ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, 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

THIN-LAYER CHROMATOGRAPHY OF THE PHOSPHOINOSITIDES. F. Gonzalez-Sastre and J. Folchi-Pi (McLean Hosp. Res. Lab., Belmont, Mass. 02178). *J. Lipid Res.* 9, 532–3 (1968). Thin-layer chromatography for the separation of mono-, di-, and tri-phosphoinositides (0.3–3 μg total phosphorus) is described.

EFFECT OF METAL CHLORIDES ON THE AUTOXIDATION OF METHYL OLEATE. Tomishi Yamada and Yoshiyuki Mochida (Kanagawa Univ.). *Yukagaku* 17, 405–6 (1968). Effect of metal chlorides on the autoxidation of methyl oleate was investigated by observing the changes in peroxide value, saponification value, iodine value and refractive index. VCl_4 and $PdCl_2$ accelerate markedly the peroxide-decomposition, while $BiCl_3$ and $ZrCl_4$ showed less effect, and $AlCl_3$ and $SiCl_4$ showed no effect. The changes in peroxide value, saponification value, acid value and refractive index were less using $MoCl_5$, $TiCl_4$ or WCl_6 but the decrease in iodine value was great. The oxidation reaction in the presence of such chlorides seemed to occur by another mechanism rather than usual inhibition of autoxidation as in the case of $SbCl_5$, $GeCl_4$, $InCl_3$ and $SnCl_4$.

MISCELLA REFINING OF COTTONSEED OIL. J. Zajic. *Sbornik V. S. C. T. (Prague)* **E14**, 65–72 (1967). The primary advantages to miscella refining of cottonseed oil are increased removal of pigments and lower refining losses. Optimal conditions for refining are 40C, with a miscella concentration of 40% and a caustic concentration of 20%. Oil loss is about 3%. (Rev. Franc. Corps Gras)

HYDROGENATION OF RAPESEED OIL BY THE STATIONARY NI-AL CATALYST. II. PROPERTIES OF THE HYDROGENATED OIL. I. Kaganowicz. *Tluszcze jad.* 11, 258–268 (1967). Rapeseed oil hydrogenated with a Ni-Al catalyst possesses certain positive characteristics. After hydrogenation, the oil is easily bleached and deodorized. The free fatty acid level does not increase during hydrogenation. The level of nickel in the oil is very low, 2 to 5 milligrams per kilogram. There are negative factors also, such as, the hydrogenation process is not selective, the product is soft and the melting point is increased to about 50C. (Rev. Franc. Corps Gras)

SINGLE PHASE CONTINUOUS INTERESTERIFICATION OF FATS AND OILS IN A PILOT PLANT REACTOR. C. Kaczanowski *et al. Tluszcze jad.* 11, 209–214 (1967). The first experiment was conducted upon a mixture of 26.6 IV tallow and rapeseed oil (35/65, W/W). The reactor was designed to handle 50 kilograms per hour. The interesterification is carried out at 95 ± 5C and 0.4% sodium methoxide. (Rev. Franc. Corps Gras)

THE STABILITY OF REFINED SOYBEAN OIL IN VARIOUS PACKAGES. A. Jakopin. *Bilten B.U.M.* 5, 30–34 (1968). The object of the present work is to evaluate the stability of refined soybean oil in various packages. The various packages were maintained at room temperature for four months with and without antioxidants. The best stability was found using a plastic bottle protected by a cardboard carton. The use of propyl gallate is not recommended since it seems to increase the peroxide value. (Rev. Franc. Corps Gras)

HYDROGENATION OF SUNFLOWERSEED OIL ON THE CATALYST NI-CR BY THE METHOD "DE LA GOUTTE." V. I. Komarov *et al. Piscev. Technol.* 6, 66–68 (1967). The hydrogenation of sunflowerseed oil by the method "de la goutte" on a stationary catalyst at atmospheric pressure proceeds as a zero order reaction. The selectivity of the process depends upon the method of contact used, the degree of hydrogenation and the height of the catalyst bed. (Rev. Franc. Corps Gras)

MOLECULAR SIEVES: PRODUCTION, PROPERTIES AND APPLICATION MAINLY IN THE FAT AND OIL AND RELATED PRODUCTS FIELD. M. T. Juillet (ITERG, Paris, Fr.). *Rev. Franc. Corps Gras* 15, 235–240 (1968). The shape, physico-chemical properties and regenerating procedures for molecular sieves are discussed. Applications, such as, purification of n-paraffins used for surfactant synthesis, support for gas chromatography and catalyst for the hydrogenation of soya oil are presented.

STUDY OF MINOR COMPONENTS OF VEGETABLE OILS. E. Federli (Nat. Center of Lipid Chem., Milan, Italy). *Rev. Franc. Corps Gras* 15, 287–289 (1968). The most difficult problem in studying the minor constituents is the isolation of these constituents from the triglyceride. Saponification destroys or alters some classes of unsaponifiables. Concentration by physical means is the only procedure which will insure unchanged material for detailed study. Column chromatography, TLC and gas chromatography are suitable physical procedures. The complete examination of the triterpenic alcohols and of the sterol fractions can develop conclusions as to pathways of biosynthesis.

APPLICATION OF UV SPECTROPHOTOMETRY AT 315 Mμ FOR THE QUALITY CONTROL OF OILS. DETECTION OF OLIVE OIL ADULTERATION WITH HUSK OLIVE OILS. P. S. Galanos, V. M. Kapoulas and E. C. Voudouris (Nutr. Lab. of the Univ. of Athens, Athens, Greece). *Rev. Franc. Corps Gras* 15, 291–300 (1968). The UV spectral characteristics of olive oil, husk olive oil and other seed oils in the region 310–320 mμ was studied. This is the region where tetraenes with conjugated double bonds have an absorption maxima. The results are expressed by the curve slope ratios on either side of the peak at 315 mμ. The slope of the curve of seeds and the slope of pure olive oil are regular and Rs values are not far from 1. Oils which have been strongly oxidized and then refined have either a negative Rs value or a very large one. The absolute value for their specific absorption in this region, the values are 10 to 30 times higher than the corresponding value for olive oil. Olive oil, adulterated by husk olive oil in the amount of 5%, is easily detected by Rs measurement.

THE INTERCHANGEABILITY OF FATS AND OILS AND ITS CONSEQUENCES. II. ECONOMIC ASPECTS. P. Worms (Dir. of CETEMA). *Rev. Franc. Corps Gras* 15, 227–234 (1968). The growing interchangeability of all dietary fats should reduce the price difference between them.

INVESTIGATIONS IN ORDER TO FIND A POSSIBLE CORRELATION BETWEEN CHEMICAL VALUES AND ORGANOLEPTIC CHANGES OF VEGETABLE OILS DURING THE INDUCTION PERIOD. M. Loury and L. Garber (Lab. of the Inst. of Fats and Oils, Paris, Fr.). *Rev. Franc. Corps Gras* 15, 301–308 (1968). This is a preliminary report of an attempt to provide a correlation between chemical analysis and taste panel data of autoxidized oils. The data indicate that the TBA and the Kreis tests do show a correlation with taste panel data, and therefore can replace taste panels to some degree.

BIOSYNTHESIS OF A LIPID HAVING A SINGLE FATTY ACID. J. Salmonowicz *et al. Roczniki T.C.Z.* 14, 129–133 (1967). It has been possible to synthesize via biosynthesis a lipid containing 96.4% eicosadienoic acid. A culture of *Fusarium culmorum* E-54 grown on a mineral media supplemented with sucrose and maltose was used. (Rev. Franc. Corps Gras)

HYDROCARBONS IN LARD. A. Rutkowski *et al. Rocznicki Tech. Chem. Zyrv.* 14, 51–57 (1967). Lard contains about 0.11% unsaponifiables. Using thin-layer chromatography the unsaponifiables can be separated into sterols (45%), hydrocarbons (42%), and the di and triterpene alcohols (13%). Using gas chromatography, the hydrocarbons were separated. The chain length of the hydrocarbons ranged between C19 and C35. The concentration of a hydrocarbon with a chain length of 28 was highest (16%). (Rev. Franc. Corps Gras)

INDUSTRIAL LECITHINS FROM COTTONSEED OIL SLUDGES. K. Viswanathan, S. Dhanvantari and S. D. Thirumala Rao. *Chem. Processing Eng. (India)* 1(3), 151 (1967). Plastic unbleached quality lecithins have been prepared from sludges obtained in the solvent extraction of cottonseed cakes and from gums of expeller cottonseed oils. The lecithin samples when tested in factories showed good performance in paints and other special types like styrene/butadiene emulsion systems, industrial inks and in leather treatment, with the potential of replacing the imported equivalents. (Rev. Current Lit. Paint Allied Ind. No. 312)

ESTIMATION OF OXIRAN-CONTENT IN SAMPLES OF EPOXIDISED VEGETABLE OILS. G. V. Sarma, A. K. Jain and R. K. Bhatnagar. *Chem. Processing Eng. (India)* 1(3), 154 (1967). Epoxidised vegetable oils and esters are finding increasing use in formulation and synthesis of high polymers and their compounds. A number of analytical methods are available for estimation of oxiran-content of such products. In the course of studies on the epoxidation of acetylated castor oil, it was noticed that these methods do not give reproducible results in spite of all precautions being taken. Three methods, based on titrations against (i) pyridine/HCl, (ii) HBr in glacial acetic

New Books . . .

