ABSTRACTS

R.A. REINERS, Editor. Abstractors: N.E. Bednarcyk, J.E. Covey, J.C. Harris, S.F. Herb, F.A. Kummerow, Biserka Matijasevic and E.G. Perkins

• Fats and Oils

SOLVENT EXTRACTION OF LINSEED OIL AND ANALYSIS OF ITS PHOSPHOLIPIDS. A.S. El-Nockrashy and Y. El-Shattory (Fats and Oils Res. Lab., National Res. Center, Dokki Cairo, U.A.R.). *Seifen-Öle-Fette-Wachse* 99(12), 325–7 (1973). Six Egyptian-types of linseed oil were extracted with six different dissolving agents and then tested for constants. Three different methods were used to identify the phospholipids in the different extracts.

METHOD FOR EXTRACTION OF TRACE AMOUNTS OF ZINC IN VEGETABLE OILS FOR COLORIMETRIC ESTIMATION WITH DITHOZONE. D.N. Sharma (Div. Agr. Chem., IARI, New Delhi-12). *Oils Oilseeds J.* 25(8), 5–6 (1973). Conventional methods for estimation of zinc based on dry ashing and wet oxidation are time consuming and inconvenient. A simple and accurate method for zinc extraction from oil with dilute HCl (1:1) and determined colorimetrically using dithozone. Applied to 24 commercial samples of groundnut oil, 63% were found to contain 0.5 ppm or less of zinc.

OIL REFINING. A STUDY ON THE NEUTRALIZATION LOSS DETERMINATIONS AND ITS CORRESPONDENCE WITH INDUSTRIAL PLANT LOSSES. J.M.P. Soler and F.R. Ayerbe (Inst. de la Grasa y sus Derivados, Dept. de Plantas Piloto, Sevilla, Spain). *Grasas y Aceites* 23, 419–27 (1972). A series of assays with olive oil, olive oil foots and oleaginous seed oils are made in order to establish the conditions for laboratory determination of neutralization losses. Variations are proposed that eliminate the rigidity of different factors in the AOCS methods for seed oils. Modification of the method for olive oil and olive oil foots made the test more rapid and exact. The laboratory results agree with industrial practice.

DETERMINATION OF TOTAL OIL IN CORN GERM BY INDIRECT COMPLEXOMETRY WITH Mg^{2+}. R. Garcia-Villanova and M.C.L. Martinez (Dept. de Bromatologia, Toxicologia y Analisis Quimico Aplicado, Facultad de Farmacia, Granada, Spain). *Grasas y Aceites* 24, 10–12 (1973). A new method is proposed for the determination of oil in corn germ by saponification with KOH solution, precipitating with an excess of standard solution of Mg^{2+} and titrating the filtrate with EDTA solution of identical molarity, using Eriochrome Black T as indicator. The results obtained are reproducible and the method is more selective than those based on extraction with organic solvents. The method permits determination of fat directly on wet samples and in less time than extraction procedures.

PESTICIDE RESIDUES IN EDIBLE FATS. II. ELIMINATION OF CHLORIDE INSECTICIDES DURING REFINING PROCESS. A. Vioque, T. Albi and M. Nosti (Inst. de la Grasa y sus Derivados, Dept. de Analisis y de Quimica y Microbiologia, Sevilla, Spain). *Grasas y Aceites* 24, 20–26 (1973). Deodorization is necessary to eliminate chloride insecticides during the refining process. Temperatures must be as high as 240C for their removal. Even at this temperature, pesticides such as p,p′-DDT and p,p′-DDD are not completely eliminated.

DETERMINATION OF CHOLESTEROL USING O-PHTHALALDEHYDE. L.L. Rudel and M.D. Morris (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto, Canada). *J. Lipid Res.* 14, 364–6 (1973). A simple, rapid method for the determination of cholesterol in plasma and tissue using o-phthalaldehyde is presented. Comparison of this method with the $FeCl_3$ method gave identical results. However, the o-phthalaldehyde determination is three times more sensitive than the $FeCl_3$ determination (molar extinction coefficients of 11,610 and 33,440 for $FeCl_3$ and o-phthalaldehyde, respectively), it takes less time to complete and the color developed is more stable. The o-phthalaldehyde method can be used to assay free and esterified cholesterol directly after thin-layer chromatographic separation.

ISOLATION OF CERAMIDE-MONOMETHYLAMINOETHYLPHOSPHONATE FROM THE LIPIDS OF TETRAHYMENA PYRIFORMIS W. C.V. Viswanathan and H. Rosenberg (Dept. of Biochem., John Curtin Schl. of Med. Res., Australian Natl. Univ., P.O. Box 334, Canberra City, ACT 2601, Australia). *J. Lipid Res.* 14, 327–30 (1973). Ceramide-monomethylaminoethylphosphonate has been isolated for the first time from the lipids of *Tetrahymena pyriformis W* and characterized on the basis of its chromatographic mobility, chemical analysis and infrared and nuclear magnetic resonance properties.

HYDROCARBONS AND POLYCHLORINATED BIPHENYLS FROM THE UNSAPONIFIABLE FRACTION OF ANHYDROUS MILK FAT. V.P. Flanagan and A. Ferretti (Dairy Prod. Lab., ARS, USDA, Washington, D.C. 20250). *J. Lipid Res.* 14, 306–11 (1973). Using a combination of gas-liquid chromatography and mass spectrometry, the presence of 39 aliphatic hydrocarbons was firmly established in the unsaponifiable fraction of anhydrous milk fat. The hydrocarbons were the C_{14} to C_{27} and the C_{29} to C_{31} straight-chain paraffins, their monoolefin analogs, and the C_{25} to C_{29} branched alkanes. Phytene (3,7,11,15-tetramethyl-*n*-hexadec-2-ene), identified for the first time in milk fat, was isolated and identified by high-resolution mass spectrometry and infrared analysis. The total hydrocarbon content amounted to 30 ppm of the milk fat. Polychlorinated biphenyls also were detected in trace amounts in the area of the chromatogram between the C_{18} and C_{23} hydrocarbons.

TRYPTAMIDES OF HYDROXY-CARBOXYLIC ACIDS IN OIL-CONTAINING SEEDS. J. Wurziger und U. Harms (Chem. und Lebensmitteluntersuchungsanstalt im Hygienischen Inst. der Freien und Hansestadt Hamburg, 2 Hamburg 36, Gorch-Fock-Wall 15–17). *Fette Seifen Anstrichmittel* 75, 121–6 (1973). Different amounts tryptamides of 5-hydroxy-carboxylic acids have been

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found in various oil-containing plant seeds, especially on their outer surface or in external layers of the tissue. In each variety, the substance present in highest concentration has been thoroughly investigated. It was found that the single fractions on thin-layer chromatograms were composed of several tryptamides of 5-hydroxy-carboxylic acids. Fatty acids ranging from C_{16} to C_{24} were detected. The antioxidative action of these tryptamides are discussed with examples.

EXPERIENCES ON THE HYDROGENATION OF FATS WITH A COPPER CATALYST. T.L. Ong (Zentralinst. fur Ernahrungsforschung TNO, Zeist, Niederlande, Utrechtsweg 48). *Fette Seifen Anstrichmittel* **75**, 127–30 (1973). Soybean oil, rapeseed oil and lard were hydrogenated using a copper catalyst. The products of hydrogenation were refined after the removal of copper following a new technique. The aforesaid oils were also hydrogenated with a nickel catalyst to the same iodine value and then refined. The products of hydrogenation using copper showed a better stability towards oxidation than those obtained with nickel.

THE EFFECT OF NON-ENZYMATIC BROWNING IN THE PRESENCE OF GLUCOSE AND GLYCINE ON THE DEVELOPMENT OF RANCIDITY IN CORN OIL. M. Maleki (College of Agr., Dept. of Food Sci., Pahlavi Univ., Shiraz/Iran). *Fette Seifen Anstrichmittel* **75**, 103–4 (1973). A model system was used to study the effect of non-enzymatic browning in the presence of glucose and glycine on the rancidity of corn oil. It was found that both glucose and glycine alone has some antioxidative effect on the development of rancidity but that the glycine-glucose mixture was considerably more effective than either alone.

PHYSIOLOGICAL ACTIONS OF HEATED FATS, ESPECIALLY FRYING FATS. K. Lang (Direktor des Physiologisch-Chem. Insts. der Johannes Gutenberg-Univ. in Mainz, 7812 Bad Krozingen, Schwarzwaldstrabe 71). *Fette Seifen Anstrichmittel* **75**, 73–6 (1973). Regular ingestion of overheated fats is shown to impair the health of experimental animals; the extent of harm done is dependent on the degree of overheating which the fat is subjected to. In comparison, neither the investigations of other workers nor the studies of the author have revealed any undesirable effects in animal experiments, as long as the fats employed correspond to the ones obtained by "good manufacturing practice." The content of polycyclic carcinogenic hydrocarbons is reduced by the frying process. These fats effect an induction of microsomal enzymes, thus providing a certain amount of protection against early disorders of the experimental animals.

INFLUENCE OF THE STRUCTURE AND MORPHOLOGY OF BLEACHING EARTHS ON THEIR BLEACHING ACTION ON OILS AND FATS. R. Fahn (Sud-Chemie AG, 8 Munchen 2, Postfach 202 240). *Fette Seifen Anstrichmittel* **75**, 77–82 (1973). In the manufacture of highly active bleaching earths from bentonite, the acid activation causes alterations in the chemical composition and structural as well as morphological properties of bentonite, depending on the concentration of acid, temperature, time etc. This has been demonstrated by changes in specific surface, volume of the micropores, particle size distribution and proportion of soluble silicic acid, and the impact of these alterations on the bleaching of vegetable oils is discussed. The results are supported by electron, optical and X-ray investigations. Studies on repeated removal of silicic acid formed by acid treatment of bentonite as well as repeated acid activation indicate that the bleaching action of these earths depends not only on specific surface, but also, to a considerable extent, on the volume of micropores.

PRODUCTION OF HYDROGEN FOR THE HYDROGENATION OF FATS AND FATTY ACIDS. K.S. Raghuraman und F. Tiemann (Selas of America (Nederland) N.V., 134 Gevers Deynootweg, P.O. Box 5101, Den Haag, Niederlande). *Fette Seifen Anstrichmittel* **75**, 82–4 (1973). A process is described for the production of highly pure hydrogen from hydrocarbons, such as natural gas, liquefied gas and light petroleum. The process consists of following three steps: 1. Desulfurization of the starting material; 2. Conversion of hydrocarbons into permanent gases by splitting with steam at high temperatures; 3. Separation of other gases from hydrogen by adsorption. This process has been tested commercially. With increasing cost of transport, and owing to regulations for the transport of hydrogen, which are difficult to fulfill, the aforesaid process offers an attractive alternative to the consumer of hydrogen. Cost of investment, energy consumption and economy of the process are dealt with.

ADSORPTION OF FATTY ACIDS ON ION EXCHANGERS. J. Zajic (Chem.-Tech. Hochschule, Prag 6, CSSR, Technicka ul. cp. 1905). *Fette Seifen Anstrichmittel* **75**, 85–8 (1973). The adsorption of saturated fatty acids C_{10} to C_{18} on strong- and weak-basic anion exchangers was examined in the presence of n-hexane, acetone and 96% ethanol. The extent of adsorption on dried anion exchangers is small, and in non-polar solvents, the effective capacity amounts to 5% of the theoretical capacity. With wetted resins, not the polarity of the solvents but the dissociation of the functional groups of the exchanger is the factor determining adsorption. Since the adsorbing ability of the exchanger is limited by the length of the fatty acid molecules, the effective capacity of strongly basic exchangers amounts only to one-third or a half of the theoretical capacity.

DIOL LIPIDS NEW TYPES OF NATURALLY OCCURRING LIPID SUBSTANCES. L.D. Bergelson (Inst. Chem. of Natural Prod., Academy of Sci. USSR, Moscow, USSR). *Fette Seifen Anstrichmittel* **75**, 89–96 (1973). Lipids of plants, animals and microorganisms frequently contain minor amounts of lipophylic derivatives of ethyleneglycol and related lower dihydric alcohols, which mostly have been overlooked in the part. Methods for the quantitative determination of diols in lipid hydrolyzates have been developed. In some particular cases, e.g. lipids of marine invertebrates, regenerating rat liver and young corn seeds comparatively high diol/glycerol ratios were found. Various methods for the structural investigation of diol lipids, including mass-spectrometry and combined GLC-mass-spectrometry are described. The chemical structure of a number of diol lipids including simple neutral lipids, diol galactolipids and diol cholinephosphatides has been clarified, the existence of other types is probable. The biosynthetic pathways of the diol lipids seem to be similar to those of the glycerolipids.

