth, such as shrinkage, discoloration, whiteness maintenance, ash content, chemical damage to fibers and mechanical wear. Standard washing procedures used in testing and minimum performance requirements expected of a commercial detergent are given.

ACTIVITY OF THE TEST METHODS COMMITTEE OF THE SPANISH COMMITTEE ON DETERGENCY. *Riv. Ital. Sostanze Grasse* 44, 11–2 (1967). The organization and activities of the Test Methods Committee of the Spanish Committee on Detergency are discussed.

INHIBITION OF HYDROLYSIS OF FATS. F. A. Norris and D. P. Grettie (Swift & Co.) *U.S. 3,300,524.* A process for inhibiting the hydrolysis of fats derived from oil bearing fruits to free fatty acids consists of treating the fats with an aqueous solution of an active chlorine-containing material.

## • *New Members*

### Active

Frank Bradley, Secretary General, International Society for Fat Research, Ruislip, Middlesex, England

Samuel Cohen, President, Lipo Chemicals, Inc., New York, N. Y.

John Cornelius Friend, Assistant Chief Chemist, Swift & Co., Kankakee, Ill.

Lowton L. Gentry, Refinery Superintendent, Cargill, Inc., Des Moines, Iowa.

Dale Norman Kinsey, Project Leader, Riviana Foods, Inc., Houston, Texas.

Klaus Robert Lange, Research Associate, Philadelphia Quartz Co., Primos, Pa.

George David Lee, Gas Chromatographic Specialist, Swift & Co., R & D Center, Chicago, Ill.

Harold Ogden Locke, Analytical Chemist, General Aniline & Film Corp., Easton, Pa.

K. T. Louis, Group Leader, Tap Research & Application Laboratories, CIBA Chemical & Dye Co., Roms River, N. J.

Gray Tillman Malcolm, Instructor, L. S. U. Medical School, New Orleans, La.

Donald George Manly, Research Manager, Glyco Chemicals, Williamsport, Pa.

Saito Minoru, Technical Director, Japan Oil and Vitamin Inspection Institute, Minato-ku, Tokyo, Japan.

Stephen Edward Mitchell, Kellogg Company, Omaha, Nebraska.

Abdel Kader Naggar, President, and Bulk Oils and Draught Surveyor, Alexandria Superintending Co., Alexandria, Egypt, and Philadelphia, Pa.

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