(Continued from page 592A)

"Physical Chemistry of Cleansing Action" by H. Lange, Henkel & Cie, G.m.b.H., Düsseldorf, Germany, defines cleansing as the removal of dirt or soil from objects or living beings. He then describes the mechanisms in both aqueous and dry cleaning systems.

"Pharmaceutical Applications and Physiological Aspects of Solubilization" by Lars Sjöblom, Department of Biochemistry and Pharmacy, Åbo Akademi, Åbo, Finland, examines surfactants used as antiseptics, and disinfectants and in conjunction with essential oils, alkaloidal and glycosidal drugs, fat soluble vitamins and hormonal steroids. He also comments on the toxicity of surfactants.

"Surfactants in Pesticidal Formulations" by Wade VanValkenburg, The Dow Chemical Company, Midland, Michigan, specializes on the preparation of stable emulsions via the HLB system, their properties and applications as insecticides, herbicides and fungicides.

"Emulsion Polymerization" by B. M. E. van der Hoff, Department of Chemical Engineering, University of Waterloo, Waterloo, Ontario, Canada, concludes the book with a discussion of emulsion polymerization, its initiation, particle formation, propagation and termination and the roles of diffusion.

The book is well documented with over 1000 references, has an author and subject index and is well illustrated with 42 tables, 120 figures and 3 electron microscope photographs.

The book is highly recommended to the fundamental researcher and the work in the applied field of surfactant chemistry.

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"NONIONIC SURFACTANTS," Volume 1 of Surfactant Science Series, edited by Martin J. Sebick, published by Marcel Dekker, Inc., New York, 1085 pages, 1967.

The physical format of the book is excellent. Starting with graphs which are easy to follow, a broad subject index preceding each chapter and an extensive subject index which combine to make this book very easy to use.

It would be difficult to compare this book with other works since this is the first time all the facets of nonionic surfactant synthesis, properties and applications has been brought under one cover.

The book is divided into four main sections covering the organic, physical, analytical and biological chemistry of all classes of nonionic surfactants. The first section discusses the organic chemistry of all classes of nonionic surfactants covering their syntheses, applications and structural influence on detergency. The second section of the book deals with the physical chemistry of nonionic surfactants covering such subjects as surface films, micelle formation, solubilization, emulsification, dispersion stability, detergency, foaming and polyoxyethylene chain configuration. The third section covers the instrumental and chemical methods currently used for the separation and analysis of nonionic surfactants. The last section of the book deals with two important subjects, toxicity and biodegradation of nonionic surfactants.

Each chapter is well coordinated with the rest of the book showing a uniformity of presentation and evidence of good editing. The treatment of each subject ranges from the theoretical to the practical as shown by the complex discussion of micelle formation in Chapter 16 to the practical suggestions of cleaning formulations in many of the other chapters. Most of the contributors expertly skirted the prolific use of trade names and when they did use them they were preceded by a descriptive chemical name.

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• *New Members*

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acid and (iii) ethereal HCl, were studied and their efficiency and reproducibility estimated. (Rev. Current Lit. Paint Allied Ind. No. 312)

ALCOHOLYSIS OF TRIGLYCERIDES. K. Gol'dberg *et al. Lakokras Mat.* (3), 23–5 (1967). The influence of monobasic acids on the alcoholysis of triglycerides with glycerol was studied. The process could be controlled by following the changes in electrical conductivity of the reaction medium. (Rev. Current Lit. Paint Allied Ind. No. 312.)

MODIFICATION OF FATTY ACIDS WITH ACETONE. S. Bhowmic, P. K. Ghosh and A. N. Saha. *Sci. Cult.* 32(5), 244–5 (1966). An attempt has been made to modify the fatty acids of linseed oil with acetone in the presence of dry HCl, based on the ability of acetone to give carbonium ion in the presence of acid. Through a mixture of linseed oil fatty acid (75 g.) and acetone (35 g.) maintained at 8–10°C., dry HCl gas was passed for 9 hr. under constant stirring. The treatment raised the av. mol. wt. of the fatty acid from 278.1 to 306.2 and lowered the I.V. from 182.2 to 158.0. Against no diene conjugation in the original fatty acid, it was 4% in the product. (Rev. Current Lit. Paint Allied Ind. No. 312.)

ASSOCIATION BEHAVIOR OF GLYCERIDES. R. Schöllner *et al. J. Prakt. Chem.* 35, 271–83 (1967). Monomeric glycerides containing 1, 2 or more OH or COOH groups (of the type used for polyester and alkyd production) have been examined in toluene and diethyl ketone for their association behavior as a function of their concentration and number of end groups. Measurements in the ebullioscope showed the association to increase linearly with concentration. (Rev. Current Lit. Paint Allied Ind. No. 312.)

A SIMPLE PROCEDURE FOR DETECTING THE PRESENCE OF CYCLOPROPANE FATTY ACIDS IN BACTERIAL LIPIDS. B. L. Brian and E. W. Gardner (Dept. Biology, Texas Christian Univ. Fort Worth, Texas 76129). *J. Appl. Microbiol.* 16, 549–552 (1968). The presence of cyclopropane fatty acids in bacterial lipid was deduced by a series of subtractive procedures coupled with GLC analysis of the fatty acid methyl esters. Extracted lipids were interesterified with BCl_3 methanol, unsaturated esters were saturated with H_2 on charcoal/5% Pt and cyclopropane esters were brominated with Br_2 in ether at 0C.

GAS CHROMATOGRAPHY AND MASS SPECTROMETRY OF SPHINGOLIPID BASES. CHARACTERIZATION OF SPHINGA-4,14-DIENINE FROM PLASMA SPHINGOMYELIN. A. J. Polito, T. Akita and C. C. Sweeley (Dept. of Biochem. and Nutr., Grad. School of Public Health, Univ. of Pittsburgh, Pitts. Pa.). *Biochemistry* 7, 2609–14 (1968). A partially purified sample of sphingo-4,14-dienine was obtained by chromatographic procedures from acid-catalyzed methanolysates of human plasma sphingomyelin. The structure of this sphingolipid base was deduced from mass spectrometric data before and after osmium tetroxide oxidation, and by mass spectrometric identification of sebacic acid after permanganate-periodate oxidation of the base. Hexadecasphing-4-enine and heptadecasphing-4-enine were also identified conclusively in sphingomyelin from the mass spectra of N-acetyl-O-trimethylsilyl derivatives. Gas chromatography of the N-acetyl-O-trimethylsilyl derivatives on selective liquid phases separates spingadienines from sphingenines and relative retention data are given for routine gas chromatographic identification of a variety of sphingolipid bases.

AUTOXIDATION OF CAROTENES IN DEHYDRATED SWEET POTATO FLAKES USING ^{14}C-β-CAROTENE. A. E. Purcell and W. M. Walter, Jr. (Dept. of Food Science, North Carolina State Univ., at Raleigh, and Southern Util. Res. Dev. Div., U. S. Dept. Agr. Raleigh, N.C. 27607). *J. Agr. Food Chem.* 16, 650–3 (1968). Autoxidation of carotenoids in food products is different from autoxidation *in vitro*. Radioactive carotenoids can be used to study autoxidation of carotenoids in food products when it can be shown that the added carotenoid behaves the same as native carotenoids. Xanthophylls are much more resistant to autoxidation *in vitro* than carotenes but only slightly more resistant in foods. Lutein added to dehydrated sweet potato autoxidized at about the same rate as carotene. When purified ^{14}C-β-carotene was added to dehydrated sweet potato flakes, the specific radioactivity of the total β-carotene fraction did not change during autoxidation of 45% of the total β-carotene. Label from the ^{14}C-β-carotene was distributed among saponifiable and nonsaponifiable lipids, methanol-water-soluble extract, and insoluble residues.

LIPID AND CHLOROFORM-METHANOL-EXTRACTABLE PROTEIN CONTENT OF CASEIN MICELLES AND OTHER MILK FRACTIONS. J. Cerbulis (Eastern Regional Res. Lab., U. S. Dept. Agr., Phil., Pa. 19118). *J. Agr. Food Chem.* 16, 647–9 (1968). Micelles from unhomogenized milk contained 0.11 to 0.63% lipids but micelles from homogenized milk contained 5.13% lipids. The unsedimented supernatant casein, obtained by acid precipitation from fresh whole milk, contained 12.40% lipids and from homogenized milk 31.21% lipids. The acid whey from the ultracentrifuge experiments from both fresh milk and homogenized milk contained considerably more lipids, particularly phospholipids, than whey obtained from uncentrifuged skim milk. None of the phospholipids were free. The micellar casein fraction obtained by ultracentrifugation was approximately 93% of the total casein in fresh cow's milk, 77% in commercial homogenized pasteurized cow's milk, and 81% in goat's milk.

STRUCTURE OF FOUR METHYL LINOLENATE DIPEROXIDES. P. H. Begemann, W. J. Woestenburg and S. Leer (Unilever Res. Lab., Vlaardingen, The Netherlands). *J. Agr. Food Chem.* 16, 679–84 (1968). Autoxidation of methyl linolenate at 37C yields a mixture containing not only methyl linolenate monohydroperoxide but also more polar peroxides. Four of these (isomeric) more polar compounds contain two peroxide groups each—a hydroperoxide group and a six-membered cyclic peroxide group.