STRUCTURE DETERMINATION OF THE PHOSPHATIDYLGLYCEROSULFATE (DIETHER ANALOG) FROM HALOBACTERIUM CUTIRUBRUM. A.J. Hancock and M. Kates (Dept. of Biochem., Univ. of Ottawa, Ottawa, Canada, K1N 6N5). *J. Lipid Res.* **14**, 422–9 (1973). A novel phosphosulfolipid has been isolated as the potassium salt from the extremely halophilic bacterium *H. cutirubrum;* its molecular formula was established as $C_{46}H_{93}PSK_2$. It accounts for 3–4% by weight of the polar lipids and about 6% of the total lipid phosphorus. The phosphosulfolipid yielded inorganic sulfate and 1-*sn*-phosphatidyl-3′-*sn*-glycerol (diphytanyl ether analog) in equimolecular proportions after solvolysis in 0.005 N HCl in tetrahydrofuran, and it was thus a sulfate ester of phosphatidylglycerol. The position of the sulfate group was determined by comparison of the infrared and NMR spectra of the salt and the methyl ester of natural phosphosulfolipid with those of synthetic 1- and 2-sulfate esters of phosphatidylglycerol. The results obtained established the structure of the bacterial phosphosulfolipid as 2,3-di-*O*-(3′*R*,7′*R*,11′*R*,15′-tetramethylhexadecyl)-sn-glycerol-1-phosphoryl-3″-sn-glycerol-1″-sulfate.

SYNTHESIS OF SULFATE ESTERS OF PHOSPHATIDYLGLYCEROL (DIPHYTANYL ETHER ANALOG). *Ibid.*, 430–7. Synthesis of 1-sn-phosphatidyl-3′-sn-glycero-1′-sulfate (phosphatidylglycero-1-sulfate) was achieved by monosulfation of 1-*sn*-phosphatidyl-3′-*sn*-glycerol (diphytanyl ether analog) with an equimolar amount of SO_3-pyridine complex at room temperature; with excess sulfation reagent at 60C, the 1′,2′-disulfate ester was obtained. The phosphatidylglycero-2-sulfate isomer was synthesized by an unambiguous route starting from the bacterial 2,3-di-*O*-phytanyl-*sn*-glycerol. The synthetic phosphatidylglycerosulfates were characterized by analytical, chromatographic, optical rotatory and spectral (infrared and NMR) data and compared with the phosphatidylglycerosulfate isolated from *H. cutirubrum.*

STRUCTURE DETERMINATION OF THE GLYCOLIPID SULFATE FROM THE EXTREME HALOPHILE, HALOBACTERIUM CUTIRUBRUM. M. Kates and P. W. Deroo. *Ibid.*, 438–45. A sulfur-containing glycolipid, accounting for ca. 25% of the total polar lipids, has been isolated from the extreme halophile *H. cutirubrum.*

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The ammonium salt of the lipid was found to have the molecular formula $C_{61}H_{117}O_{21}S \cdot NH_4$, and on strong acid hydrolysis it yielded 2,3-di-*O*-phytanyl-*sn*-glycerol, glucose, mannose, galactose and sulfate in equimolar proportions. Infrared and NMR spectra indicated the presence of a secondary sulfate group. Solvolysis of the lipid in 0.004 M HCl in tetrahydrofuran resulted in rapid release of inorganic sulfate and formation of galactosyl-mannosyl-glucosyl diphytanyl glycerol ether. With higher acid concentration (0.25 M methanolic HCl), stepwise hydrolysis of monosaccharide units occurred, giving mannosyl-glucosyl glycerol diphytanyl ether and monoglucosyl glycerol diphytanyl ether. The position of attachment of the sugars and of the sulfate group was determined by methylation of the free acid form of the glycolipid sulfate, followed by acid hydrolysis and gas-liquid chromatographic analysis of the partially methylated sugars as the alditol acetates. The configuration of the glycosidic linkages was established both by optical rotation measurements and by specific enzymatic hydrolysis. The results obtained established the structure as 2,3-di-*O*-phytanyl-1-*O*-[β-D-galactopyranosyl-3′-sulfate-(1′ → 6′)-*O*-α-D-mannopyranosyl-(1′ → 2′)-*O*-α-D-glucopyranosyl]-*sn* glycerol.

2,3-ERYTHRO-DIHYDROXYHEXACOSANOIC ACID AND HOMOLOGS: ISOLATION FROM YEAST CEREBRIN PHOSPHATE AND DETERMINATION OF THEIR STRUCTURES. Motonori Hoshi, Yasuo Kishimoto and C. Hignite (E. K. Shriver Center for Mental Retardation, Waltham, Mass. 02154). *J. Lipid Res.* 14, 406-14 (1973). Homologs of methyl esters of very polar fatty acids were obtained by methanolysis of cerebrin phosphate isolated from baker's yeast. The major ester component was isolated by preparative gas-liquid chromatography and was found to be 2,3-dihydroxyhexacosanoic acid as deduced from the mass spectra of its trimethylsilyl ether and isopropylidene derivative, reaction with periodate, and comparison of its chromatographic behavior with that of synthetic *erythro-* and *threo*-dihydroxy acids. Its infrared spectrum supported the above conclusions. From their retention times by gas-liquid chromatography, the homologs were found to be saturated, unbranched 2,3-dihydroxy fatty acids with 24–27 carbon atoms. The synthesis of the new fatty acids, *erythro-* and *threo*-2,3-dihydroxyhexacosanoic acids, is also reported. A method for separating *trans*-2-hexacosenoic acid, a key intermediate of the above synthesis, and its isomer, *trans*-3-hexacosenoic acid, both formed by dehydrobromination of 2-bromohexacosanoic acid, is also described.

CATALYST FOR HYDROGENATION OF OILS. J.J.M.G. Eurlings, J.W. Geus and C.A.M. Weterings (Stamicarbon N.V.). *U.S. 3,743,662.* The catalyst, for hydrogenating oil at elevated temperature, contains elementary copper and nickel on a thermostable carrier. The catalyst is obtained in three separate steps. In the first step, a homogeneous layer of hydrated nickel oxide is precipitated onto the carrier; in the second, an insoluble copper compound is homogeneously precipitated onto the layer of hydrated nickel oxide and, in the third step, the loaded carrier is subjected to a reductive treatment at a temperature above 150C.

MARGARINE. J.P. McNaught (Lever Bros.). *U.S. 3,746,551.* The highly nutritive margarine contains a high proportion of polyunsaturated fatty acids. It is physically stable with respect to texture at deep freeze storage temperatures (e.g., −10C) when at least 25% of the oil therein having a high polyunsaturated content has been randomly interesterified.

PROCESS FOR REFINING GLYCERIDE FATS AND OILS. E.J. Keating (U.S. Sec'y. of Agriculture). *U.S. 3,746,731.* The process relates to the purification of crude glyceride oils or fats usually with alkaline reagents for the purpose of clarifying and conditioning the fats or oils for edible products and other end uses.

OXIDATION- AND LOW TEMPERATURE-RESISTANT GLYCERIDES OF NATURAL FATTY ACIDS. H. Bünger and G. Renckhoff (Dynamit Nobel Aktiengesellschaft). *U.S. 3,748,265.* Glyceride mixtures resistant to oxidation and low temperatures comprise 10–99% of diacetyl monododecanoyl triglyceride, up to 25% of diacetyl monohexadecanoyl triglyceride, and/or up to 90% of diacetyl monotetradecanoyl triglyceride. Optionally, up to 10% of an acetyl dialkanoyl triglyceride wherein the alkanoyl groups contain 12–16 carbon atoms may be included.

DIRECTED-INTERESTERIFIED GLYCERIDIC OILS HAVING A HIGH LINOLEIC ACID CONTENT AND PROCESS FOR THEIR PRODUCTION. B. Sreenivasan (Lever Bros.). *U.S. 3,748,348.* Glyceridic oils having a high linoleic acid content, and having insufficient solid triglycerides to form a plastic margarine, are subjected to a directed interesterification process at temperatures of 0 to −15C using an alkali metal alkoxide catalyst along with an aprotic substance, namely dimethyl sulfoxide, dimethyl formamide, dimethyl acetamide, dimethyl cyanamide, or 3,3-dimethylaminopropionitrile. The combination catalyst allows the interesterification to proceed at a higher rate than when an alkoxide alone is used, forming sufficient solid triglycerides, in seven days or less, that a plastic margarine having a linoleic acid to saturated acid ratio of 8:1 can be made therefrom without the presence of any hydrogenated stock, or having a linoleic acid to saturated acid ratio of 6:1 with a small proportion of hardstock.

• Fatty Acid Derivatives

ADDITION OF FATTY ACIDS TO GLYCIDOL. I. STUDY OF THE REACTION WITHOUT SOLVENTS. R.M. Utrilla and A.O. Villen (Inst. de Productos, Lacteous y Derivados Grasos, Madrid, Spain). *Grasas y Aceites* 24, 13–19 (1973). To better understand the opening reaction of the glycidol epoxide group (2,3-epoxy-1-propanol) by fatty acids, without solvents, the influence of the variation of temperature, molar ratio of reactants, catalysts and nature of fatty acid on the velocity of reaction, was studied. Among the catalysts tested, benzyltrimethylammonium chloride had the highest activity. The analysis of kinetic data suggests that the reaction velocity is independent of the acid concentration and proportional to the catalyst and glycidol concentrations.

PROCESS FOR SOFTENING FABRICS IN A DRYER. P.P. Zamora (Procter & Gamble). *U.S. 3,743,534.* The process comprises loading fabrics into a dryer, adding a length or sheet of fabric softening composition, and operating the dryer at 75F–170F. The fabric softening composition consists of a substrate with a coating consisting of a solid, waxy, cationic, or nonionic material. The solid outer coating amounts to 30–100% of the weight of the softener, and at least one of the coatings has a melting point no greater than 170F.

WHIPPABLE TOPPING COMPOSITIONS. R.J. Zielinski and C. Gilmore (SCM Corp.). *U.S. 3,746,552.* Edible whippable topping compositions of the non-dairy type comprise fat, protein, water and emulsifier. They have excellent resistance to emulsion breakdown or phase separation on thawing after a freeze cycle. Such resistance is obtained by including as a part of the emulsifier a polyoxyalkylene derivative of a polyglycerol fatty acid ester.

N-SUBSTITUTED FATTY ACID AMIDE LUBRICANTS. F.C. Magne, R.R. Mod, G. Sumrell and W.E. Parker (U.S. Sec'y. of Agriculture). *U.S. 3,746,644.* N-acylmorpholines and N-mono- and N,N-disubstituted fatty acid amides and similar derivatives of epithioamides are useful as extreme pressure lubricants and additives.

PURIFICATION OF SUCROSE ESTERS OF FATTY ACIDS. M. Mizutani, I. Sasaki, T. Ito, H. Ueno, S. Nishizaki, and T. Ishizuka (Dai-Ichi Kogyo Seiyaku Co.). *U.S. 3,748,324.* The process comprises the steps of dissolving the crude reaction mixture in a system containing an organic solvent and water and removing the impurities by carrying out one or more of the following treatments: (a) adding an acid or acid salt to bring the pH to 3.5–5.0 and recovering the sucrose ester by liquid-liquid extraction; (b) adding a salt of a metal whose valence is at least two to form double decomposition salts and then removing the salts to recover the ester; (c) adding a water soluble substance to recover the ester by precipitation.

• Biochemistry and Nutrition

DEGOSSYPOLISATION OF COTTONSEED MEAL. III. CHEMICAL AND NUTRITIONAL EVALUATION OF AMMONIA AND FERROUS SULPHATE

TREATED COTTONSEED MEAL. A.S. El-Nochrashy, A.H. Khalil and A.M. Gad (Fats and Oils Lab., National Res. Centre, Dokki, Cairo, U.A.R.). *Grasas y Aceites* 23, 427–31 (1972). Hexane defatted cottonseed meal was treated with ammonia gas and ferrous sulphate solution to remove gossypol. The effect of the treatments on the chemical and nutritional characteristics of the meal was investigated. Chicks were used as experimental animals. The treatments resulted in considerable improvement in the feeding efficiency of the meal.

VITAMIN A AND BONE METABOLISM IN THE RAT. M. Zile, H. Ahrens and H.F. deLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, Wis. 53706). *J. Nutr.* 103, 308–13 (1973). The mobilization of calcium from bone in the rat was found to be unaffected by vitamin A deficiency. Furthermore, the mechanisms that regulate high serum calcium levels function normally in vitamin A deficiency suggesting no impairment of calcitonin secretion. However, vitamin A deficiency lowers alkaline phosphatase activity of plasma and bone and increases hydroxyproline concentration of the plasma which implies some role of vitamin A in the metabolism of bone.

PURIFICATION AND PROPERTIES OF THE FATTY ACID SYNTHETASE FROM MYCOBACTERIUM PHLEI. D.E. Vance, Osamu Mitsuhashi and K. Bloch (Conant Chem. Labs., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* 248, 2303–9 (1973). The fatty acid synthetase from *Mycobacterium phlei* has been purified 340-fold to homogeneity. The enzyme has a molecular weight of 1.39×10^6. At low concentrations of phosphate buffer (0.005 M), the synthetase dissociates into an enzymatically inactive species (7.65 S) which can be partially reaggregated and reactivated by dialysis against 0.5 M potassium phosphate buffer. The mycobacterial polysaccharides, 3-O-methylmannose-containing polysaccharide (MMP) and 6-O-methylglucose-containing polysaccharide (MGLP), stimulate the fatty acid synthetase markedly. Their presence lowers the K_m values for acetyl-CoA and malonyl-CoA 9-fold and 4-fold, respectively. The polysaccharides also appear to function by altering the rate-limiting step of fatty acid synthesis. MMP stimulates fatty acid synthesis more effectively than MGLP. Various chemical modifications of the polysaccharides do not markedly alter their stimulating activity. Acetyl-CoA is the most effective primer and its concentration affects the degree to which MMP and MGLP stimulate fatty acid synthesis. It is proposed that the polysaccharides function primarily by binding long chain acyl-CoA and thereby relieve product inhibition of the fatty acid synthetase.