• Fatty Acid Derivatives

SYNTHESES OF SOME METHYL 10,11-DIARYLUNDECANOATES AND 11-ARYL-9-UNDECANOATES AND THEIR ACTIVITY AS ANTIOXIDANTS AND CORROSION INHIBITORS. Kyo Takaoka, Mikio Takahashi and Yoshiyuki Toyama. *Yukagaku* 17, 387–91 (1968). Reaction of methyl 10-undecanoate and mercuric acetate in methanol gives methyl methoxyacetoxymercuriundecanoate. Reaction of mercurial adduct with phenol, *o*-cresol, *m*-cresol, *p*-cresol and *o*-tertbutylphenol in 1:5 molar ratio each for 1 hour at 60C in the presence of perchloric acid as a catalyst gives methyl 10,11-diarylundecanoates of respective phenols. Reaction of the mercurial adduct and 2,6-di-*tert*-butylphenol gave methyl 11-(hydroxy,di-tert-butylphenyl)-9-undecanoate instead of methyl 10,11-diarylundecanoate. The reaction of the mercurial adduct with methyl benzoate, dimethyl phthalate and methyl acetylsalicylate under the same condition for 2 hours gave methyl 11-methoxycarbonylphenyl-9-undecanoate, methyl 11-dimethoxycarboylphenyl-9-undecanoate and methyl 11-acetoxymethoxycarbonylphenyl-9-undecanoate. All diaryl undecanoates listed above showed antioxidant activity for methyl oleate at 40C and 100C though their activities were somewhat less than the activity of BHA. They showed effective corrosion inhibition by the water-dip method with a sample of turbine oil and test pieces of mild steel, aluminum, zinc and brass at the concentrations of 0.2, 0.4, 0.6 and 0.8%. Especially, the derivatives from *p*-cresol and *o*-cresol were excellent corrosion inhibitors. Methyl 11-methoxycarbonylphenyl-9-undecanoate, methyl 11-dimethoxycarbonylphenyl-9-undecanoate and methyl 11-(acetoxymethoxycarbonylphenyl)-9-undecanoate were converted to sodium, calcium, strontium and barium soaps, and the results of corrosion inhibition in turbine oil against various metals were listed.

HYDROGENOLYSIS OF HIGHER FATTY ESTER TO HIGHER ALCOHOL USING FE-BASED CATALYST. Isao Ikeda, Satoshi Morioka and Saburo Komori (Osaka Univ.). *Yukagaku* 17, 391–6 (1968). Hydrogenolysis of methyl ricinoleate to 1,12-octacanediol was studied by use of Fe-Cu-CdO catalyst; the yield of diol was 77% from the methyl ester, while the yield from triglyceride was 50%. During the hydrogenolysis of the ester, destruction of 65% of the unsaturation occurred. Fe and Fe_2O_4 were found to be active in the reduction.

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• Biochemistry and Nutrition

LIPID COMPOSITION OF CHLOROPLASTS ISOLATED BY AQUEOUS AND NONAQUEOUS TECHNIQUES. A. Ongun, W. W. Thomson and J. B. Mudd (Dept. of Biochem., Univ. of Calif., Riverside, Calif. 92502). *J. Lipid Res.* 9, 409–15 (1968). Chloroplasts isolated from tobacco leaves in 0.5 M sucrose solution (the 1000 g pellet) contained 83% of the total cellular monogalactosyl diglyceride, 88% of the digalactosyl diglyceride, 76% of the sulfolipid, and 74% of the phosphatidyl glycerol. Phosphatidyl inositol was concentrated in the 15,000 g pellet. Phosphatidyl choline and phosphatidyl ethanolamine were concentrated in the 15,000 g supernatant fraction. Chloroplasts isolated from tobacco leaves by a nonaqueous technique in hexane-carbon tetrachloride show a glycerolipid composition similar to that found in chloroplasts isolated in the aqueous system, even though some lipid, particularly monogalactosyl diglyceride, is extracted by the organic solvent during the process.

LIPID FIXATION DURING PREPARATION OF CHLOROPLASTS FOR ELECTRON MICROSCOPY. *Ibid.*, 416–24. Reaction of osmium tetroxide with isolated spinach chloroplasts fixed completely the glycolipids, phosphatidyl glycerol, and phosphatidyl choline. Under the same reaction conditions only 30% of the chlorophyll was fixed. Reaction of potassium permanganate with isolated spinach chloroplasts fixed more than 90% of the glycolipids, phosphatidyl glycerol and phosphatidyl choline, provided the reaction period was long enough. Potassium permanganate also fixed the chlorophyll. Reaction of osmium tetroxide and potassium permanganate with isolated ^{14}C-lipids from *Chlorella pyrenoidosa* fixed 59% and 66% of the radioactivity, respectively. The lipids that were not fixed included sterols and pigments. Electron micrographs show that chloroplasts extracted with chloroform-methanol after fixation in osmium tetroxide or potassium permanganate differ from those dehydrated with acetone mainly in that in the former, osmiophilic globules have been removed and there seems to be some fusion of the boundary membranes and grana membranes. These effects may be due to the extraction of unfixed, neutral lipids such as sterols and quinones.

LIPID BIOSYNTHESIS IN RELATION TO CHLOROPLAST DEVELOPMENT IN BARLEY. L. Appelqvist, J. E. Boynton, P. K. Stumpf and D. Von Wettstein (Dept. of Biochem. and Biophys., Dept. of Genetics, Univ. of Calif., Davis, Calif.). *J. Lipid Res.* 9, 425–36 (1968). During greening of detached leaves from dark-grown barley seedlings, the linolenic acid content of the lipids increases in the early stages of the formation of the chloroplast lamellar system. Primarily the fraction containing monogalactosyl diglyceride is enriched with linolenic acid. Incorporation of ^{14}C-labeled acetate into the leaf lipids of detached whole leaves is low, but increases 10- to 20-fold during greening. Increasing percentages of label appear in linolenic acid during the first 15 hrs of greening, whereafter they remain constant. A constant, but relatively high, amount of acetate is incorporated into lipids when slices of leaves at various stages of greening are incubated by submersion in acetate solution, a treatment that blocks further chlorophyll synthesis during incubation. At the initial greening stages 75% of the label is channeled into steroids and other unsaponifiable lipids, but in advanced stages of chloroplast development 75% of the incorporated acetate is built into phospho-, sulfo- and galacto-lipids, and only 25% is channeled into unsaponifiable lipids.

LIPID BIOSYNTHESIS IN CHLOROPLAST MUTANTS OF BARLEY. L. Appelqvist, J. E. Boynton, K. W. Henningsen, P. K. Stumph and D. Von Wettstein. *Ibid.*, 513–24. The capacity of leaf slices from light-grown seedlings of wild type barley and 10 xantha mutants at six different gene loci to incorporate acetate-^{14}C into various lipids has been investigated. The fatty acid composition of the leaf lipids in these lethal mutants was similar to that of the wild type, but the fatty acid labeling pattern in the individual lipid classes can be drastically altered by these mutations, which effect chloroplast differentiation. A genetic block in chlorophyll synthesis, caused by mutations in the *xan-f* locus, leads to a repression of the formation of chloroplast membranes and of acetate incorporation into phospho-, sulfo-, and galacto-lipids (the acetate being preferentially channeled into a lipid fraction containing steroids and free fatty acids). Two leucine "auxotrophs" at different loci, which in the absence of leucine in the growth medium produce giant grana and accumulate some chlorophyll, differed considerably in the amount of labeling of their polar lipids during incubation.

METABOLISM OF HYDROXY FATTY ACIDS IN DOGS WITH STEATORRHEA SECONDARY TO EXPERIMENTALLY PRODUCED INTESTINAL BLIND LOOPS. Y. S. Kim and N. Spritz (Dept. of Med., Cornell Univ. Medical College, New York 10021). *J. Lipid Res.* 9, 487–91 (1968). Several aspects of the metabolism of hydroxy fatty acids were studied in dog with steatorrhea resulting from an experimentally produced jejunal blind loop. In these animals hydroxy acids were present in the stool in amounts far above normal. These acids disappeared from the feces during tetracycline administration and after exclusion of the blind loop. Both procedures apparently corrected the steatorrhea by reducing bacterial overgrowth. Hydroxy acids persisted in higher than normal amounts, however, after administration of taurocholic acid, which also corrected the steatorrhea, but by a different mechanism. Both in normal dogs and in those with blind loops, hydroxy acid constituted a higher percentage of total fatty acids in the jejunum. When hydroxy acids were fed to normal dogs, steatorrhea was not produced and absorption in amounts similar to that of unsubstituted stearic acid was observed. Isotopic oleic and linoleic acids were converted to hydroxy acids both *in vivo* and during *in vitro* incubation with feces; stearic acid was not.