EFFECT OF DIET ON FATTY LIVER-HEMORRHAGIC SYNDROME INCIDENCE IN LAYING CHICKENS. J.H. Wolford and D. Murphy (Poultry Sci. Dept., Mich. State Univ., East Lansing, Mich. 48823). *Poultry Sci.* 51, 2087–94 (1972). Liver hemorrhages characteristic of those seen in Fatty Liver-Hemorrhagic Syndrome were not observed in livers having less than 4.0 g lipid per liver or weighing less than 30 g wet weight. However, liver size and lipid level per se were not the definitive causes of the hemorrhaging because birds without hemorrhages had liver weights and lipid values equal to or greater than those with hemorrhages. Incorporation of lipotropic vitamins (B_{12}, E, choline, inositol) into the diet of laying chickens did not significantly ($P > 0.01$) reduce their liver lipid content. Increasing the dietary level of protein, vitamin B_{12}, vitamin E, choline, inositol, selenium and/or cobalt did not prevent the occurrence of liver hemorrhages. Liver lipid was significantly ($P > 0.01$) reduced by feeding a low energy diet; and no liver hemorrhages were observed.

THE ACCEPTABILITY OF ACIDULATED COTTONSEED SOAPSTOCK AS AN ENERGY SUPPLEMENT FOR BROILER DIETS. P.W. Walkroup and V.E. Tollett (Dept. of Animal Sci., Univ. of Arkansas, Fayetteville, Ark. 72701). *Poultry Sci.* 51, 1907–14 (1972). Studies were conducted with broiler chicks to determine the acceptability of acidulated cottonseed soapstock as a dietary energy source and to determine criteria which would be indicative of an acceptable sample. A poor quality sample, characterized by a high level of ether insoluble impurities (23.8%) and total gossypol (0.42%), caused a linear depression in weight gains, associated primarily with reduction in feed intake. Blending the poor-quality soapstock with high-quality animal or vegetable fats was of no benefit in alleviating this depression. Several samples of soapstock which were characterized by low ether insoluble impurities and gossypol were acceptable as energy sources for the growing chick.

STIMULATION OF STEROID SECRETION BY ANTIMICROTUBULAR AGENTS. R. Temple and J. Wolff (Natl. Inst. of Arthritis, Metabolism, and Digestive Diseases, Natl. Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 248, 2691–8 (1973). The antimicrotubular agents (colchicine, vinblastine, and podophyllotoxin) have been found to stimulate steroid production by Y-1 adrenal tumor cells in culture. The amount of steroid secreted under the influence of these agents is comparable to the amount produced during maximal adrenocorticotropin (ACTH) stimulation. The steroid end products, 20α-dihydroprogesterone and 11β-hydroxy-20α-dihydroprogesterone, are identical after both kinds of stimulation. ACTH stimulation and vinblastine stimulation are not additive. As with ACTH, stimulation by vinblastine occurs between the cholesterol and Δ4-pregnenolone steps, and it is inhibited by aminoglutethimide and cycloheximide. It does not, however, involve activation of the adenylate cyclase system. The time course of stimulation differs from ACTH; the antimicrotubular agents stimulate after a 6- to 9-hour lag period which is absent with ACTH. D_2O, an agent which stabilizes microtubules, inhibits stimulation of steroid by vinblastine, ACTH, or cyclic adenosine 3',5'-monophosphate (cAMP). Steroid secretion by Leydig tumor cells in culture is also stimulated by vinblastine, but to a lesser extent than by cAMP. This stimulation exhibits a lag period and is inhibited by D_2O. We propose that the antimicrotubular agents facilitate access of cholesterol to the mitochondrion and that this may also be the mechanism of hormonally-stimulated steroid secretion.

EPIDEMIOLOGY OF CORONARY HEART DISEASE AND STROKE IN JAPANESE MEN LIVING IN JAPAN, HAWAII, AND CALIFORNIA: METHODOLOGY FOR COMPARISON OF DIET. J.L. Tillotson, H. Kato, M. Nichaman, D.C. Miller, M.L. Gay, K.G. Johnson and G.G. Rhoads (Clinical Applications Program, Nat'l. Heart and Lung Inst., Bethesda, Md. 20014). *Am. J. Clin. Nutr.* 26, 177–84 (1973). Details of the dietary studies carried out in conjunction with a study of men of Japanese ancestry now living in Japan, Hawaii, and California have been presented together with preliminary results. Dietary information gathered by four different methods over a period of 5 years reveals striking differences in dietary patterns as the Japanese men have migrated to areas where American culture prevails. Using the data from these collaborative studies of men with a common ancestral background, the relationship of nutrient intake to serum lipid levels will be analyzed in subsequent reports.

THE EFFECT OF VITAMIN E ON EGG PRODUCTION, HATCHABILITY AND HUMORAL IMMUNE RESPONSE OF CHICKENS. R.P. Tengerdy and C.F. Nockels (Dept. of Microbiol., Col. State Univ., Fort Collins, Col. 80521). *Poultry Sci.* 52, 778–83 (1973). Vitamin E supplementation (132 mg/kg) to a control chicken diet

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• President's Club. . .

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significantly ($P < 0.01$) increased the humoral immune response of 2 and 4 week-old chicks. The same supplementation had no effect on the hatchability of chicken embryos. Hatching at higher altitude was not significantly influenced by vitamin E supplementation. The altitude of hatching had no effect on the immune response of chicks. The immune response of hens and chicks maintained on a fish-oil base, vitamin E depleting diet was not impaired by the egg production but hatchability was drastically reduced.

THE METABOLIZABLE ENERGY OF LINEAR PARAFFINS FOR THE CHICK. R.L. Squibb and J.W. Frankenfeld (Bureau of Biol. Res., Rutgers, State Univ., New Brunswick, N.J. 08903). *Poultry Sci.* 51, 2056–60 (1972). Linear hydrocarbons (C_{14} to C_{17}) were incorporated in the diet of young chicks in amounts as high as 12%. The diets were highly palatable and had no apparent adverse effects on growth, feed efficiencies and serum levels of free fatty acids, cholesterol and total carotenoids. Metabolizable energy values were 2.17 kcal/g when the hydrocarbons were tested at levels above 7% of the diet. The M.E. value increased to 5.6 kcal/g when the hydrocarbons were reduced to 3% of the ration. This reasonably high utilization of linear hydrocarbons, and the normal absorption of dietary carotenoids, indicate a distinct species difference. Further research in indicated to establish a possible commercial value for the hydrocarbons in poultry diets.

EFFECT OF DIETARY PROTEIN AND FAT ON PROTHROMBIN TIME OF CHICKENS AT DIFFERENT ENVIRONMENTAL TEMPERATURES. K.F.A. Soliman and T.M. Huston (Dept. of Poultry Sci., Univ. of Georgia, Athens, Ga. 30601). *Poultry Sci.* 51, 1984–9 (1972). Prothrombin time was determined on 144 growing White Plymouth Rocks fed six different diets at three different temperatures (8, 19 and 30C). In a second trial prothrombin time was determined on 108 Athens Randombred chickens fed a conventional diet in the same environments as used in the first trial. The determination of prothrombin time was conducted in each individual twice at 15 day intervals. The birds fed the high level of protein (25.4%) had longer prothrombin time than birds fed the lower level of protein (22.1%). The prothrombin time was shortened by increasing the fat content of the diet. The longer prothrombin time was observed among those birds raised at 30C. There was no difference in prothrombin time between males and females or between 15- and 52-week old males.

HYPOCHOLESTEROLEMIC AGENTS AND MOBILIZATION OF TISSUE CHOLESTEROL IN MAN. H.S. Sodhi, B.J. Kudchodkar and L. Horlick (Dept. of Med., Univ. of Saskatchewan, Saskatoon, Canada). *Atherosclerosis* 17, 1–19 (1973). Plasma cholesterol was pulse-labelled with [4-^{14}C]cholesterol in 11 hyperlipemic subjects on cholesterol balance studies. When the decline in the specific activity of plasma cholesterol became exponential, various parameters of cholesterol metabolism were measured during steady state conditions of the control period. The subjects were then given clofibrate, nicotinic acid or plant sterols and the changes in these parameters were noted. There was a prompt decline in the plasma cholesterol concentration and a marked upswing in the specific activity slope; the latter could only occur by the entry of cholesterol from the tissues. The amounts of tissue cholesterol entering plasma were estimated from the increases in the fecal excretion of endogenous cholesterol and its metabolites, and from the increases in the secretion of endogenous cholesterol into the lumen of the gastrointestinal tract. Both estimates were in good agreement. The increases in plasma cholesterol specific activity had excellent correlations with the amounts of cholesterol mobilized from the tissues. These parameters in turn correlated well with fall in plasma cholesterol concentration suggesting that the mobilization was secondary to the acute reduction in the plasma cholesterol concentrations and was not caused directly by the drugs.

STEROL METABOLISM. PART 18. ON THE UNIQUENESS OF THE OCCURRENCE OF 26-HYDROXYCHOLESTEROL IN THE HUMAN AORTA. L.L. Smith and N.L. Pandya (Div. of Biochem., Dept. of Human Biol. Chem. and Genetics, Univ. of Texas Med. Branch, Galveston, Tx. 77550). *Atherosclerosis* 17, 21–30 (1973). 26-Hydroxycholesterol known to accumulate in the human aorta does not occur in a variety of other human tissues, nor does the sterol occur in aortal tissues of the baboon, the White Carneau pigeon and a variety of domestic animals. Induction of aortal lesions in the white rabbit by cholesterol feeding, by injections of epinephrine and thyroxine, or by infusions of norepinephrine was not accompanied by a demonstrable accumulation of 26-hydroxycholesterol in the aortal tissues.

EFFECT OF DIETARY ANIMAL TALLOW AND VEGETABLE OIL ON FATTY ACID COMPOSITION OF EGG YOLK, ADIPOSE TISSUE AND LIVER OF LAYING HENS. J.S. Sim, D.B. Bragg and G.C. Hodgson (Dept. of Animal Sci., Univ. of Manitoba, Winnipeg 18, Man., Canada). *Poultry Sci.* 52, 51–7 (1973). Effect of four levels of dietary animal tallow, soybean oil, sunflower oil and rapeseed oil on the changes in the fatty acid composition of liver, egg yolk and adipose tissue of laying hens was studied. Changes in the fatty acid composition were generally proportional to the respective fatty acid patterns of dietary fat. Linoleic acid from soybean, sunflower oil and rapeseed oil source was preferentially deposited in tissue and egg yolk with a simultaneous depression of oleic and palmitoleic deposition. Constant or increasing level of long chain saturated acid was found irrespective of dietary stearic acid level when hens were fed high linoleic acid diets. Animal tallow or low-fat diets, decreased linoleic acid and increased oleic acid in tissue and egg yolk, indicating that linoleic acid was conserved in the body fat of laying hens and that oleic acid was preferential synthesized from non-fat or fat precursors. High dietary levels of rapeseed oil suppressed the linoleic acid deposition and increased the oleic acid in the liver. Erucic acid of the diet was deposited in substantial amount in egg yolk and liver whereas none was detected in adipose tissue. Linolenic acid from soybean oil was more actively deposited in egg yolk and tissue than from rapeseed oil. The metabolic fate of individual fatty acids from different fat sources and their interaction due to the fatty acid make-up of dietary oils were discussed.

LATERAL PHASE SEPARATION IN PHOSPHOLIPID MEMBRANES. E.J. Shimshick and H.M. McConnell (Stauffer Labs. for Physical Chem., Stanford, Cal. 94305). *Biochemistry* 12, 2351–60 (1973). The phase diagrams of aqueous dispersions of binary mixtures of dimyristoyl-, dipalmitoyl-, and distearoylphosphatidylcholine and dipalmitoylphosphatidylethanolamine have been determined. The method used is based on the partition of the spin label, 2,2,6,6-tetramethylpiperidine-1-oxyl (Tempo) between the fluid hydrophobic regions of the lipids and the aqueous regions. As the hydrophobic regions of the phospholipid mixtures "freeze," Tempo is excluded and its solubility in the lipids decreases. This solubility, measured by means of a Tempo spectral parameter for different lipid mixtures, exhibits abrupt changes in slope at characteristic temperatures corresponding to the onset and completion of lateral phase separations. These temperatures are used to define points on the equilibrium phase diagrams for five binary phospholipid mixtures. A model is presented in which one can calculate the Tempo spectral parameter as a function of temperature from the experimentally determined phase diagrams. Phospholipid phase separations in biological membranes are discussed.

SATURATED FAT IN THE DIET AND SERUM CHOLESTEROL CONCENTRATION: A CRITICAL EXAMINATION OF THE LITERATURE. R. Reiser (Dept. of Biochem. and Biophysics, Texas A&M Univ., College Station, Tx. 77843). *Am. J. Clin. Nutr.* 26, 524–55 (1973). Attribution of hypercholesteremia to a saturated fat, based on data obtained when it was contrasted to a polyunsaturated, phytosterol-containing vegetable oil, has been an error in experimental design leading to erroneous interpretation of results. Efforts have rarely been made to compare the two types of oils by relating each to a neutral diet. Preoccupied by the saturated fats, researchers have attributed differences to the saturated fats alone. It is relevant that in similar studies in which interest was on the unsaturated fats, all differences were often attributed to them alone.

UTILIZATION OF METHIONINE FOR PHOSPHOLIPID FORMATION AS AFFECTED BY DIETARY PROTEIN IN THE RAT. F.H. Radke, H. De Haas and R.A. Cook (Dept. of Biochem. and Schl. of Human Development, Maine Agr. Exp. Station, Univ. of Maine, Orono, Me. 04473). *J. Nutr.* 103, 285–9 (1973). Phospholipids were isolated from the livers and brains of rats which had been force-fed L-methionine-methyl-^{14}C 3 hours previously.

The rats had been fed three diets—amino acids (AA), caseinlactalbumin (CL) and wheat gluten (WG)—which had been made up to the FAO pattern in essential amino acids and to the same total nitrogen (N) concentration. These diets were fed to rats at two levels, 1.2 and 1.6% of N, for 2 weeks. The ^{14}C-activity of liver phospholipids reached a peak after 3 hours and began to decrease. The ^{14}C-activity of the brain phospholipids continued to rise for at least 8 hours, but the greatest rate of increase occurred between 3 and 5 hours after the force-feeding of the radioactive methionine. There was no difference in the liver or brain in the degree of conversion of the methyl-^{14}C activity from methionine to phospholipids due to the AA, CL or WG diets. In the liver, the groups fed 1.2% of dietary N showed a significantly higher conversion of the methyl-^{14}C from methionine to phospholipids than the groups fed 1.6% dietary N. In the brain the groups fed 1.6% of dietary N showed a greater relative conversion of the methyl-^{14}C to phospholipids than the group receiving 1.2% of dietary N.

FUNCTION OF CYTIDINE DIPHOSPHATE-DIGLYCERIDE AND DEOXYCYTIDINE DIPHOSPHATE-DIGLYCERIDE IN THE BIOGENESIS OF MEMBRANE LIPIDS IN ESCHERICHIA COLI. C.R.H. Raetz and E.P. Kennedy (Dept. of Biol. Chem., Harvard Med. Schl., Boston, Mass. 02115). *J. Biol. Chem.* **248**, 1098–1105 (1973). CDP-diglyceride synthesized by chemical procedures is an efficient donor of phosphatidyl residues for the enzymatic synthesis of phospholipids in cell-free extracts of *Escherichia coli*. However, prior to the present work, CDP-diglyceride had never been isolated from living cells of *E. coli* or any other organism. In these experiments, cells growing in the log phase were simultaneously labeled with tritiated cytosine and *sn*-glycero-3-[^{32}P]phosphate. Under the conditions employed *sn*-glycero-3-[^{32}P]phosphate was taken up without prior hydrolysis and was rapidly converted to labeled lipids.

PHOSPHOLIPID BIOSYNTHESIS IN THE MEMBRANES OF IMMATURE AND MATURE RED BLOOD CELLS. A.K. Percy, E. Schmell, B.J. Earles, and W.J. Lennarz (Dept. of Neurology and the Dept. of Physiological Chem., Johns Hopkins Univ. Schl. of Med., Baltimore, Md. 21205). *Biochemistry* **12**, 2456–61 (1973). Reticulocytes were isolated from rabbits in which reticulocytosis was induced by phenylhydrazine injection. Reticulocytes, as well as erythrocytes from untreated rabbits, were lysed and the resulting membranes were washed and purified by isopycnic centrifugation. The purified membranes from reticulocytes were found to contain enzymes that catalyze the synthesis of phosphatidylcholine from CDP-choline and 1,2-diglyceride, and the synthesis of phosphatidylinositol from CDP-diglyceride and inositol. In contrast, erythrocyte membranes are devoid of these enzymes. Thus, during the maturation process whereby reticulocytes are converted to erythrocytes de novo synthesis of these two lipids ceases.

Crude glycerine production for June down from May figure

According to the U.S. Department of Commerce, production of crude glycerine (including synthetic) for June, 1973, totaled 29.1 million pounds, down 3.1 million pounds from May, 1973, and down 0.8 million pounds from June, 1972.

At the end of June, 1973, producers' stocks of crude and refined glycerine totaled 39.3 million pounds, down 4.3 million pounds from May, 1973, (revised), and down 9.4 million pounds from the end of June, 1972.

Exports of crude and refined glycerine in June totaled 8,036,761 pounds (100% basis), of which 1,349,416 pounds were crude and 6,687,345 pounds were refined. There were no imports of crude or refined glycerine reported for June, 1973.

The May refined production and crude stocks figures were revised slightly as follows, in thousand pounds, 100% glycerol basis: refined production, from 29,863 to 29,779; crude stocks, from 26,471 to 26,492. The change in crude stocks has raised total stocks from 43,597,000 to 43,618,000 pounds and lowered domestic disappearance from 28,396,000 to 28,375,000 pounds. ■

THE LACK OF EFFECT OF DIETARY INOSITOL SUPPLEMENTATION ON EGG PRODUCTION AND LIVER LIPID METABOLISM IN THE LAYING HEN. J. Pearce (Dept. of Agr. Chem., Queen's Univ. of Belfast, Belfast, BT9 6BB and Ministry of Agr., Northern Ireland). *Poultry Sci.* **51**, 1998–2001 (1972). An experiment is described in which the effects of dietary inositol supplementation on egg production and liver lipid metabolism in the laying hen were examined. Forty laying hens were randomised into 4 groups of ten birds and each group received a cereal-based laying ration containing either 0, 1, 2 or 5 g inositol/kg diet. The experiment lasted for three 28 day periods. The addition of inositol to the diet had no significant effects on liveweight, egg production, egg size, food consumption or the efficiency of food utilisation. Similarly, there were no significant differences in liver size, liver total lipid content or hepatic ATP-citrate lyase and "malic" enzyme activities between the dietary treatments. These observations are discussed in relation to the results of other workers on the effects of dietary inositol on liver lipid and egg production in normal laying hens and birds affected by the fatty liver syndrome.

APPLICATION OF THE PHASE PARTITION METHOD TO A HYDROPHOBIC MEMBRANE PROTEIN, PHOSPHOLIPASE A1 FROM ESCHERICHIA COLI. P.Å. Albertsson (Dept. of Biochem., Stanford Univ. Schl. of Med., Stanford, Cal. 94305). *Biochemistry* 12, 2525–30 (1973). Phase partition has been applied to the purification of hydrophobic membrane proteins. Phase systems of up to four liquid phases contained various polymers and detergents in aqueous solution. The polymers dextran, Ficoll, poly(ethylene glycol) and poly(propylene glycol) produced phases with distinctive hydrophobic and hydrophilic characteristics. Partitions of the membrane-bound phospholipase A1 of *Escherichia coli* brought about a several-hundredfold purification of the enzyme and a separation from phospholipid and added detergents. The added polymers are also removed from the enzyme.

RATE AND EXTENT OF ABSORPTION OF THE FATTY ACIDS OF FULLY ESTERIFIED GLYCEROL, ERYTHRITOL, XYLITOL AND SUCROSE AS MEASURED IN THORACIC DUCT CANNULATED RATS. F.H. Mattson and R.A. Volpenhein (Procter & Gamble Co., Miami Valley Lab., Cincinnati, Ohio 45239). *J. Nutr.* 102, 1177–80 (1972). Rats were fed by stomach tube an emulsion diet in which the fat component consisted of 95 parts of unlabeled glycerol trioleate and 5 parts of one of the following: glycerol 1-^{14}C-trioleate, erythritol 1-^{14}C-tetraoleate, xylitol 1-^{14}C-pentaoleate or sucrose 1-^{14}C-octaoleate. Thoracic duct lymph was collected in 2-hour increments for the subsequent 24 hours. The lipids from these fractions were assayed for ^{14}C-oleate content. The percentage of the fed, labeled acid that appeared in the lymph in 24 hours was 88% from the glycerol ester, 67% from the erythritol ester, 24% from the xylitol ester, and 2% from the sucrose ester. It is proposed that the differences in the amounts and in the patterns of the appearance of the fatty acids of the various esters are related to the particular enzymes that hydrolyze these fats in the intestinal tract.

LIPID AND FATTY ACID COMPOSITION OF FROG PHOTORECEPTOR OUTER SEGMENTS. W.T. Mason, R.S. Fager and E.W. Abrahamson (Dept. of Chem., Case Western Reserve Univ., Cleveland, Ohio 44106). *Biochemistry* 12, 2147–50 (1973). Frog rod outer segments purified by density gradient centrifugation were studied to determine the phospholipid and neutral lipid contents as well as the respective fatty acid profiles of these classes. The outer segment photoreceptor membranes contained large quantities of palmitic (16:0), stearic (18:0), linolenic (18:3), and docosahexanoic (22:6) acid. Glycolipid was found to be in relative abundance (25% of the total lipid) and cholesterol in smaller quantities (2%). The photoreceptor membrane consists of 61% protein and 39% lipid; rhodopsin was 27% of the total lipoprotein of the membrane on a dry weight basis. Phosphatidylcholine (45%), phosphatidylethanolamine (26%), phosphatidylserine (15.1%) and sphingomyelin (6.4%) were the predominant phospholipid components. These results confirm the general fluidity characteristics associated with frog disk photoreceptor membranes on the basis of more physicochemical studies.

EFFECTS OF SELECTED PSYCHROPHILIC BACTERIA ON THE FATTY ACID COMPOSITION OF CHICKEN BREAST MEAT. M.G. Mast and J.F. Stephens (Dept. of Poultry Sci., Ohio Agr. Res. and Dev. Center, Columbus, Ohio 43201). *Poultry Sci.* 52, 173–8 (1973). To determine the effects of psychrophilic microorganisms on the fatty acid composition of chicken breast meat, aseptically procured samples were inoculated with an *Alcaligenes* sp., a *Flavobacterium* sp., or *Pseudomonas putre-*

faciens, and stored at 3C for periods of time up to 14 days. Following storage, the samples were analyzed for total bacterial numbers. The pH of each sample was determined and the meat was then heat-treated. Butyl esters of fatty acids were prepared from lipids extracted from the chicken meat. The fatty acid composition of these samples was determined using gas-liquid chromatography. Eighteen fatty acids were detected and tentatively identified in chicken breast meat. The fatty acid composition of aseptically procured uninoculated meat remained relatively constant throughout the 14 day storage period. However, in chicken meat inoculated with psychrophilic spoilage bacteria, the proportion of "lower" fatty acids (C-14 through C-17, plus isostearic acid and stearic acid) tended to increase with storage time. This change in fatty acid composition was particularly pronounced as spoilage occurred in the chicken meat.

A STUDY OF SOME ENZYMES OF GLYCEROLIPID BIOSYNTHESIS IN RAT LIVER AFTER SUBTOTAL HEPATECTOMY. E.H. Mangiapane, K.A. Lloyd-Davies and D.N. Brindley (Dept. of Biochem., Univ. of Nottingham Med. Schl., Nottingham NG7 2RD, U.K.). *Biochem. J.* **134**, 103–12 (1973). The accumulation of triglyceride in the liver remnant after subtotal hepatectomy (removal of 82% of the liver) exceeded that described for partial hepatectomy (removal of 70% of the liver). Palmitoyl-CoA synthetase, glycerol phosphate acyltransferase and diglyceride acyltransferase activities were measured in the microsomal fraction, and phosphatidate phosphohydrolase activity was measured in the particle-free supernatant fraction prepared from the liver remnant at various times after subtotal hepatectomy. The only enzyme showing a significant change in specific activity was phosphatidate phosphohydrolase. The specific activity was approximately fivefold that of the control value at 6h after operation and threefold that of the control at 10, 16 and 24h after operation. A smaller increase in the specific activity of the enzyme in sham-operated animals occurred only at 6h after operation. However, at this time the total phosphohydrolase activity of the remaining liver in the sham-operated rats was approximately threefold that in hepatectomized rats. Injection of actinomycin D prevented the increase in activity of phosphatidate phosphohydrolase but did not prevent the accumulation of triglyceride.

EFFECT OF LONG-TERM INGESTION OF POLYUNSATURATED FAT, AGE, PLASMA CHOLESTEROL, DIABETES MELLITUS AND SUPPLEMENTAL TOCOPHEROL UPON PLASMA TOCOPHEROL. J.S. Lewis, A.K. Pian, M.T. Bauer, P.B. Acosta, G.A. Emerson (Home Econ. Dept., Cal. State Univ., Los Angeles, Cal.). *Am. J. Clin. Nutr.* **26**, 136–43 (1973). No plasma tocopherol values less than 0.3 mg/100 ml were found for the 217 subjects studied. No adults or normal children had plasma tocopherol levels below 0.6 mg·100 ml. No significant difference was found between the means of plasma tocopherol levels of children on high polyunsaturated fat diets since birth and of children on normal diets. Plasma tocophtrol levels were significantly correlated to age and significantly correlated to cholesterol levels. Mean plasma tocopherol levels of nonobese diabetics were not significantly different from those of normal nonobese subjects of the same age and sex. Plasma tocopherol values for the same individual varied little from day to day or month to month. Supplements of d-α-tocopheryl acetate did not significantly change plasma cholesterol levels. Supplements of 200 and 600 IU of d-α-tocopheryl acetate increased plasma tocopherol levels only from 50 to 60%, and plasma levels returned to presupplementation levels within 4 days.