OXIDATIVE DECARBOXYLATION OF RETINOIC ACID IN MICROSOMES OF RAT LIVER AND KIDNEY. A. B. Roberts and H. F. DeLuca (Dept. Biochem., Univ. of Wisc., College of Agr. and Life Sci., Madison, Wisconsin 53706). *J. Lipid Res.* 9, 501–8 (1968). Liver and kidney microsomes have been found to catalyze a rapid decarboxylation of retinoic acid *in vitro*. The reaction requires NADPH and Fe^{2+}, and is further stimulated by the presence of pyrophosphate. Thiamine pyrophosphate contained sufficient iron as an impurity to provide strong enhancement of the reaction in the absence of added iron. The decarboxylation could also be shown to occur nonenzymatically in the presence of ascorbate, Fe^{2+} and boiled microsomes, but there was little autoxidation resulting in decarboxylation. The reaction was strongly inhibited by chelating agents, N,N'-diphenyl-p-phenylene diamine, phenazine methosulfate, and ferricyanide, and resembled lipid peroxidation in both its cofactor requirements and response to inhibitors.

CEREBROSIDES OF HUMAN AORTA: ISOLATION, IDENTIFICATION OF THE HEXOSE AND FATTY ACID DISTRIBUTION. J. L. Foote and E. Coles (Dept. of Chem., Western Mich. Univ., Kalamazoo, Mich. 49001). *J. Lipid Res.* 9, 482–6 (1968). Cerebrosides have been isolated from adult aortic tissue. Each aorta was divided into portions classified as normal, fatty streaks, fibrous plaques, or complicated lesions. The concentration of cerebrosides was higher in fatty streaks than in the more advanced plaques; apparently normal tissue gave the same crebroside content as plaques found in the same aorta. The quantities of cerebrosides ranged from 0.01 to 0.73% of the total lipid. Of the 16 cerebroside samples isolated, 10 contained glucosyl ceramide, 1 contained galactosyl ceramide, and 5 were not analyzed for specific hexose. The fatty acid distribution was determined for 11 of the samples; it was similar to that of spleen cerebrosides. "Normal tissue" cerebrosides contained less unsaturated fatty acids than cerebrosides from a diseased area of the same aorta.

QUANTITATIVE ASPECTS OF THE INTESTINAL ABSORPTION AND METABOLISM OF CHOLESTEROL AND β-SITOSTEROL IN THE RAT. B. Borgstrom (Div. of Physiol. Chem., Chem. Ctr., Univ. of Lund, Lund, Sweden). *J. Lipid Res.* 9, 473–81 (1968). The quantitative aspects of intestinal absorption and metabolism of cholesterol and β-sitosterol have been studied in the rat after a single feeding of radioactive sterols. When increasing amounts of cholesterol were fed in a constant amount of triolein, the percentage absorbed decreased only

gradually and the total amounts absorbed increased to a maximum. Solubility in the fat component fed is one limiting factor in the absorption of cholesterol. At the lowest dose fed, only about 50% of dietary cholesterol was absorbed even though increasing the amount fed led to a 10- to 15-fold increase in total absorption. Sitosterol, when fed in triolein, was absorbed in amounts only one-tenth of the corresponding dose of cholesterol. Intestinal transit studies indicate that the distinction between sitosterol and cholesterol, when fed together, took place during the process of uptake into the intestinal mucosa. Once taken up by the intestinal mucosal cells, cholesterol and sitosterol did not differ in their subsequent rate of transit out of the mucosal cell.

EFFECT OF LARGE DOSES OF THE ORAL CONTRACEPTIVE, ENOVID, ON CHOLESTEROL METABOLISM IN THE RAT. L. Aftergood, H. J. Hernandez and R. B. Alfin-Slater (Div. of Nutritional Sci., School of Public Health, Univ. of Calif., Los Angeles, Calif.). *J. Lipid Res.* 9, 447–52 (1968). Short-term effects of the oral contraceptive drug, Enovid, a mixture of estrogenic and progesterone compounds, have been determined in experiments on male and female rats. Oral administration of large doses for 7 days resulted in marked decreases of cholesteryl esters in plasma accompanied by only slight elevations of heaptic cholesterol content. Cholesteryl esters were also much lower in adrenals and ovaries, organs which are usually responsible for steroid hormone biosynthesis. At the same time, cholesterol-esterifying activity in plasma was substantially increased. Enovid administration was shown also to affect the fatty acid composition of sterol esters remaining in plasma, adrenals, and ovaries. The concentration of sterol and arachidonate was significantly decreased in plasma sterol esters, whereas the concentrations of arachidonate and docosatetraenoate in adrenals and of docosatetraenoate in ovaries were significantly lowered. All of the changes reported were more pronounced in the female than in the male rat.

PLACENTAL TRANSPORT OF FREE PALMITIC AND LINOLEIC ACIDS IN THE GUINEA PIG. M. S. Hershfield and A. M. Nemeth (Anatomy Dept., Med. School, Univ. of Pa. Phil., Pa.). *J. Lipids Res.* 9, 461–8 (1968). Radioisotopic tracers were used to measure the unidirectional transfer rates of free fatty acids across the placenta of fed and fasted pregnant guinea pigs. Free ^{14}C-labeled palmitic and linoleic acids (in serum) were injected simultaneously into a jugular vein of an anesthetized pregnant guinea pig. Serial samples of maternal blood were collected from a carotid artery; fetal blood was collected from the umbilical vein of an exposed fetus. Analysis of maternal and fetal plasma revealed that: a) the half-lives of free palmitic and linoleic acid in maternal plasma are approximately 1.3 min and 0.7 min, both in fed animals with low plasma concentrations of these acids and in fasted animals with high concentrations; b) free linoleic and palmitic acids cross the placenta from maternal to fetal plasma in a ratio of approximately 2.0, a value which appears not to change as the transfer rates of these acids from maternal to fetal plasma are increased by fasting the mother. It is suggested that the ratio in which free linoleic and palmitic acids cross the placenta from maternal to fetal plasma is determined by the ratio of the unbound free linoleic and palmitic acid concentrations in maternal plasma.

UPTAKE AND ESTERIFICATION OF PALMITATE BY RAT DIAPHRAGM IN VITRO. G. Schonfeld (Phys. Branch, USAF School of Aerospace Med., Brooks Air Force Base, Texas 78235). *J. Lipid Res.* 9, 453–9 (1968). The contribution of exogenously supplied palmitate to the intracellular palmitate pool and its role in esterification were studied for the intact rat diaphragm *in vitro*. Palmitate-1-^{14}C attached to albumin in various molar ratios ($\bar{v}$) was taken up by the tissue in an initial rapid phase which led, after 4 min, to a steady-state level of tissue free fatty acid. The level was determined by $\bar{v}$ but also by the albumin concentration below 2 g/100 ml. The exogenous palmitate taken up constitutes one-quarter to three-quarters of the intracellular palmitate pool as $\bar{v}$ is increased from 0.5 to 5.5 (albumin concentration 2 g/100 ml). Turnover rates of intracellular palmitate at a given $\bar{v}$ are stable over 35 min of incubation, as indicated by constant rates of esterification (largely to triglyceride, but also to phospholipids) and by the unchanging specific activity ratios between intracellular and medium palmitate-1-^{14}C. These ratios also indicate that only a portion of the palmitate taken up is available for exchange with the albumin complex in the medium. Calculation of esterification rates at various $\bar{v}$ values suggests that not all of the palmitate is in a pool that is available for esterification.

THE ALK-1-ENYL GROUP CONTENT OF MAMMALIAN MYELIN PHOSPHOGLYCERIDES BY QUANTITATIVE TWO-DIMENSIONAL THIN-LAYER CHROMATOGRAPHY. L. A. Horrocks (Lab. of Neurochem., Cleveland Psychiatric Inst., Cleveland, Ohio 44109). *J. Lipid Res.* 9, 469–72 (1968). Myelin phospholipids have been examined by a separation-reaction-separation procedure for two-dimensional thin-layer chromatography on silica gel. After separation in one dimension, alk-1-enyl groups are cleaved by exposure of the plates to HCl fumes. Development in the second dimension quantitatively separates acid-labile and acid-stable phosphoglycerides as well as the aldehydes released from the acid-labile phosphoglycerides. Myelin phospholipids from the central nervous systems of the rhesus monkey, squirrel monkey, ox and mouse contain 32–36% acid-labile ethanolamine phosphoglycerides (ethanolamine plasmalogens) and 8–14% acid-stable ethanolamine phosphoglycerides. Acid labile choline and serine phosphoglyceride account for less than 1% of the myelin phospholipids.

ROLE OF ACETATE IN THE REDUCTION OF PLASMA FREE FATTY ACIDS PRODUCED BY ETHANOL IN MAN. J. R. Crouse, C. D. Gerson, L. M. DeCarli and C. S. Lieber (Liver Disease and Nutr. Unit, Second (Cornell) Med. Div., Bellevue Hosp. New York 10016). *J. Lipid Res.* 9, 509–12 (1968). To investigate the mechanism by which ethanol lowers plasma free fatty acids, the ability of two products of alcohol metabolism, acetate and lactate, to lower free fatty acids was tested in man. Sodium acetate was given orally to five healthy fasting volunteers and caused a significant fall in plasma free fatty acids. After amounts of ethanol and acetate that produced similar reduction in free fatty acids, plasma acetate increased 3- to 4-fold within 20 min. In each of three subjects the fall of free fatty acids observed after acetate ingestion occurred at plasma acetate levels less than or equal to those reached after ethanol. In all studies plasma glucose remained stable. Oral administration of sodium lactate to another volunteer in amounts sufficient to raise plasma lactate concentrations to a level similar to that found after ethanol administration failed to lower plasma free fatty acids. Thus acetate, a metabolite of ethanol, reduces plasma free fatty acids at plasma acetate levels comparable to those resulting from ethanol metabolism, which suggests that the lowering of plasma free fatty acids produced by ethanol is mediated, at least in part, by acetate.