RELATIONSHIP OF MILK FAT GLOBULE MEMBRANE MATERIAL TO FLAVOR DEVELOPMENT IN CHEDDAR CHEESE. B.A. Law, M.E. Sharpe, H.R. Chapman and B. Reiter (Natl. Inst. for Res. in Dairying, Shinfield, Reading RG2 9AT, England). *J. Dairy Sci.* **56**, 716–23 (1973). The effect on ripening of varying the amount of fat globule membrane material in Cheddar cheese was investigated by altering the buttermilk content of the cheese milks. The stability of phospholipids during cheese ripening was also measured. The rate of lipolysis increased in cheeses made with skimmilk and butteroil (without buttermilk); but there was no significant flavor difference between cheeses made from whole milk, whole milk with additional buttermilk powder or skimmilk and butteroil (homogenized at $352 \cdot 10^3 kg/m^2$). All had a typical mild flavor. Cheese made with skimmilk and butteroil homogenized at $422 \cdot 10^3 kg/m^2$ were rancid after 6-months ripening and contained very high amounts of free fatty acids. Cheese made with skimmilk and buttermilk powder contained only 0.5% fat and were hard and dry in texture with no typical flavor. Counts of starter streptococci were not affected by the presence or absence of buttermilk either during cheesemaking or ripening. Phospholipid in the cheeses decreased by 50 to 70% during the 6-month ripening.

PALMITYL COENZYME A INHIBITION OF FATTY ACID SYNTHESIS. RELIEF BY BOVINE SERUM ALBUMIN AND MYCOBACTERIAL POLYSACCHARIDES. H. Knoche, T.W. Esders, K. Koths and K. Bloch (Conant Chem. Lab., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* **248**, 2317–22 (1973). The effects of acyl-CoA derivatives (C_8 to C_{20}) on the activity of the fatty acid synthetases from yeast and *Corynebacterium diphtheriae* have been examined. Both enzyme systems are inhibited by the longer chain acyl thioesters (C_{16} to C_{20}) and protected against this inhibition by bovine serum albumin (BSA). Identical relief from acyl-CoA inhibition is provided by the 6-*O*-methylglucose-containing lipopolysaccharide (MGLP), from *Mycobacterium phlei*. It is shown that MGLP forms a stable complex with palmityl-CoA. This interaction accounts for the BSA-like effects of the polysaccharide. BSA and MGLP have two further effects on the fatty acid synthetases under study, also attributable to complex formation with palmityl-CoA. They stimulate the rate of over-all synthesis from acetyl-CoA and malonyl-CoA, and they cause a shift of the fatty acid pattern towards products of shorter chain length. The observed effects are discussed in terms of the regulation of fatty acid synthesis both with respect to rate and product composition. It is concluded that in the two microbial enzyme systems negative feedback inhibition and its relief are important control mechanisms.

LINOLEIC ACID REQUIREMENT OF TURKEY POULTS. H.G. Ketola, R.J. Young and M.C. Nesheim (Dept. of Poultry Sci. and Grad. Schl. of Nutr., Cornell Univ., Ithaca, N.Y. 14850). *Poultry Sci.* **52**, 597–603 (1973). The dietary requirement of young turkey poults (0–3 weeks of age) for linoleic acid was investigated. The first 2 experiments determined the influence of soybean extract and level of hydrogenated coconut fat (1–3%) on the response of poults to dietary linoleic acid (3%). The results showed a highly significant growth response to linoleic acid which was independent of the extract or the coconut fat. Feed/gain and mortality were markedly reduced by linoleic acid. In a third experiment, oleic acid (0.85%) or graded levels of linoleic acid (0, 0.25, 0.51, 1.02, 1.44, 2.09 and 4.25%) were fed in a casein-glucose basal diet. Weight gains and feed conversions were improved by linoleic acid supplements up to 1.02% of diet. Additions beyond this level gave no further improvement. Oleic acid had no effect on growth or feed conversion. In addition to growth and feed conversion, lipid composition of liver and heart also indicated that the minimum requirement for linoleic acid by young growing turkeys was 1% of the diet or 3.2% of the calories.

CHARACTERIZATION OF AN ADRENAL ACTIVATOR FOR CHOLESTEROL SIDE CHAIN CLEAVAGE. K.W. Kan and F. Ungar (Dept. of Biochem., Univ. of Minnesota Med. School, Minneapolis, Minn. 55455). *J. Biol. Chem.* **248**, 2868–75 (1973). The enzyme system which converts cholesterol to pregnenolone by side chain cleavage is present in a soluble buffer extract of an acetone powder of adrenal mitochondria. An activation factor remains in the soluble buffer extract after heating at 100C for 2 min, whereas the known components of the P-450 enzyme system are inactivated. The addition of this soluble, heat-stable factor with the active enzyme will enhance pregnenolone formation 5- to 10-fold. The activator is precipitable with acetone and saturated $(NH_4)_2SO_4$, is not dialyzable, and is inactivated partially with trypsin. The factor is present in 105,000 × *g* supernatant but not the microsome fraction. Bovine serum albumin or rat serum does not stimulate. A heat-stable soluble liver cholesterol carrier protein (liver-SCP) has been shown to stimulate cholesterol side chain cleavage using the adrenal mitochondrial enzyme system. The binding properties of the activator with cholesterol on Sephadex G-25

are consistent with its behavior as a carrier protein for cholesterol. Pregnenolone and other adrenal steroids bind less than 1%. Evidence is presented for a cholesterol-protein complex which may serve to transport cholesterol within the cell and to participate at the active site for the enzymatic cleavage of the cholesterol side chain.

LIPOGENIC ENZYME ACTIVITY IN ADIPOSE TISSUE DURING THE GROWTH OF SWINE WITH DIFFERENT PROPENSITIES TO FATTEN. R.L. Hood and C.E. Allen (Dept. of Animal Sci., Univ. of Minnesota, St. Paul, Minn. 55101). *J. Nutr.* 103, 353–62 (1973). Adipose tissue from three depots in swine of three breeding groups with different propensities to fatten was assayed for NADP-malate dehydrogenase (ME), NADP-isocitrate dehydrogenase (ICDH), glucose-6-phosphate dehydrogenase (G-6-PDH), 6-phosphogluconate dehydrogenase (6-PGDH) and acetyl CoA carboxylase (CBX). Net de novo synthesis was estimated by calculation to account for 73 and 82% of the total body fat accumulated during the growth of Hampshire × Yorkshire (H × Y) and Minnesota 3 × 1 (Minn 3 × 1) pigs, respectively. All enzyme activities were greater in the tissues of the fatter Minn 3 × 1 pigs than the respective tissues from the leaner H × Y pigs, while tissues from the Hormel Miniature pigs contained higher activities (cell basis) than the conventional pigs at equivalent live weights. Enzyme activities expressed on a cellular basis were found to be positively correlated with the weight of extramuscular fat, mean adipose cell volume and cellular soluble protein content and negatively correlated with chronological age and total number of extramuscular adipose cells at constant live weight.

ISOTACHYSTEROL$_3$ AND 25-HYDROXYISOTACHYSTEROL$_3$: ANALOGS OF 1,25-DIHYDROXYVITAMIN D$_3$. M.F. Holick, H.F. DeLuca, P.M. Kasten and M.B. Korycka (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, Wisc. 53706). *Science* 180, 964–6 (1973). Isotachysterol$_3$, 25-hydroxyisotachysterol$_3$, and isovitamin D$_3$ have been synthesized and tested for biological activity. Like 1,25-dihydroxyvitamin D$_3$, isotachysterol$_3$ stimulates intestinal calcium transport and bone calcium mobilization in anephric rats, whereas 25-hydroxyvitamin D$_3$ does not. Although isovitamin D$_3$ is biologically active in normal rats, it is inactive in anephric rats.

INOSITOL DEFICIENCY: AN INTESTINAL LIPODYSTROPHY IN THE GERBIL. D.M. Hegsted, K.C. Hayes, A. Gallagher and H. Hanford (Dept. of Nutr., Harvard School of Public Health, Boston, Mass. 02115). *J. Nutr.* 103, 302–7 (1973). An intestinal lipodystrophy characterized by accumulation of fat in the intestinal mucosal cells was produced in female gerbils fed purified diets containing certain fats. The syndrome resulted in a relative hypocholesterolemia, debilitation and death. It was most severe when the dietary fat was highly saturated and developed minimally or not at all when the diet contained highly unsaturated oils such as safflower oil. Males were minimally affected with either diet. The syndrome was prevented by the inclusion of liver extract or yeast in the diet. The factor in liver or yeast is presumably inositol since this is also effective.

FOOD PARTICLES AS A SITE FOR BIOHYDROGENATION OF UNSATURATED FATTY ACIDS IN THE RUMEN. C.G. Harfoot, R.C. Noble and J.H. Moore (Hannah Res. Inst., Ayr KA6 5HL, U.K.). *Biochem. J.* 132, 829–32 (1973). On incubation of linoleic acid with strained rumen contents from sheep, it was observed that conversion of linoleic acid into C-18:1 *trans*-11 monoenoic acid and subsequently into stearic acid was largely associated with the food-particle fraction. The bacteria, protozoa and cell-free supernatant together contributed less than 30% to the overall change in the added C-18:2 fatty acid.

RELATIONSHIP BETWEEN FATS IN BROILER FINISHER RATIONS AND FATS IN CHILLER WATER FROM BROILER PROCESSING. D. Hamm, R.E. Childs and A.J. Mercuri (Russell Agr. Res. Center, A.R.S., USDA, Box 5677, Athens, Ga. 30604). *Poultry Sci.* 52, 88–92 (1973). Commercial type broiler chicks were fed rations containing, 0, 4 or 8% added tallow, grease or poultry oil for a 4 week period prior to slaughter. Eviscerated carcasses were chilled in slush ice and water for 25 minutes. Lipids were quantitatively recovered from the chill water. No significant differences in quantity of fats were found in the chill waters among birds fed the 4 or 8% tallow diet, the 4% poultry oil or the basal diet which contained no added fat. The level of chill water fats from birds on 8% poultry oil and 4% and 8% grease were similar and were significantly higher than the fats from the other diets fed. The results indicate that the additions of the higher levels of poultry oil and the use of 4% or more grease in poultry rations may contribute significantly to the fat level in poultry processing effluents.

FATTY ACID SYNTHESIS IN THE BROWN FAT AND LIVER OF FOETAL AND NEWBORN RABBITS. J. Iliffe, B.L. Knight and N.B. Myant (Med. Res. Council Lipid Metabolism Unit, Hammersmith Hospital, London W12 OHS, U.K.). *Biochem. J.* 134, 341–3 (1973). The postnatal fall in fatty acid synthesis in the liver and brown fat of newborn rabbits is accompanied in both tissues by a decrease in the capacities of the enzymes of fatty acid synthesis and an apparent increase in the degree of inhibition of one or more of these enzymes.

REGULATION OF FATTY ACID SYNTHESIS IN ISOLATED HEPATOCYTES PREPARED FROM THE LIVERS OF NEONATAL CHICKS. A.G. Goodridge (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto 101, Ontario, Canada). *J. Biol. Chem.* 248, 1924–31 (1973). Isolated hepatocytes have been prepared from the livers of neonatal chicks by an enzymatic technique. The cells were 80 to 95% viable as judged by trypan blue exclusion. Less than 5% of the lactate dehydrogenase appeared in the medium during a 1-hour incubation. The cells had a high rate of endogenous respiration, synthesized glucose from lactate and exhibited many of the metabolic properties characteristic of liver slices prepared from neonatal chicks. The de novo synthesis of fatty acids was stimulated by fructose, glycerol, dihydroxyacetone, lactate and pyruvate. The stimulatory effects of fructose and dihydroxyacetone required the concomitant presence of acetate in the medium; the stimulatory effects of pyruvate and lactate were independent of a supplementary substrate. Free fatty acids (albumin-bound) and glucagon inhibited the effects of lactate and fructose. Theophylline and cyclic adenosine 3′,5′-monophosphate mimicked the effects of glucagon. Insulin stimulated fatty acid synthesis slightly whether or not glucagon was present. The results support the hypothesis that fatty acid synthesis is regulated by the intracellular concentration of a metabolite derived from free fatty acids, probably long chain fatty acyl-CoA. The sugars may modulate the concentration of the free fatty acid metabolite or they may be metabolized to an intermediate which stimulates fatty acid synthesis.

ACTIVITIES OF ENZYMES RESPONSIBLE FOR STEROID BIOSYNTHESIS AND CHOLESTEROL ESTER METABOLISM IN RABBIT OVARIAN INTERSTITIAL TISSUE AND CORPORA LUTEA. A COMPARISON OF ENZYME ACTIVITIES WITH FLOW RATES. A.P.F. Flint and D.T. Armstrong (Dept. of Physiol. and Obstetrica and Gynaecol., Health Sci. Centre, Univ. of Western Ontario, London, Ont., Canada). *Biochem. J.* 132, 301–11 (1973). A method involving the use of isolated cholesterol ester-storage granules as substrate is described for the assay of cholesterol esterase in rabbit ovarian tissues. Activities of cholesterol esterase 100–200 fold higher than those previously reported in ovarian tissues were measured by using this method. In addition to that of cholesterol esterase, activities of cholesterol ester synthetase, cholesterol side-chain cleavage enzyme and 3β-hydroxy steroid dehydrogenase were determined in rabbit ovarian interstitial tissue and corpora lutea. Activities of these enzymes are in general compatible with the flows through them measured under a variety of conditions both in vivo and in vitro. It is concluded that, in the rabbit ovarian tissues investigated, these enzymes are capable of catalysing the conversions usually attributed to them.

FATTY ACID SYNTHETASE ACTIVITY IN EUGLENA GRACILIS VARIETY BACILLARIUS. CHARACTERIZATION OF AN ACYL CARRIER PROTEIN DEPENDENT SYSTEM. M.L. Ernst-Fonberg (Biol. Dept.,

Yale Univ., New Haven, Conn. 06520). *Biochemistry* 12, 2449–55 (1973). *Euglena gracilis* variety *bacillarius* has been shown to have two fatty acid synthetase systems which differ in organizational complexity. One enzyme system is independent of added acyl carrier protein (ACP) for activity in vitro and is a complex of molecular weight greater than 1,000,000. The second synthetase is dependent on added ACP for activity. Bio-Gel chromatography of the latter system suggests that it is associated loosely in an active complex with a molecular weight of about 360,000. Studies of the kinetics of the ACP-dependent system gave parameters which are similar to those reported for multienzyme complex fatty acid synthetases which contain tightly bound ACP. Investigation of ACP substrate dependency showed that, when ACP and the enzymes are incubated together prior to initiation of reaction, a sigmoidal relationship between ACP and initial reaction velocity and the highest V_{max} was obtained. The degree of expression of each of the two fatty acid synthetases in comprising total enzyme activity is dependent on the stage of chloroplast development.

HEPATIC LIPID DROPLETS. ISOLATION, MORPHOLOGY AND COMPOSITION. R.P. DiAugustine, J.M. Schaefer and J.R. Fouts (Nat. Inst. of Environmental Health Sci., Nat. Inst. of Health, P.O. Box 12233, Res. Triangle Park, N.C. 27709). *Biochem. J.* 132, 323–7 (1973). The floating lipid layer isolated by centrifugation of rat liver was examined for composition and ultrastructure. It was chiefly composed of triglycerides and cholesterol esters plus much smaller amounts of free cholesterol, diglycerides, phospholipid and protein. No free fatty acids were detected. The triglyceride and cholesterol ester fractions consisted mostly of esters of linoleic acid, oleic acid and palmitic acid. Electron micrographs of the floating lipid layer revealed numerous spherical osmiophilic droplets having a mean diameter of 0.5–2 μm with a very-thin dense outer coat. Similar structures were observed as organelles in electron micrographs of the intact liver cell. The amount of triglyceride in the layer decreased in rats starved for 72h, but pellet triglyceride (homogenate minus the floating lipid layer) was unchanged. These results suggest that the floating lipid layer is the representative in vitro of lipid-rich organelles which probably function as a depot form of hepatic-cell neutral lipid.

OLEIC ACID ABSORPTION FROM MICELLAR SOLUTIONS AND EMULSIONS IN THE RAT. A.M. Dawson and J.P.W. Webb (Dept. of Gastroenterology, St. Bartholomew's Hosp., London EC1A 7BE). *Proc. Soc. Exp. Biol. Med.* 142, 906–8 (1973). Closed loops of rat jejunum in vivo have been used to study the absorption of oleic acid from nonmicellar and micellar taurocholate solutions and compared with that from micellar solutions of a nonionic detergent, Pluronic Acid F 68. Absorption from 15 mM taurocholate was greater than from 1 mM taurocholate over a range of oleic acid concentrations. Absorption of oleic acid was proportional to its total and not its micellar concentration. Pluronic acid micelles were as efficient as taurocholate micelles in promoting absorption from a 10 mM oleic acid solution but had no advantage over a nonmicellar solution at low oleic acid concentration (0.1 mM).

FORMATION OF MONOENOIC FATTY ACIDS BY DESATURATION IN RAT BRAIN HOMOGENATE. SOME PROPERTIES OF THE ENZYME SYSTEM OF 10-DAY-OLD BRAIN. H.W. Cook and M.W. Spence (Depts. of Biochem. and Pediatrics, Faculty of Med., Dalhousie Univ., Halifax, Nova Scotia, Canada). *J. Biol. Chem.* 248, 1786–93 (1973). Desaturation of [1-^{14}C]stearic acid, [1-^{14}C] palmitic acid and [1-^{14}C]stearoyl-CoA was measured in homogenates of 10-day-old rat brain. Desaturation was maximal with stearoyl-CoA at pH 6.0 to 6.6. With free fatty acids, monoene formation was maximal at pH 7.2 to 7.6; stearic acid was more actively desaturated than palmitic acid. Activity was stearic acid or stearoyl-CoA was linear with protein concentration of 2 to 6 mg per ml and time to 10 min and was optimal at 37 to 45C. At pH 7.4, fatty acid desaturation was not limited by the formation of fatty acyl-CoA derivatives when coenzyme A, Mg^{2+} and ATP were added. Rapid loss of activity in vitro prevented accurate subcellular location of the enzyme system. Oxygen and NAD^+ or NADH were necessary for maximal activity. Diphosphonucleotides were more active than triphosphonucleotides, and oxidized were as effective as reduced forms. The monoene fraction from desaturation of the labeled stearic acid was 91% oleic acid (18:1 (n-9)); desaturation of palmitic acid produced 22% palmitoleic acid (16:1 (n-7) and 72% cis-vaccenic acid (18:1 (n-7)). At concentrations approximating normal tissue levels, these monoenes did not inhibit desaturation.

FORMATION OF MONOENOIC FATTY ACIDS BY DESATURATION IN RAT BRAIN HOMOGENATE. EFFECTS OF AGE, FASTING AND REFEEDING, AND COMPARISON WITH LIVER ENZYME. Ibid., 1793–6. Desaturation of [1-^{14}C]stearic acid at pH 7.4 and of [1-^{14}C] stearoyl-CoA at pH 7.4 and 6.0 in rat brain homogenates showed brain enzyme activity to be maximal in the fetus, rapidly declining between 10 and 20 days, and decreased to 10% of fetal values in adults. By contrast, desaturation by liver preparations (stearoyl-CoA at pH 6.0) was less than by brain in fetal and suckling rats and increased rapidly after weaning to 50-fold values in adults. Fasting only slightly decreased desaturation by adult and 10-day-old brain, but it markedly depressed desaturation by liver particularly in adults. Refeeding stimulated activity in adult liver but gave varied results with adult brain and 10-day-old brain and liver. The monoene-forming system in rat brain appears most important for independence from diet when liver enzyme activity is low. It contributes significantly to normal maturation of the central nervous system and may ensure the supply of monoenes in the brain of the starving adult.

CELL PROLIFERATION IN THE ATHEROSCLEROTIC LESIONS OF CHOLESTEROL-FED RABBITS. PART 2. HISTOLOGICAL, ULTRASTRUCTURAL AND RADIOAUTOGRAPHIC OBSERVATIONS ON EPINEPHRINE-TREATED RABBITS. C. Cavallero, U. Di Tondo, P.L. Mingazzini, P.C. Pesando and L.G. Spagnoli (Inst. of Pathol. Anatomy II, Univ. of Rome, Rome, Italy). *Atherosclerosis* 17, 49–62 (1973). Tritiated thymidine radioautography was employed to study the effect of epinephrine on cellular proliferation in the aorta and pulmonary artery of rabbits with cholesterol atherosclerosis. Rabbits fed cholesterol for 90 days were given epinephrine intravenously in a single large dose or in multiple low daily doses. Labeled cell counts in animals killed at intervals ranging from one to twelve days after the start of treatment showed that both treatments, as compared with controls, increase the deoxyribonucleic acid synthesis both in intimal plaques and in the media. This effect was particularly evident in the animals treated with low daily doses which, otherwise, in light and electron microscopy studies showed less marked structural changes of the medial coat. No definite relationship was found to exist between increased rate of DNA synthesis and serum cholesterol levels. It is suggested that the increased DNA synthesis induced in the atherosclerotic vessels by epinephrine is not merely a consequence of the structural damage, but should also be regarded as a response

of the arterial wall to functional and/or metabolic stimuli that are as yet undetermined. On the other hand it is concluded that the contributing or enhancing effect of epinephrine on cholesterol atherogenesis might be due, at least partly, to the increased mitotic rate into the arterial wall.

BIOSYNTHESIS OF A GLOBOSIDE-TYPE GLYCOSPHINGOLIPID BY A β-N-ACETYLGALACTOSAMINYLTRANSFERASE FROM EMBRYONIC CHICKEN BRAIN. J.-L. Chien, T. Williams and S. Basu (Dept. of Chem., Biochem. and Biophysics Program, Univ. of Notre Dame, Notre Dame, Ind. 46556). *J. Biol. Chem.* 248, 1778–85 (1973). A β-N-acetylgalactosaminyltransferase activity has been detected in 11-day-old embryonic chicken brain which catalyzes the transfer of N-acetylgalactosamine from UDP-N-acetyl [^{14}C]galactosamine to a triglycosylceramide (GloboTricer or O-α-galactosyl (1 → 4)-O-β-galactosyl (1 → 4)-O-β-glucosyl (1 → 1)-ceramide) to form the globoside-type tetraglycosylceramide, GalNAc → Gal → Gal → Glc → ceramide. The enzyme is membrane bound and requires sodium taurocholate and Mn^{2+} for optimal activity. The optimum pH value for the incorporation of N-acetylgalactosamine was 6.5 in 2-(N-morpholino)ethanesulfonic acid buffer. The K_m values were 1.7×10^{-3}M and 2.0×10^{-4}M for GloboTri-cer and UDP-GalNAc, respectively. The radioactive product of the reaction was isolated, purified and characterized as globoside-type tetraglycosylceramide. The terminal [^{14}C]GalNAc was cleaved 78% by the action of jack bean β-N-acetylgalactosaminidase. The ^{14}C product formed a precipitin line with anti-globoside serum, and the line fused with that of globoside derived from porcine heart or erythrocytes.

THE EFFECT OF A LIPID-RICH DIET ON THE PROPERTIES AND COMPOSITION OF LIPOPROTEIN PARTICLES FROM THE GOLGI APPARATUS OF GUINEA-PIG LIVER. M.J. Chapman, G.L. Mills and C.E. Taylaur (Courtauld Inst. of Biochem., Middlesex Hosp. Med. Schl., London W1P 5PR, U.K.). *Biochem. J.* 131, 177–85 (1973). A cell fraction rich in Golgi apparatus was isolated from the livers of guinea pigs fed on a lipid-rich diet (1.6% cholesterol, 15% corn oil). The Golgi cisternae and secretory vesicles contained electron-dense particles which were tentatively identified as VLD (very-low-density) and LD (low-density) lipoproteins. Particles of moderate electron density, 150-500nm in diameter, were seen associated with membranous elements of the Golgi-apparatus cell fraction. Disruption of this cell fraction permitted the release of these three species of particles, which were separated into particulate lipid, and VLD and LD lipoproteins. The large particles of moderate electron density, isolated as particulate lipid, were distinct from both species of Golgi particles in their chemical composition and in possessing an immunochemically unreactive apolipoprotein(s). Morphological observations suggest that the particulate lipid arose from cytoplasmic lipid droplets which were present as contaminants of the Golgi-rich fraction. The chemical and immunochemical results are consistent with the suggestion that the Golgi LD particles are precursors of the VLD particles, into which they may be transformed by the addition of both triglyceride and cholesteryl ester. The pressent results provide further support for the proposal that the Golgi VLD particles are precursors of the serum VLD lipoproteins in the guinea pig.

FATTY ACID AND 3-β-HYDROXYSTEROL SYNTHESIS IN THE PERFUSED RAT LIVER, INCLUDING MEASUREMENTS ON THE PRODUCTION OF LACTATE, PYRUVATE, β-HYDROXY-BUTYRATE AND ACETOACETATE BY THE FED LIVER. H. Brunengraber, M. Boutry and J.M. Lowenstein (Grad. Dept. of Biochem., Brandeis Univ., Waltham, Mass. 02154). *J. Biol. Chem.* 248, 2656–69 (1973). Conditions are described for perfusing rat liver in vitro which result in rates of fatty acid synthesis which equal the rates observed in vivo. Rates of 3-β-hydroxysterol synthesis by the perfused liver are equal to or greater than those observed in vivo. Livers from starved animals perfused with low concentrations of glucose show low rates of fatty acid and 3-β-hydroxysterol synthesis. When such livers are perfused with high concentrations of glucose they show a substantial increase in the rate of fatty acid and 3-β-hydroxysterol synthesis. These increases are compared with similar increases in vivo, which are observed when starved animals are refed. Relationships are examined between rates of fatty acid synthesis and the production of lactate, pyruvate, β-hydroxybutyrate and acetoacetate, as well as the oxygen consumption. Metabolite contents are reported for perfused livers that exhibit high and low rates of fatty acid synthesis.