SPECIFICITY OF ACYL-CoA:PHOSPHOLIPID ACYLTRANSFERASES: SOLVENT AND TEMPERATURE EFFECTS. P. Jezyk and W. E. M. Lands (Dept. of Biol. Chem., Univ. of Michigan, Ann Arbor, Mich. 48104). *J. Lipid Res.* 9, 525–33 (1968). Acyltransfer from CoA thiol esters to either the 1- or 2-position of monoacylglycerophosphoryl choline, which is catalyzed by a microsomal preparation from rat liver, had a temperature optimum of 30–35C. No significant alteration was observed in the ability of the acyltransferases to distinguish among the various thiol esters tested in the range of 15–40C. Acyl-CoA: 1-acylglycerophosphoryl choline acyltransferase activity is inhibited by urea, N-alkyl ureas and short-chain alcohols. The effect is not equal for all acyl derivatives, and ethylene glycol has much less inhibitory effect on the transfer of acids with an n-6 (ω6) double bond. On the other hand, this inhibition of acyl transfer was relatively insensitive to the configuration of the Δ^9-double bond of octadecadienoates. The specificity of the enzyme catalyzed transfer of different acids to the 2-position can be correlated in part with the dissociation constants for the urea clathrate complexes. Added glycol does not appreciably alter the specificity of enzyme-catalyzed transfer to the 1-position, but it inhibits the transfer of all acids in a similar fashion.

7-DEHYDROSTIGMASTEROL AND ERGOSTEROL: THE MAJOR STEROLS OF AN AMOEBA. F. R. Smith and E. D. Korn (Lab. of Biochem., Sect. on Cellular Physiol. Nat. Heart Inst., Nat. Inst. of Health, Bethesda, Md. 20014). *J. Lipid Res.* 9, 405–8 (1968). The sterol fraction of Acanthamoeba (Neff) contains 60% 7-dehydrostigmasterol and 40% ergosterol. The sterols were characterized by infrared and ultraviolet spectroscopy, gas chromatography, specific reactions and mass spectral analysis. Sterols constitute 5% of the lipids and 15% of the neutral lipids in this species.

RELATION OF LIPID STRUCTURE OF SARCOTUBULAR VESICLES TO Ca^{++} TRANSPORT ACTIVITY. B. P. Yu, F. D. DeMartinis and E. J. Masoro (Dept. of Physiol. and Biophys., Woman's Med. College of Pa., Phil., Pa. 19129). *J. Lipid Res.* 9, 492–500 (1968). The role of lipids of the sarcotubular membranes in their Ca^{++} uptake and Mg-ATPase activities was investigated. Treatment of the membranes with phospholipase C inhibits both processes. Treatment with phospholipase A and phospholipase D, which results in massive hydrolysis of the sarcotubular phospholipids, does not inhibit either the Ca^{++} uptake or the Mg-ATPase activities, nor does treatment with the polyene antibiotics affect these processes. Essential fatty acid deficiency alters sarcotubular membrane lipids; they contain much less stearic, linoleic and arachidonic acids and much more oleic and eicosatrienoic acids than normally, but do not lose the ability to actively sequester Ca^{++}. It is concluded that neither nonpolar lipids nor the nonpolar regions of polar lipids are involved in Ca^{++} sequestering and Mg-ATPase activities of the sarcotubular membranes. Of the polar components, the phosphoryl moiety of the phospholipids is required for both activities. However, the phosphoryl group appears to be required for the maintenance of the membranous structure necessary for Ca^{++} sequestration rather than serving specifically in the active transport process. That treatment with phospholipase D, which results in the conversion of much of the sarcotubular phospholipid from a dipolar to an anionic structure, does not affect Ca^{++} uptake activity is a most remarkable finding.

CHOLINE-DEFICIENCY FATTY LIVER: IMPAIRED RELEASE OF HEPATIC TRIGLYCERIDES. B. Lombardi, P. Pani and F. F. Schlunk (Dept. of Pathol., Univ. of Pittsburgh, School of Med., Pittsburgh, Pa. 15213). *J. Lipid Res.* 9, 437–46 (1968). After intravenous injection of palmitate-1-^{14}C to rats fed a choline-deficient (CD) or choline-supplemented (CS) diet for 15–18 hours, liver triglycerides became labeled very rapidly. In CS, but not in CD rats, there was a considerable loss with time of radioactivity from liver triglycerides. At the same time significantly less radioactivity appeared in plasma triglycerides of CD rats than of CS animals. No difference was seen in the triglyceride content of microsomes isolated from the liver of rats fed the two diets. The lower radioactivity in plasma triglycerides of CD rats was essentially due to a lower concentration and specific activity of very low density lipoprotein triglycerides. After intravenous injection of Triton and labeled palmitate, considerable radioactivity accumulated in plasma triglycerides and phospholipids of CD rats than of CS animals. Post-Triton hyperphospholipidemia was also less pronounced in CD rats. It was concluded that the fatty liver observed in CD rats results from an impaired release of hepatic triglycerides into plasma.

LIPASE ACTIVITY OF MUCOR PUSILLUS. G. A. Somkuti and F. J. Babel (Dept. Animal Sciences, Purdue Univ., Lafayette, Ind. 47907). *J. Appl. Microbiol.* 16, 617–619 (1968). Two strains of *Mucor pusillus* were examined for ability to synthesize lipase in a medium used for production of milk-clotting protease. Lipase activity of both strains reached a maximum after 6 days incubation in submerged culture at 35C. The lipase hydrolyzes butterfat, vegetable oils and synthetic triglycerides.

EFFECT OF LIPID MATERIALS ON THE PRODUCTION OF LIPASE BY TORULOPSIS ERNOBII. F. Yoshida, H. Motai and I. Ichishima (Lab. of Enzymology, Kikkoman Shoyu Co. Ltd., Noda, Chiba-prefecture, Japan). *J. Appl. Microbiol.* 16, 845–847 (1968). The yeast *Torulopsis ernobii* produced 50 units/ml. of glycerol ester hydrolase (E.C.3.1.1.3) when grown on a basal medium of soybean and wheat flours, dry yeast and ammonium sulfate. The addition of fats, oils and triglycerides to the medium gave up to 2 fold increases in enzyme production.

PHOSPHOLIPASE ACTIVITY OF THE DELTA HEMOLYSIN OF STAPHYLOCOCCUS AUREUS. G. M. Wiseman and J. D. Caird (Dept. of Med. Microbiol., Univ. of Manitoba Med. School, Winnipeg, Canada). *Proc. Soc. Exptl. Biol. Med.* 128, 428–30 (1968). Purified delta hemolysin from the Newman and E-delta strains of *S. aureus* liberates aqueous organic phosphorus from phospholipid extracts of various species of mammalian erythrocytes. Of several phospholipids investigated as substrates, phosphatidylinositol is most susceptible to degradation by the delta hemolysin. Phosphatidylserine was to a lesser extent attacked by the enzyme. In contrast with the beta hemolysin of *S. aureus*, delta hemolysin does not hydrolyze sphingomyelin and its activity is unaffected by EDTA or Mg^{2+} ions.

STAGES IN THE FORMATION AND METABOLISM OF INTRACELLULAR LIPID DROPLETS IN ATHEROSCLEROSIS. AN ELECTRON MICROSCOPICAL AND BIOCHEMICAL STUDY. R. Weller, R. A. Clark and W. B. Oswald (Dept. of Pathology, Guy's Hosp. Med. School, London, England). *J. Atheroscler. Res.* 8, 249–63 (1968). Previous electron microscope, polarised light and histochemical studies have defined two main types of lipid droplet in atherosclerotic lesions. One is a lamellated droplet containing cholesterol and phospholipid; the other is an amorphous globule of cholesterol ester. A sequence of electron micrographs is presented in this paper as a possible pathway for the formation of the lamellated droplets from cell membrane; the early stages of this process resemble the production of myelin. Transformation of lamellated cholesterol-phospholipid droplets into amorphous cholesterol ester globules is proposed from the observation of intermediate stages; the importance of the liquid-crystalline state in the esterification of cholesterol is discussed. Intracellular lipid droplets were isolated by differential centrifugation of homogenates of atherosclerotic tissue; phospholipid/cholesterol ratios were between 15:1 and 45:1 in the droplets; a small amount of protein was also present.

IN VIVO UTILIZATION OF DIHYDROSPHINGOSINE-4,5-^{3}H. B. Weiss and R. L. Stiller (Dept. of Biochem., New York State Psychiatric Inst., and College of Physicians and Surgeons, Columbia Univ., New York, N. Y. 10032). *Proc. Soc. Exptl. Biol. Med.* 128, 689–93 (1968). Dihydrosphingosine-4,5-^{3}H, injected intracranially into nursing rats, was converted to sphingosine-^{3}H, utilized for the synthesis of sphingolipids and dihydrosphingolipids, and catabolized with the incorporation of isotope into cholesterol and fatty acids from phospholipids and sphingolipids. Pathways of long-chain base metabolism are discussed.