ISOTOPE EFFECTS IN ENZYMATIC HYDROXYLATION OF STEROIDS. Inkue Kim, C.E. Hay and H.J. Brodie (Worcester Found. for Exp. Biol., Shrewsbury, Mass. 01545). *J. Biol. Chem.* 248, 2134–9 (1973). We had shown previously that the isotope concentration in 6β-hydroxyestr-4-ene-3,17-dione, obtained from incubation of 7β-deuterated or 7β-tritiated estr-4-ene-3,17-dione with the respiring mold *Botryodiplodia malorum*, was significantly increased over that of substrate. This did not occur in another metabolite, 1β-hydroxyestr-4-ene-3,17-dione, or in recovered substrate. We now report that the hydrogen isotope also was concentrated in another product, estr-4-ene-3,11,17-trione. In addition, incubation of estr-4-ene-3,17-dione, labeled with deuterium or tritium equally at C-6β and C-7β, gave the major product, 7β-hydroxyestr-4-ene-3,17-dione, in which there was a much greater than 50% loss of label. In the same experiment there was the expected 50% decrease in the concentration of label in 6β-hydroxyestrenedione and there was a large increase in the concentration of label in the C-11 ketone and in newly-isolated 11α-hydroxyestr-4-ene-3,17-dione. When 6β-deuterated estrenedione was incubated, there was no change in label content in 7β-hydroxyestrenedione, while there was a significant decrease in the amount of 6β-hydroxyestrenedione formed as compared to that obtained with unlabeled substrate. The results indicate that a positive isotope effect is operating during 7β-hydroxylation. It is postulated that the increase in the concentration of label in other hydroxylation products is due to the resultant diversion of enzyme-bound labeled substrate to production of these materials.

THE EFFECTS OF HEAT AND GLUCAGON ON THE PLASMA GLUCOSE AND FREE FATTY ACIDS OF THE DOMESTIC FOWL. A.F. Braganza, R.A. Peterson and R.J. Cenedella (Div. of Animal and Vet. Sci. and Dept. of Pharm., West Virginia Univ., Morgantown, W.V. 26506). *Poultry Sci.* 52, 58–63 (1973). The effects of glucagon on plasma free fatty acid (FFA) and glucose levels were studied in heat-acclimated and heat-exposed male broiler chickens and compared to controls. Chickens heat acclimated at 35C for 4 weeks had significantly lower plasma FFA (343 μeq/l.) compared to the controls at 21C (463 μeq/l.). Glucagon at 20 and 100 μg/kg injected i.m. in Freunds adjuvant significantly elevated plasma FFA and glucose in both the 21C and 35C acclimated birds. Chickens heat exposed to 35C for 4 hours had significant elevations of plasma FFA (719 μeq/l.) when compared to the controls at 21C (510 μeq/l.). Glucagon at 20 and 100 μg/kg injected i.m. into chickens exposed to 21C and 35C significantly elevated plasma FFA but not glucose except at 45 minutes. Thus, chickens acclimated to heat have decreased levels of plasma FFA; in addition, these data strengthen the view that glucagon is an important lipolytic hormone in chickens.

INFLUENCE OF DIETARY ENERGY SOURCE ON PERFORMANCE AND FATTY LIVER SYNDROME IN WHITE LEGHORN LAYING HENS. D.B. Bragg, J.S. Sim and G.C. Hodgson (Dept. of Animal Sci., Univ. of Manitoba, Winnipeg 19, Manitoba, Canada). *Poultry Sci.* 52, 736–40 (1973). White Leghorn laying hens were fed five levels (0,1,2,4, and 8%) of dietary animal tallow, soybean oil, sunflower oil and rapeseed oil during six periods of 28 days each. Egg production showed a significant improvement with 1% soybean and sunflower oil, 2% rapeseed oil and animal tallow. Feed efficiency improved with energy density for hens fed animal tallow whereas vegetable oil showed improvement at the level of 1% in the diet. Egg weight and yolk weight improved with increasing energy in animal tallow

treatments. Soybean and sunflower oil improved egg weight and yolk weight at 1% in the diet whereas rapeseed oil showed no improvement over the low fat control diet. Fatty livers were observed with a high level (8%) of dietary animal tallow and rapeseed oil whereas soybean and sunflower showed protection against fat accumulation at all levels (1,2,4 and 8%) tested.

THE ABNORMAL BIOCHEMISTRY OF INHERITED DISORDERS OF LIPID METABOLISM. R.O. Brady (Developmental and Metabolic Neurology Branch, Natl. Inst. of Neurol. Diseases and Stroke, Natl. Inst. of Health, Bethesda, Md. 20014). *Fed. Proc.* 32, 1660–7 (1973). The abnormal biochemistry of lipid storage diseases is now well established. These disorders are characterized by a number of constant features that include the accumulation in various tissues of complex lipids which have a portion of their structure in common, namely ceramide, an N-fatty acyl derivative of sphingosine; the rate of synthesis of the stored lipid, comparable to that in nonaffected humans; the enzymatic defect in each of these diseases, a deficiency of a specific hydrolytic enzyme required for the degradation of the lipid; and the degree of attenuation of enzymatic activity, similar in all of the tissues of an afflicted individual.

THE REGULATION OF RAT LIVER CALCIFEROL-25-HYDROXYLASE. M.H. Bhattacharyya and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisc.-Madison, Madison, Wisc. 53706). *J. Biol. Chem.* 248, 2969–73 (1973). Rats treated with vitamin D_3 show decreased levels of liver calciferol-25-hydroxylase activity. The extent of the depression and its persistence are related to the dose of vitamin D_3. The decrease in enzyme activity measured in vitro cannot be accounted for by dilution of the labeled substrate by unlabeled vitamin D_3 remaining in the liver. The in vitro decrease is reflected in vivo by a decrease in the rate and extent of appearance of ^{3}H-labeled 25-hydroxyvitamin D_3 in the blood and liver following a dose of ^{3}H-labeled vitamin D_3 administered to rats pretreated with unlabeled vitamin D_3. These data show the existence of a mechanism which regulates the activity of the rat liver calciferol-25-hydroxylase.

PRELYCOPERSENE PYROPHOSPHATE AND LYCOPERSENE. INTERMEDIATES IN CAROTENE BIOSYNTHESIS. F.J. Barnes, A.A. Qureshi, E.J. Semmler, and J.W. Porter (Lipid Metabolism Lab., Vet. Admin. Hosp., and the Dept. of Physiological Chem., Univ. of Wisc., Madison, Wisc. 53706). *J. Biol. Chem.* 248, 2768–73 (1973). Prelycopersene pyrophosphate and lycopersene have been isolated and identified as intermediates in plant carotenogenesis. Incubation of tomato plastid acetone powder extracts with [^{14}C]geranylgeranyl pyrophosphate at 25C yields prelycopersene pyrophosphate and, in the presence of NADPH, lycopersene. These compounds have been isolated and purified by several chromatographic systems, and their identity has been confirmed by mass spectroscopy. Both compounds are utilized by the tomato enzyme system in the formation of phytoene and lycopene. It is concluded, therefore, that these compounds are intermediates in the conversion of geranylgeranyl pyrophosphate to phytoene.

PROPRANOLOL AND HYPERTRIGLYCERIDEMIA. J.J. Barboriak and H.D. Friedberg (Dept. of Pharmacology, Med. College of Wisc., Milwaukee, Wisc. 53193). *Atherosclerosis* 17, 31–5 (1973). Eight subjects with elevated fasting plasma triglyceride levels and type IV hyperlipoproteinemia, who received a 60 g fat meal before and after 2-week treatment with propranolol, showed an enhanced lipemic response to the meal after the treatment. In 6 subjects without fasting hypertriglyceridemia, treatment with propranolol led to a slight but consistent decrease in alimentary lipemia. Plasma cholesterol levels were not affected in either group.

CHARACTERIZATION, SUBCELLULAR LOCALIZATION AND PARTIAL PURIFICATION OF A HEPARIN-RELEASED TRIGLYCERIDE LIPASE FROM RAT LIVER. G. Assmann, R.M. Krauss, D.S. Fredrickson and R.I. Levy (Molecular Disease Branch, Natl. Heart and Lung Inst., Natl. Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 248, 1992–9 (1973). Post-heparin plasma in the rat contains triglyceride lipase activity of both hepatic and extrahepatic origin. The lipase released into rat hepatic perfusate by heparin has been characterized in an assay containing Triton X-100, albumin and [^{14}C]triolein. Fatty acid release was linear for 120 min over a wide range of enzyme concentrations at 27C and 37C. The pH optimum was 9.5. Enzymatic activity was >80% inhibited by prior incubation with 0.5 M NaCl or 750 μg of protamine per ml. The apparent K_m was 1.28 mM. The enzyme was localized in rat liver cell fractions. Cell fractions were checked for purity by marker enzymes and electron microscopy. Activity inhibited by NaCl or protamine was found in plasma membranes, microsomes and cytosol, having pH optima of 9.5, 9.0 and 8.0, respectively. A different triglyceride lipase not affected by NaCl or protamine and having a pH optimum at 4.4 was found in lysosomes. The plasma membrane-bound lipase had a specific activity 10 times that in liver homogenate. Addition of heparin to the plasma membrane fractions in a concentration as low as 1 unit per ml effected the release of the enzyme into the medium. The plasma membrane-released lipase had the same apparent K_m. A 360-fold enhancement of plasma membrane lipase activity over that in whole liver homogenate was achieved by heparin affinity chromatography.

DISTRIBUTION OF ALAMETHICIN IN LIPID MEMBRANES AND WATER. W.S. Chelack and A. Petkau (Med. Biophysics Branch, Whiteshell Nuclear Res. Estab., Atomic Energy of Canada Limited, Pinawa, Manitoba, Canada). *J. Lipid Res.* 14, 255–7 (1973). The concentration of alamethicin in aqueous solutions was quantitated using measurements of the spot area on thin-layer chromatograms. These data were utilized to measure a partition coefficient of 17 for alamethicin in a phospholipid membrane-water system under equilibrium dialysis conditions.

QUANTITATIVE EXTRACTION AND DETERMINATION OF NONESTERIFIED FATTY ACIDS IN PLASMA. W.G. Duncombe and T.J. Rising (Wellcome Res. Labs., Beckenham, Kent, BR3 3BS, England). *J. Lipid Res.* 14, 258–61 (1973). A method is described for the determination of nonesterified fatty acids in plasma. Extraction is at least 98% efficient, and losses during subsequent stages are corrected for by the use of an internal radioactive standard. The method is suitable for reference purposes rather than for routine determinations. Higher values are obtained than by other methods of analysis, and it is suggested that some plasma fatty acids remain protein-bound after normal methods of extraction.

NONSTAINABLE POLYESTER FILM, CRONAR, FOR ELECTROPHORESIS OF PLASMA LIPOPROTEINS. R.P. Noble (Sharon Res. Inst., Sharon, Conn. 06069). *J. Lipid Res.* 14, 255 (1973). The Photo Products Department of E.I. du Pont de Nemours has recently made available a new type of polyester film, Cronar, for use in the electrophoretic separation of plasma lipoproteins. This film does not take up lipid dyes. There is no background color. The film remains clear and transparent after staining for lipoproteins.

THREE-POOL MODEL OF THE LONG-TERM TURNOVER OF PLASMA CHOLESTEROL IN MAN. D.S. Goodman, R.P. Noble and R.B. Dell (Depts. of Med. and Pediatrics, Columbia Univ. College of Physicians and Surgeons, New York, N.Y. 10032). *J. Lipid Res.* 14, 178–88 (1973). The long-term turnover of plasma cholesterol was examined in six men injected intravenously with [4-^{14}C]cholesterol. The specific radioactivity-time curves were determined for periods of 32–41 wk and were analyzed by computer according to a two-pool and to a three-pool model. In each subject, the three-pool model provided a significantly better description of the long-term turnover curve than did the two-pool model. When only the first 12 wk of data were analyzed, the turnover curves in all subjects conformed to the two-pool model. The results so obtained were compared with those obtained with the long-term data. The medium-term data provided a valid estimate for M_1, a slightly (8–9%) elevated value for *PR*, and a quantitatively unreliable (low) estimate of total exchangeable body cholesterol, as compared with the long-term data. Previous estimates of the production rate from studies of 10–12 wk duration can be considered valid if reduced by 8–9%.

LIPOLYSIS AND REESTERIFICATION: EFFECTS OF SOME INHIBITORS OF ADENOSINE 3′,5′-CYCLIC MONOPHOSPHATE PHOSPHODIESTERASE. F.P. Kupiecki (Diabetes Res., The Upjohn Co., Kalamazoo, Mich. 49001). *J. Lipid Res.* 14, 250–4 (1973). Theophylline and three lipolytic agents, 2,5-bis(2-chloroethylsulfonyl)-pyrrole-3,4-dicarbonitrile (substituted pyrrole), 2,4-diamino-6-butoxy-s-triazine (substituted triazine), and 2,3-dihydro-5,6-dimethyl-3-oxo-4-pyridazinecarbonitrile (substituted pyridazine), stimulate basal lipolysis in adipose tissue in vitro. They also cause an increased release of free fatty acids, but not glycerol, from adipose tissue in which lipolysis is already maximally stimulated by epinephrine. The four compounds also inhibit cyclic AMP phosphodiesterase and the conversion of [1-^{14}C]glucose to $^{14}CO_2$. Evidence is presented that free fatty acids accumulate as the result of inhibited reesterification. The substituted pyridazine and triazine, but not the pyrrole, elevate plasma free fatty acids after oral or intraperitoneal administration in rats.