INHIBITION OF TRIGLYCERIDE SYNTHESIS IN EVERTED INTESTINAL SACS. G. V. Vahouny, J. Nelson and C. R. Treadwell (Dept. of Biochem., School of Med., The George Washington Univ., Washington, D. C. 20005). *Proc. Soc. Exptl. Biol. Med.*

128, 495–500 (1968). Optimal conditions for synthesis of triglyceride from oleic acid-1-^{14}C in everted intestinal sacs were determined. Using several experimental conditions, it was found that 2-ethyl-n-caproate inhibited oleic acid incorporation into triglyceride by 25–50%. When inhibition of triglyceride synthesis occurred, there was a concomitant increase in mucosal unesterified fatty acids but no increase in the phospholipid, mono- or diglyceride fractions. The inhibition of glyceride synthesis in the intestinal mucosa by 2-ethyl-n-caproate appears to be at the level of long-chain fatty acid activation.

EFFECT OF ILEAL BYPASS ON SERUM LIPOPROTEINS IN ESSENTIAL HYPERCHOLESTEROLEMIA. E. H. Strisower, R. M. Kradjian, A. V. Nichols, E. Coggiola and J. Tasai (Depts. of Med. and Surgery, The Permanente Med. Group and Kaiser Foundation Hosp., Oakland; and Donner Lab. of Med. Phys., Lawrence Radiation Lab., Univ. of Calif., Berkeley, Calif.). *J. Atheroscler. Res.* 8, 525–34 (1968). The effects of ileal bypass on lipoprotein concentration and composition were studied in a 55-year-old man and a 61-year-old woman with essential hypercholesterolemia. A third patient died 8 days after operation. In the man, apparently permanent reduction of 40% to 50% in S_f 0–12 and cholesterol concentration followed ileal bypass, but postprandial diarrhea and weight loss continued for 5 months after operation. Lipoprotein composition changes in the second patient closely paralleled those in the first, but there was progressive weight loss and severe diarrhea until day 381, which coincided with the maximum reduction in S_f 0–12 concentration. Thereafter, the number of stools decreased to 4–6/day, weight remained stable, and S_f 0–12 levels rose until more than half of the surgically induced reduction had been regained by day 500.

THE LIPIDS IN RAISED FATTY AND FIBROUS LESIONS IN HUMAN AORTA. A COMPARISON OF THE CHANGES AT DIFFERENT STAGES OF DEVELOPMPNT. E. B. Smith, R. S. Slater and P. K. Chu (Courtauld Inst. of Biochem., Middlesex Hosp. Med. School, London, England). *J. Atherosclerosis Res.* 8, 399–419 (1968). Raised atherosclerotic lesions were divided into two main types on a histological basis: 1) fatty lesions in which the lipid was primarily within fat-filled cells; 2) fibrous lesions which contained collagen and no fat-filled cells. Both types of lesion were then sub-divided into early stages, in which all the sudanophilic lipid is within fat-filled cells or in the form of intact perifibrous lipid, and later stages in which there is a central area of extracellular "amorphous" lipid. Lipid analyses were made on whole small lesions of both types and stages, and on the dissected caps and amorphous centres of larger lesions. The cholesterol ester fatty acid composition was completely different in the two types of lesion: fatty lesions with no amorphous lipid contained 53% oleic acid and 13% linoleic acid, whereas fibrous lesions with no amorphous lipid contained 25% oleic acid and 43% linoleic acid. In lesions with amorphous lipid the percentage of free cholesterol increased, and this is highly correlated with changes in the proportions of oleic and linoleic acid. In each type of lesion the proportion of the most abundant acid falls with increasing percentage of cholesterol in the free form. This suggests that enzymic hydrolysis of cholesterol ester is occurring.

THE EFFECT OF STARVATION ON PALMITATE-1-^{14}C INCORPORATION AND THE FREE FATTY COMPOSITION OF RAT MUSCLE. G. Schonfeld and L. L. Rodrguez (Physiology Branch, USAF School of Aerospace Med., Brooks Air Force Base, Texas 78235). *Proc. Soc. Exptl. Biol. Med.* 128, 875–9 (1968). Skeletal muscle FFA contents are increased during starvation in the rat. An attempt has been made to determine the source of the FFA by incubating the intact rat diaphragm preparations of fed and 72-hour starved animals in palmitate-albumin solutions containing palmitate-1-^{14}C and by assaying the composition of the plasma and tissue FFA and tissue TGFA of fed and starved animals. The 1-min uptake of label was minimally influenced by starvation and not at all by incubation in ouabain, Amytal or 100% nitrogen. Steady-state levels of label were minimally increased by starvation but the increases were insufficient to account for the enhanced tissue FFA levels. Tissue FFA composition differed from both plasma FFA and tissue TGFA. Starvation from 0 to 96 hours did not affect the tissue FFA composition. These results are compatible with the following conclusions: The initial association between the albumin-FFA complex and the diaphragm is not affected by metabolic inhibitors; intracellular FFA do not approach the composition of either the plasma or muscle TGFA during progressive starvation suggesting selectivity in uptake or utilization or both, the selectivity of the processes reponsible for tissue FFA size and composition is unaltered by starvation, and tissue FFA are increased during starvation.

HORMONAL INFLUENCE ON FATTY ACID COMPOSITION OF STEROL ESTER AND PHOSPHOLIPID FRACTIONS OF EXPERIMENTAL MAMMARY CARCINOMAS. E. D. Rees, Amy E. Shuck, and Hazel Ackermann (Dept. of Med., and the Clin. Res. Ctr., Univ. of Kentucky Med. Ctr., Lexington, Ky. 40506). *Proc. Soc. Exptl. Biol. Med.* 128, 666–70 (1968). The fatty acid composition of the sterol ester and phospholipid fractions of mammary carcinomas and a derived, transplantable sarcoma were determined; the composition of the sarcoma differed from that of the carcinoma. Hormonal modification (ovariectomy plus 50 μg estradiol-17 with or without progesterone) of hosts bearing mammary carcinomas did not *per se* result in changes in the fatty acid composition of the phospholipid fraction of the carcinomas, except in those carcinomas which became laden with fat. The phospholipid and sterol ester fractions of fat-laden carcinomas had increased proportions of the shorter chain (C_{10-14}) fatty acids and decreased proportions of polyunsaturated fatty acids but differences were not as great as in the triglycerides.

STUDIES ON THE MECHANISM OF FATTY ACID SYNTHESIS. XX. PREPARATION AND GENERAL PROPERTIES OF β-HYDROXYBUTYRYL ACYL CARRIER PROTEIN DEHYDRASE. M. Mizugaki, G. Weeks, R. E. Toomey and S. J. Wakil (Dept. of Biochem., Duke Univ. Med. Ctr., Durham, N. C. 27706). *J. Biol. Chem.* 243, 3661–70 (1968). An enzyme, β-hydroxybutyryl acyl carrier protein (ACP) dehydrase, which catalyzes the reversible dehydration of short chain β-hydroxyacyl-ACP to the corresponding α,β-unsaturated acyl-ACP derivatives has been isolated from extracts of *Escherichia coli*. Dehydrase preparations of specific activity of 5000 mμmoles per min per mg of protein were homogeneous as assessed by ultracentrifugal analysis and by polyacrylamide disc gel electrophoresis. The enzyme has an estimated molecular weight of 26,000. It is relatively heat-stable and is active over a broad pH range with maximal activity between pH 7.5 and 8.5. The dehydrase has a functional SH group and can be readily inhibited by SH-binding reagents such as N-ethylmaleimide and iodoacetamide. The dehydrase reaction is readily re-

versible and the equilibrium constant for the dehydration of β-hydroxybutyryl-ACP is estimated to be 19 M.

DEGRADATION OF SPHINGOSINE, DIHYDROSPHINGOSINE, AND PHYTOSPHINGOSINE IN RATS. Y. Barenholz and S. Gatt (Dept. of Biochem., The Hebrew Univ.-Hadassah Med. School, Jerusalem, Israel). *Biochemistry* **7**, 2603–9 (1968). Tritium-labeled sphingosine, dihydrosphingosine, and phytosphingosine were administered by intravenous injection into rats. Two main changes were observed in the intact liver. The bases were converted in a biosynthetic route into ceramide (the N-acyl derivatives of the bases). In a degradative pathway they were cleaved to fatty acids which could be isolated from the liver triglycerides and lecithin. Using gas-liquid partition chromatography and determining the radioactivity of the effluents, the fatty acids formed by cleavage of the respective bases were identified. Hexadecanoic (palmitic) acid was the main product of the degradation of both sphingosine and dihydrosphingosine; pentadecanoic acid was the main product of phytosphingosine. The possible mechanisms leading to the formation of these fatty acids are discussed.

CHANGES IN PHOSPHOLIPASE A, LIPASE AND CHOLESTEROL ESTERASE ACTIVITY IN THE AORTA IN EXPERIMENTAL ATHEROSCLEROSIS IN THE RABBIT AND RAT. J. Patelski, D. E. Bowyer, A. N. Howard and G. A. Gresham (Dept. of Biochem. and Dept. of Path., Univ. Cambridge, Cambridge, England). *J. Atheroscler. Res.* **8**, 221–8 (1968). Esterase activity has been examined in the aorta of rats given hypercholesterolaemic, thrombogenic or atherogenic diets, and of rabbits given an atherogenic, semi-synthetic diet low in cholesterol. In normal rat aorta, the specific activity values are in the numerical order of phospholipase A > lipase > cholesterol esterase. In the rabbit the activities were in the same order but of much lower magnitude. In the rat, feeding an atherogenic diet containing 40% peanut oil, 5% cholesterol and 2% cholic acid produced an increased phospholipase A and lipase, and a decreased cholesterol esterase activity compared with normal animals. Replacement of peanut oil with butter produced no change in phospholipase A and cholesterol esterase and only a small increase in lipase. Thiouracil depressed the higher lipase, abolished the increased phospholipase A activity of the peanut oil group and decreased cholesterol esterase in both the butter and peanut oil groups.