EFFECTS OF ACIDIC PHOSPHOLIPIDS, NUCLEOTIDES AND HEPARIN ON THE ACTIVITY OF LIPASE FROM RAT LIVER LYSOSOMES. Masao Kariya and A. Kaplan (Dept. of Microbiol., St. Louis Univ. Schl. of Med., St. Louis, Mo. 63104). *J. Lipid Res.* **14**, 243–9 (1973). Purification and characterization of endogenous lipid factors that stimulate rat liver lysosomal lipase has led to the identification of cardiolipin, phosphatidylserine and phosphatidic acid as stimulators of this activity. Bovine heart cardiolipin (half-maximal stimulation at 1.5×10^{-4} M) and bovine brain phosphatidylserine (half-maximal stimulation at 9.5×10^{-4} M) were the most potent of the phospholipids from other sources tested. The major rate-enhancing effect of phosphatidylserine is expressed as a 35-fold increase in the apparent V_{max} of the enzyme. The effect is produced by acid phospholipids specifically, since in no case was there greater than a two-fold stimulation by synthetic detergents, zwitterionic phospholipids, taurocholic acid or gum acacia. The observed degree of stimulation depends upon the detergent used to disperse tripalmitin substrate and the relative concentrations of factor and detergent in reaction mixtures. The concentration of phosphatidylserine to produce half-maximal stimulation is directly dependent upon the Triton X-100 concentration, but the effects of this detergent on cardiolipin stimulation are more complex. Enzyme activity is inhibited 50% by 1 mM nucleoside triphosphate and 2.5 mM ADP, 80% by 1 mM PP_i, 100% by 20 U/ml heparin and 0.25 mg/ml chondroitin sulfate and 80% by 10 mM sulfate ion. Inhibition is partially prevented by phosphatidylserine.

LIPID COMPOSITION OF PLANT MITOCHONDRIA AND OF CHLOROPLASTS. H.A. Schwertner and J.B. Biale (Biol. Dept., Univ. of Cal., Los Angeles, Cal. 90024). *J. Lipid Res.* **14**, 235–42 (1973). The mitochondrial lipids from avocado fruit, cauliflower buds and potato tubers, and the lipids of chloroplasts isolated from avocado fruit and from cauliflower leaves were identified and the concentrations were determined. The lipid composition was compared with that of beef heart mitochondria. Phospholipids constituted 50–56% of total lipids in plant mitochondria while this fraction made up 90% of the lipids in beef heart mitochondria. In both cases the chief phospholipids were phosphatidylcholine and phosphatidylethanolamine. A characteristic feature of plant mitochondria was the presence of monogalactosyl- and digalactosyldiglyceride and of sulfolipid. Potato mitochondria differed from the particles of other species investigated by their higher content of galactolipids, sterol glycosides and carotenoids and lower content of phospholipids and of total lipids in the lipid-protein complex. The galactolipid content was markedly higher in chloroplasts from all sources than in mitochondria. The spectrum of lipids in the phospholipid fraction differed more strikingly between chloroplasts of the leaf and the mitochondria of the bud of cauliflower than between the two organelles of the avocado mesocarp. The fatty acid distribution of individual lipids and of classes of lipids was also more similar in the two organelles of the fruit tissue than in the cauliflower material.

BILE ACIDS. XXXVII. IDENTIFICATION OF THE 3β ISOMERS OF ALLOCHOLIC AND ALLOCHENODEOXYCHOLIC ACIDS AS METABOLITES OF 5α-CHOLESTEROL IN THE RAT. B.W. Noll, S.A. Ziller, Jr., E.A. Doisy, Jr. and W.H. Elliott (Dept. of Biochem., St. Louis Univ. Schl. of Med., St. Louis, Mo. 63104). *J. Lipid Res.* **14**, 229–34 (1973). Bile was collected for 18–24 days from adult male rats with cannulated bile ducts that had received intraperitoneally 0.8 mg of 5α-[4-^{14}C, 3α-^{3}H]cholestan-3β-ol. Bile from the first 2 days containing 14.2% of the administered ^{14}C and 3.3% of the ^{3}H was hydrolyzed, and the bile acids were separated by acetic acid partition chromatography. The previously unidentified metabolite more polar than cholic and allocholic acids was identified by isotopic dilution as 3β,7α,12α-trihydroxy-5α-cholanic acid and represented 3% of the biliary ^{14}C and 15% of the ^{3}H. Similarly, 3β,7α-dihydroxy-5α-cholanic acid was identified in fractions more polar than allochenodeoxycholic acid and represented 0.6% of the biliary ^{14}C and 8% of the ^{3}H. More polar fractions contained 4% of the ^{14}C and 31% of the ^{3}H in unidentified metabolites.

QUANTITATIVE ANALYSIS OF UNCONJUGATED AND CONJUGATED BILE ACIDS IN DUODENAL FLUID BY DENSITOMETRY AFTER PAPER ELECTROPHORESIS. N. Kaplowitz and N.B. Javitt (Gastroenterology Div., Dept. of Med., Cornell Univ. Med. College, N.Y. 10021). *J. Lipid Res.* **14**, 224–8 (1973). A new paper electrophoretic method for the separation of bile acids into five groups; unconjugated, glycine conjugates and taurine conjugates, and the respective monosulfates, is described. Rapid and accurate qualitative and quantitative estimations of each group are obtained by densitometry after internal standardization and phosphomolybdate color development. The technique can be done in the routine clinical laboratory and is useful for the detection of diseases affecting the enterohepatic circulation of bile acids.

METABOLISM OF PALMITIC ACID IN THE SUBCELLULAR FRACTIONS OF MOUSE BRAIN. G.Y. Sun and L.A. Horrocks (Lab. of Neurochem., Cleveland Psychiatric Inst., Cleveland, Ohio 44109). *J. Lipid Res.* **14**, 206–14 (1973). After an intracerebral injection of [^{14}C]palmitic acid to C57BL/10J mice, the radioactivity in the brains decreased rapidly with time. The incorporated radioactivity was primarily in the 16:0 acyl groups of the diacyl phosphoglycerides at 1 and 3 days after injection. At longer times, increasing proportions of the radioactivity were found in cerebrosides, alkenyl groups and other acyl groups. The specific radioactivities of the phosphoglycerides were highest in the microsomal fraction at 1 day after injection. The exchange of the diacyl glycerophosphorylcholines and diacyl glycerophosphorylethanolamines between the microsomes and the myelin required 8–14 days. When calculated on the basis of the radioactivity in the 16:0 acyl groups, the half-lives for both of these phosphoglycerides were 6–8 days in all subcellular fractions during the period from 14 to 30 days after injection. The radioactivity in the total lipids from the purified myelin fraction did not decline until more than 14 days after injection because of the reutilization of labeled 16:0 acyl groups for lipid biosynthesis. Recycling of the acyl groups explains the long half-lives reported for myelin phosphoglycerides after injection of [^{14}C] acetic acid. Lipids with a relatively high specific radioactivity were lost from the myelin fraction during the purification procedure. The most likely source of these lipids is the most recently formed myelin that is not consolidated into the myelin sheath.

This Issue's Index to Advertisers

• Detergents

LABORATORY EVALUATION OF CITRATE BASED LAUNDRY DETERGENTS. P.J. Borchert and J.L. Neff (Miles Laboratories, Inc.). *Soap/Cosmetics/Chemical Specialties* **49**(6), 31–7, 68–70(1973). The efficiency of four leading detergents, two phosphate-based and two carbonate-based, was compared with that of two sodium citrate-based experimental home laundry detergents in terms of soil removal and redeposition. Limited data on corrosiveness, safety and inorganic buildup were also collected. Formulations for the two citrate detergents, one spray dried and the other dry blended, are given. The experimental detergents performed acceptably in terms of detergency on cotton and on a synthetic blend, corrosiveness, toxicity and eutrophic potential. The limited comparative laboratory data also indicate that the 12.3% phosphate detergent performance does not exceed that of the nonphosphate formulations on all test soils examined. Citrate detergents were found to be no more irritating or corrosive to eyes than phosphate-based products. Economic potential of the new products is somewhat limited, however.

(Continued on page 462A)

Classified Advertising

POSITION OPEN

A vacancy announcement has just been issued inviting applications for a research leadership position at the USDA's Eastern Regional Research Center, for Chief of the Dairy Products Laboratory. The position at the Center will be at Wyndmoor (a northern suburb of Philadelphia), Pa. and will be filled under Civil Service procedures at either the GS-14 or GS-15 levels (current salary $23,088-$26,898), depending on the successful candidate's qualifications and expertise. U.S. citizenship is required.

Applications should be filed on government form SF-171, available at post offices or civil service commission offices. In their reply applicants should refer to announcement ARS-NE-73-88, and should send applications to:

Dorothy M. Sisson
ARS, Northeastern Region, Personnel
Room 124, Administration Building
Agricultural Research Center, West
Beltsville, Maryland 20705

Applications should be received by October 12, 1973.

The applicant will have technical responsibility in a broad sense for the planning, development, and implementation of a forward-looking research program on dairy products and processes. Applicants should have a Ph.D. or equivalent degree in a food-related scientific field or an allied field such as biochemistry, and a career record that shows progressive professional development.

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• Abstracts. . .

(Continued from page 460A)

MANUFACTURE OF WASHING AGENTS BY THE SPRAY MIX PROCESS. K. Merkenich and K. Henning (Knapsack AG, 5033 Knapsack). *Seifen-Öle-Fette-Wachse* 99(13), 351–9 (1973). Experiments concerning the manufacture of powdered detergents by spray mix process using various types of mixers (with rotating and stationary mixing elements) and various builders (light and heavy sodium tripolyphosphates, silicates, sulfates and combination products of STP and sodium sulfate) are described. The influence of different parameters such as the water content and surfactants and the order sequence in which these products are sprayed during the mixing operation and the after treatment of the mixing product on flowability, grain structure, bulk density and storage stability are determined.

GAFQUAT-COPOLYMER, A NEW GENERATION OF CATION ACTIVE RESINS FOR HAIR PREPARATIONS. I. G.P. Lauhus (Hamburg). *Seifen-Öle-Fette-Wachse* 99(11), 307–12 (1973). A requirement for resins to be used in hair cosmetics is affinity for keratin. These copolymers contain cationic and peptide groups and have this affinity. Their substantive action is shown by electron micrographs. These copolymers are soluble in water and alcohol and are compatible with soaps and surface active agents. Films of these resins are waterproof.

II. *Ibid.*, 333–7. Formulas are given for use of these resins in shampoos, rinses, aerosols, etc.

ASSESSMENT OF THE PRESERVATIVE CAPACITY OF SHAMPOOS. P.C. Flawn, S.A. Malcolm and R.C.S. Woodroffe (Unilever Res. Lab., 455 London Road, Isleworth, Middlesex). *J. Soc. Cosmet. Chem.* 24(4), 229–38 (1973). Some factors involved in the development of a test for preservative capacity (challenge test) for shampoos are discussed. A microbiological survey of public water supplies revealed the presence of Gram-negative bacteria, including Pseudomonas sp capable of utilizing anionic detergents as a sole carbon and sulfur source by virtue of their inducible suphatase enzymes. Tap water therefore provides a suitable source of challenge test bacteria which may be isolated on Ionagar containing 0.1% detergent. The amount of slime produced by these organisms is increased during growth in detergent. Utilizing these data, a challenge test for shampoos is described.

SOLID BLENDS OF PEROXY COMPOUNDS AND PHOSPHATE CONTAINING DETERGENT BASES. J.F.G. Harris (Laporte Chemicals Ltd.). *U.S. 3,743,600.* A particulate detergent composition comprises a phosphate containing base and a solid blend of peroxy compounds made up of inorganic peroxidic compounds selected from the group consisting of percarbonates, perborates in the form of an active oxygen containing material. This material consists of substantially regular particles of which at least 80% have diameters varying by not more than 25% from the mean diameter of the inorganic peroxy compound particles. The perborate and percarbonate components manifest the bulk density of 1.3 times that of the detergent base and an average mean particle diameter within 25% of the norm.

OPTICAL BRIGHTENING AGENTS IN DETERGENT COMPOSITIONS. M. Ohkawa, M. Matsuo, T. Sakaguchi, S. Sato and Y. Momoi (Sumitomo Chem. Co.). *U.S. 3,743,602.* Beta-form crystals of the compound have a particle size of 1–2 μ and are prepared by pulverizing the crystals in the presence of alkaline phosphates and/or alkaline silicates or in the presence of alcohol, ester, ketone, hydrocarbon or mixtures of these. The brightening agent is incorporated into a washing agent also containing a detergent and a builder.

ALKALINE PROTEASE AND DETERGENT COMPOSITION. J.P. Viccaro (Lever Bros.). *U.S. 3,748,233.* Alkaline protease is obtained by propagating the organism *Bacillus licheniformis* A.T.C.C. No. 21424 in nutrient media and thereafter recovering the enzyme.

DETERGENT COMPOSITIONS. D.H. Stokes (Lever Bros.). *U.S. 3,748,267.* A fabric washing detergent composition incorporates, as a detergency builder, a water soluble or water dispersible salt of an alkylaryl dicarboxylic acid.

METHOD OF IMPROVING DETERGENCY IF ALKYLPHENOL POLYSULFONATES BY BASE PRECIPITATION AND SEPARATION. E.D. Hannah (Chevron Res. Co.). *U.S. 3,748,353.* A process for enhancing the detergency of linear alkylphenol polysulfonate detergent actives containing 25–50 mol percent of para-alkyl materials comprises mixing sufficient base with the material in aqueous solution to form a precipitate and removing the precipitate. ■