THE INFLUENCE OF A LINOLEIC-ACID-DEFICIENT MATERNAL DIET ON GROWTH OF PROGENY. H. Menge and G. V. Richardson (U. S. Dept. of Agr., Beltsville, Maryland 20705). *Poultry Sci.* **47**, 542–7 (1968). A comparison was made between the growth rate of progeny of linoleic acid-deficient and non-deficient Leghorn dams. Three trials of 50 chicks each were made over a period of 16 weeks each. Both the deficient and nondeficient chicks were fed a corn-soy diet containing 4% linoleic acid (corn oil) from hatch to 16 weeks of age. The results of a least-squares analysis showed the effect of maternal diet on progeny weight to be highly significant. Fatty acid composition of plasma, heart and brain lipids of deficient chicks at hatching time indicated a linoleic acid deficiency, but fatty acid composition of tissues from both deficient and nondeficient chicks was essentially the same after 4 weeks of linoleic acid supplementation. The linoleic acid-depleted chicks were weak, had a poor sense of balance or equilibrium, and had difficulty in locating feed and water in comparison with normal chicks. This difference in weight throughout the 16-week period could be due to the smaller egg and chick size of the deficient chicks at hatch time when compared with the nondeficient chicks, or the linoleic acid deficiency of the dams may have caused an irreversible change in some biological mechanism of the chick embryo that was not compensated by linoleic acid supplementation.

THE REGULATION OF FATTY ACID BIOSYNTHESIS IN RAT HEPATOMAS. P. W. Majerus, R. Jacobs and M. B. Smith (Depts. of Internal Med. and Biol. Chem., Washington Univ. School of Med. St. Louis, Missouri 63110) and H. P. Morris. *J. Biol. Chem.* **243**, 3588–95 (1968). The dietary regulation of fatty acid synthesis *de novo* in two transplantable hepatomas, 7777 and 9618A, has been studied by comparison of the acetyl coenzyme A carboxylase and fatty acid synthetase activities of tumor and host liver, both in animals fasted 48 hours and in those subsequently refed a fat-free diet for 48 hours. Neither acetyl-CoA carboxylase nor fatty acid synthetase of these hepatomas was subject to the changes in enzyme concentration normally observed in host liver following dietary alteration. Thus, in livers of refed animals acetyl-CoA carboxylase activity was 12- to 29-fold greater than in the livers of fasted animals. Neither tumor studied showed any change in enzyme levels upon refeeding 48-hour fasted animals; 1.4 mμmoles of malonyl-CoA were formed per mg per min for hepatoma 7777 and 3.3 mμmoles of malonyl-CoA were formed per mg per in for hepatoma 9618A. These activities are 5- to 10-fold greater than fasting level in host liver.

IN VIVO LIPOGENESIS IN THE DOMESTIC CHICKEN. G. A. Leveille, E. K. O'Hea and Krishna Chakrabarty (Div. of Nutr. Biochem., Dept. of Animal Science, Univ. Ill., Urbana, Ill. 61801). *Proc. Soc. Exptl. Biol. Med.* **128**, 398–401 (1968). The ability of chicks to utilize glucose-U-^{14}C and acetate-1-^{14}C as substrates for lipid synthesis has been studied. Chicks readily incorporated glucose and acetate carbon into fatty acids and nonsaponifiable lipids of liver and adipose tissue. Glucose-U-^{14}C was also utilized for glyceride-glycerol formation. The relative importance of adipose tissue and liver as sites of fatty acid synthesis was estimated. Check adipose tissue was found to be of minor importance as compared to liver, accounting for no more than 30% of total fatty acid synthesis.

EXPERIMENTAL ATHEROSCLEROSIS IN RABBITS FED CHOLESTEROL-FREE DIETS: INFLUENCE OF CHOW COMPONENTS. D. Kritchevsky and S. A. Tepper (Wistar Inst. of Anatomy and Biol., and Div. of Animal Biol., School of Veterinary Med., Univ. of Pa., Phil., Pa.). *J. Atheroscler. Res.* **8**, 357–69 (1968). The addition of saturated fat to a semi-synthetic ration is atherogenic for rabbits, whereas addition of the same amount of fat to rabbit chow has no effect. To test the factor in the chow which may exert this "protective" action, rabbits were fed the following diets: (SS), semi-synthetic containing 14% hydrogenated coconut oil; (SS-PF), semi-synthetic containing 12% hydrogenated coconut oil (HCNO) and 2% of the fat extracted from rabbit chow; (XP-HCNO): the fat extracted chow residue plus 14% HCNP; and (PC-HCNO): chow milled with additional 12% HCNO. The data suggest that the complete chow is required to overcome the effects of HCNO on serum lipids, but the extracted chow residue will inhibit aortic atherosclerosis, at least over a 6 month feeding period. The pattern of liver and serum lipids suggest that in animals fed HCNO there is an initial increase in liver cholesterol, followed by increases in serum total and β-lipoprotein cholesterol, and then by aortic plaque formation. Cholesterol biosynthesis from acetate-1-^{14}C was inhibited in most of the groups fed HCNO, eliminating increased cholesterogenesis as a mechanism for the moderate hypercholesteremia which we observed.

LIPID ALTERATIONS IN BEAGLES PRODUCED BY ATHEROGENIC STRESS AND VITAMIN A. R. F. Krause, M. A. Pallotta and I. I. Yoder (Dept. of Biochem., W. Va. Univ. Med. Ctr., Morgantown, W. Va.). *J. Atheroscler. Res.* **8**, 277–89 (1968). The application of atherogenic stress (ATCH, thiouracil and high fat diet) to purebred beagles resulted in the following lipid alterations: 1) increased serum cholesteryl esters and total lipid and decreased serum triglycerides; 2) increased triglycerides and decreased phospholipids of all organs; 3) increased free cholesterol of arterial segments and 4) increased percentages of saturated fatty acids associated with esterified lipids. Vitamin A supplementation produced the following modification of lipid changes produced by atherogenic stress: 1) increased all serum lipid fractions above atherogenic levels with the exception of free cholesterol; 2) increased phospholipid content of all organs; 3) increased all arterial lipid levels except that of free cholesterol, which was lowered and 4) reduced percentages of saturated fatty acids in esterified lipid. From these observations it appears that vitamin A may have a usefulness in alleviating abnormal lipid deposition produced by atherogenic stress by retarding the deposition of free cholesterol in arterial segments.

EFFECT OF DIETARY FAT ON BILE ACID EXCRETION BY THE ISOLATED, PERFUSED RAT LIVER. L. M. Klevay and D. M. Hegsted (Dept. of Nutr., Harvard School of Public Health,

Boston, Mass.). *J. Atheroscler. Res.* 8, 329–41 (1968). Purified diets containing either safflower or coconut oil (20%, w/w) were fed to rats used either as liver or perfusate donors for liver perfusion experiments were designed to separate perfusate and liver effects. Bile was collected from the perfused livers and bile acids measured. In the first series of experiments, in which the perfusate was varied, more cholic acid was excreted by the safflower oil groups. The difference did not attain statistical significance. In the second series, in which the liver was varied, nearly identical amounts of cholic, chenodeoxycholic and deoxycholic acids were excreted by the two groups. Inclusion of Cholestyramine caused increased bile acid excretion, but did not unmask a differential oil effect. An acid with chromatographic mobility and color reaction of hyodeoxycholic acid, present at about 10% of total bile acids, was excreted in significantly greater amount in the coconut oil group. It was concluded that any existing differential effect of the fats on bile acid excretion was mediated through the perfusate. The differential excretion of the "hyodeoxycholic like" acid may represent a metabolic effect on the intestinal flora of the liver donors.

THE DEGRADATION OF TRITIATED DIHYDROSPHINGOSINE IN THE INTACT RAT. R. W. Keenan and K. Okabe (Dept. of Biochem. and the New England Med. Ctr. Hosp., Tufts Univ. School of Med. Boston, Mass. 02111). *Biochemistry* 7, 2696–2701 (1968). Tritiated dihydrosphingosine prepared by the catalytic reduction of sphingosine with tritium gas in the presence of platinum on charcoal, was administered by intravenous injection to mature rats. The animals were sacrificed after periods of time which varied from 15 to 90 min and the total lipids of the livers were isolated. Between 18 and 26% of the injected radioactivity were present in the liver lipids and were shown to be about equally divided between the long-chain base groups and the fatty acid groups. The largest part of the tritium of the fatty acid fraction was present in palmitic acid. Both the amount and the intramolecular distribution of the radioactivity in the palmitic acid led to the conclusion that this compound was formed directly from the injected dihydrosphingosine by reactions which resulted in the metabolic removal of carbon atoms 1 and 2 from the lipid base molecule. Evidence was obtained that sphingosine and phytosphingosine are probably not intermediates in the enzymatic degradation of dihydrospingosine.

POOR PREDICTABILITY OF LIPOPROTEIN CHOLESTEROL FROM WHOLE SERUM LIPIDS. R. J. Jones, L. Cohen and L. Dobrilovic (Div. of Biol. Sci., Univ. of Chicago, Chicago, Ill.). *J. Atheroscler. Res.* 8, 463–70 (1968). Lipid classes of whole serum and its four major lipoprotein fractions were measured in 67 sera from normal subjects and patients with coronary arterial disease and/or hyperlipidemia. Significant correlations were found between high density lipoprotein cholesterol and whole serum triglycerides (−0.42), low density lipoprotein cholesterol and whole serum cholesterol (+0.40), low density lipoprotein cholesterol and whole serum triglycerides (−0.36) and very low density lipoproteins or $S_f > 400$ lipoprotein lipids and all serum lipids. $S_f > 400$ cholesterol was best correlated with whole serum triglycerides (+0.98). Mutiple regression equations were examined in stepwise fashion to best relate lipoprotein cholesterols to the independent variables: whole serum cholesterol, phospholipids, triglycerides or their ratios. It can be concluded that, except for gross elevations of whole serum triglyceride with which elevations of lipoproteins of $S_f > 400$ correlate well, an adequate representation of lipoprotein lipid distribution connot be derived from whole serum lipid values.

EFFECT OF GLUCAGON ON PLASMA FREE FATTY ACIDS AND BLOOD SUGAR IN BIRDS. F. Grande (Lab. of Physiological Hygiene, Univ. Minnesota, Minneapolis, Minn. 55455). *Proc. Soc. Exptl. Biol. Med.* 128, 532–6 (1968). Intravenous injection of crytaline glucagon caused a prompt elevation of plasma FFA and blood sugar in geese, ducks, turkeys and roosters. The FFA response in geese, for doses between 1 and 100 μg/kg, showed a highly significant correlation with the logarithm of the dose ($r = 0.981$, $P < 0.01$). The relative changes in FFA concentration, for a given dose of glucagon, were greater than the relative blood sugar changes. These observations indicate that glucagon may play a role in the process of fat mobilization in birds.

RESPONSE OF HYPERLIPOPROTEINEMIA TO CHOLESTYRAMINE RESIN. H. J. Fallon and J. W. Woods (Dept. of Med., Univ. N. Carolina School of Med., Chapel Hill). *J. Am. Med. Assoc.* 204, 1161–4 (1968). Cholestyramine resin, an anion exchange resin, was given for 38 to 416 days to 21 patients with hyperlipoproteinemia. Fourteen patients with essential hypercholesterolemia (type II hyperlipoproteinemia) responded with a 24% decline in serum cholesterol level. Seven patients with other forms of hyperlipoproteinemia had no significant decrease in cholesterol during therapy with cholestyramine. Serum triglyceride levels remained unchanged in all patients at the dose of cholestyramine given. Gastrointestinal side effects were mild and no other toxic effects of long-term treatment were observed. These results suggest that patients with essential hypercholesterolemia may respond more effectively to cholestyramine therapy than patients with other forms of hyperlipoproteinemia.

CHARACTERISTICS OF LIPASE-RICH FRACTIONS OF MILK PROTEIN. P. J. Gaffney, Jr., W. J. Harper and I. A. Gould (Dept. of Dairy Techol., Ohio State Univ., and Ohio Agr. Res. and Dev. Ctr., Columbus, Ohio). *J. Dairy Sci.* 51, 1161–5 (1968). Lipase-rich fractions of skimmilk, frozen-thawed skimmilk and a water extract of rennet-casein were obtained by Sephadex gel filtration. Three similar fractions were obtained from all materials. Protein predominated in the fast-moving fraction and lipase activity concentrated in the two slow-moving components. Slow components showed 10–200 fold greater activity than the starting material, with the slowest moving component being the highest. Slower moving components from frozen-thawed skimmilk and from the water extract of rennet casein were 5–10 times higher in specific activity than comparable skimmilk fractions. Two slow-moving components from the three materials contained sulfur and carbohydrate in all fractions. Molecular weights were less than 10,000. Variations in 200/280 mμ absorption UV ratios suggested differences in molecular structure. The second extract from the rennet casein showed a complex composition containing amino sugars, neuraminic acid, glucose or galactose and an unknown ninhydrin positive component. Lipase activity was unaffected by pressure ultrafiltration but decreased by freeze drying. Polyacrylamide electrophoresis revealed the freeze-dried fractions had a relatively high degree of protein homogeneity, whereas, in the ultrafiltrated fractions the protein had aggregated with a high degree of polydispersity and heterogeneity.

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• Detergents

EFFECT OF ALKYL CHAIN BRANCHING ON THE BIODEGRADABILITY OF ALKYLBENZENESULFONATES. Yasuo Fujiwara, Tetsuya Takezono, Saburo Kyono, Sadao Sakayanagi, Kazuhide Yamasato and Hiroshi Iizuka. *Yukagaku* **17**, 396–9 (1968). Degree of alkyl chain branching of various commercially available detergent alkylates, including straight chain type, branched chain type and the mixture thereof, was studied by means of high resolution nuclear magnetic resonance, and an explicit correlation between alkyl chain branching of detergent alkylates and biodegradability of their sulfonates was obtained. The degree of alkyl chain branching in detergent alkylates is expressed by a parameter $(H_{CH_3}-6)/(\Sigma H-5)$ which is obtained by a combination of NMR and gas chromatography where H_{CH_3} and $\Sigma H-5$ denote the number of methyl hydrogens and the total number of hydrogens in the alkyl chain, respectively. A plot of this parameter for the alkyl chain branching of detergent alkylates against biodegradability of their sulfonates was found to be almost linear.

SOME PHYSICOCHEMICAL PROPERTIES OF SURFACTANTS DISCLOSED BY NMR. Toshio Nakagawa (Shionogi & Co., Osaka). *Yukagaku* **17**, 204–210 (1968). A review with 14 references.

INTERACTION OF DETERGENTS WITH PROTEINS. Koichiro Aoki (Gifu Univ., Kagamigahra City, Japan). *Yukagaku* **17**, 184–192 (1968). A review with 90 references.

FLUORESCENT SURFACE-ACTIVE AGENTS, THEIR PROPERTIES AND POSSIBLE APPLICATIONS. Tamotsu Kondo (Science Univ. of Tokyo). *Yukagaku* **17**, 172–175 (1968). A review with 12 references.

BEHAVIOR OF SURFACE ACTIVE AGENTS IN SOLUTION UNDER HIGH PRESSURE. Mitsuru Tanaka (Tokushima Univ., Japan). *Yukagaku* **17**, 148–163 (1968). A review with 44 references.

CORRELATION BETWEEN THE DISSOLUTION STATE OF NONIONIC SURFACTANT AND EMULSIFYING ACTION. Hiroshi Saito and Kozo Shinoda (Yokohama Natl. Univ.). *Yukagaku* **17**, 133–139 (1968). A review with 14 references.

MOLECULAR STRUCTURE AND SURFACE ACTIVITY OF SURFACE ACTIVE SUBSTANCE. Tsunetaka Sasaki (Tokyo Metropolitan Univ.). *Yukagaku* **17**, 116–124 (1968). A review with 73 references.

INTERACTION OF SURFACE-ACTIVE AGENTS WITH MACROMOLECULES. Shuji Saito. (Momotani Juntenkan Co., Osaka). *Yukagaku* **17**, 176–183 (1968). A review with 54 references.

HYDROLYSIS OF SURFACE ACTIVE AGENTS. Kenjiro Meguro and Takeshi Hikota (Science Univ. of Tokyo). *Yukagaku* **17**, 164–171 (1968). A review with 14 references.

PROPERTIES OF OIL-SOLUBLE SURFACTANTS IN NONAQUEOUS MEDIA. Ayao Kitahara (Science Univ. of Tokyo), *Yukagaku* **17**, 140–147 (1968).

STRUCTURE AND PROPERTIES OF HIGHLY CONCENTRATED SOLUTIONS OF NONIONIC SURFACE ACTIVE AGENTS. Shigetaka Kuroiwa (Shinshu Univ., Ueda-shi, Japan). *Yukagaku* **17**, 125–132 (1968). A review with 21 references.

SEROLOGICAL STUDIES ON LAURYL SARCOSINATE-PROTEIN COMPLEXES. Reiko Gojima and Ichiro Hara. *Yukagaku* **17**, 399–404 (1968). According to the ordinary precipitin reaction, only 1 or 2 positive reactions were found both in egg albumin (EA)-anti lauryl sarcosinate and bovine serum albumin (BSA)-anti BSA systems against 3 or 4 positive reactions in EA-anti EA and BSA-anti BSA systems. Other serological reactions are given in detail.

RAPID METHOD FOR THE DETERMINATION OF THE STABILITY OF SOAPS. A. Popov and N. Yanishieva (Bulgarian Acad. of Sci., Sofia, Bulgaria). *Rev. Franc. Corps Gras* **15**, 215–218 (1968). The method is based on following the accumulation of peroxides in soap at room temperature and under UV radiation. The stability of soap is expressed as the amount of time required to reach a peroxide value of 1.5. The influence of additives such as iron and diphenylamine were investigated. The stability of several commercial samples was determined.