ABSTRACTS

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

• Fats and Oils

DYE-SENSITIZED PHOTOOXIDATION OF α-TOCOPHEROL. G.W. Grams, K. Eskins and G.E. Inglett (No. Reg. Res. Lab., Peoria, Ill. 61604). *J. Amer. Chem. Soc.* 94, 866–74 (1972). The photooxidation of α-tocopherol with visible light requires the presence of a dye sensitizer (proflavin). α-Tocopherol photooxidized smoothly in methanol to isomers of 4a,5-epoxy-8a-methoxy-α-tocopherone (34%), 8a-methoxy-α-tocopherone (14%), α-tocoquinone 2,3-oxide (6%), and α-tocoquinone (<1%). Two geometric isomers of 4a,5-epoxy-8a-methoxy-α-tocopherone were isolated and characterized and a possible mechanism involving singlet oxygen is proposed.

THE EFFECT OF VARIOUS COMPOUNDS ON THE ADSORPTION OF CHOLESTEROL IN AN IN VITRO SYSTEM. L.D. Wright (Grad. Sch. of Nutr., Sect. of Biochem. and Mol. Biol., Cornell Univ., Ithaca, N.Y. 14850). *Proc. Soc. Exp. Biol. Med.* 139, 402–5 (1972). A number of compounds have been studied with respect to influence on the adsorption of cholesterol from solution in safflower oil by Permutit. While some compounds have no effect on the adsorption and other compounds appear to be preferentially adsorbed over cholesterol, a number of compounds, including some fatty acids, when present with cholesterol, appear to be associated with an increase in the adsorption of the sterol by Permutit in this in vitro system.

EFFECT OF SOME WATER-SOLUBLE COMPONENTS ON AROMA OF HEATED ADIPOSE TISSUE. A.E. Wasserman and Ann Marie Spinelli (Eastern Reg. Res. Lab., Eastern Marketing and Nutr. Res. Div., ARS, USDA, Philadelphia, Pa. 19118). *J. Agr. Food Chem.* 20, 171–4 (1972). The precursors of the characteristic aromas of heated pork, beef, and lamb adipose tissues were present in the lipids extracted with chloroform: methanol. Water-washing the extracts removed components involved in forming the characteristic odors. Amino acids and glucose were identified in the water-wash, which gave a non-specific roast meat aroma on heating to dryness. Preliminary gas chromatographic studies of the extracted fats and the water-washes show primarily quantitative differences among the meat species.

IDENTIFICATION AND ESTIMATION OF TOCOPHEROLS AND TOCOTRIENOLS IN VEGETABLE OILS USING GAS CHROMATOGRAPHY-MASS SPECTROMETRY. M.K.G. Rao and E.G. Perkins (Burnsides Res. Lab., Dept. of Food Sci., Univ. of Illinois, Urbana, Ill. 61801). *J. Agr. Food Chem.* 20, 240–5 (1972). A one-step method to estimate and identify TMS derivatives of tocopherols and tocotrienols using gas chromatography and mass spectrometry is described. Thin-layer chromatography is used as a pretreatment of unsaponifiable material when the critical isomers β- and γ-tocopherols are present together. The contents of individual tocopherols and trienols in oats, wheat germ, barley, soybean and coconut oils are recorded. Wheat germ oil has a total tocopherol content of 212 mg/100 g of oil; oats, barley, and coconut oils have less than 3 mg/100 g of oil. Oats and barley oils are found to contain major amounts of α-tocotrienol, whereas coconut oil contains γ-tocotrienol. The bulk of the tocopherols are distributed between α- and β-tocopherols in wheat germ oil and γ- and δ-tocopherols in soybean oil. Barley oil seems to possess almost all the known tocopherols and trienols. However, the presence or absence of δ-tocotrienol has not been determined due to nonavailability of the standard compound.

ANALYSIS OF OXIDISED WAXES I: DETERMINATION OF HYDROXYL NUMBER. A. Brink and P.P. Haasbroek (South African Coal, Oil and Gas Corp. Ltd., Sasolburg, South Africa). *Fette Seifen Anstrichm.* 73, 608–10 (1971). Several analytical procedures for the determination of the hydroxyl number of oxidised waxes were examined. Best results were obtained with the stearic anhydride reagent and direct determination of excess anhydride with morpholine.

DECOMPOSITION OF METHYL OLEATE HYDROPEROXIDES IN VACUO ON EXPOSURE TO VISIBLE LIGHT AND HEAT. Y.S.R. Sastry and G. Lakshminarayana (Reg. Res. Lab., Hyderabad-9, India). *Fette Seifen Anstrichm.* 73, 633–5 (1971). Methyl oleate hydroperoxides were decomposed in sealed tubes under vacuum either by exposure to light from a 500-W tungsten bulb or by heating in the dark at 63C. Heat treatment caused a faster reduction in peroxide value than the exposure to light. Free acids, hydrocarbons and epoxy compounds were among the products of decomposition. The formation of similar decomposition products in both the treatments suggests that the mechanism of decomposition is the same.

FATTY ACID COMPOSITION OF SEEDS OF WILDLY GROWING OIL-BEARING PLANTS OF VIETNAM. Cl. Franzke, Duong tan Phuoc und E. Hollstein (Lehrabteilung Lebensmittelchemie der Sektion Chemie der Humboldt-Univ. zu Berlin, DDR). *Fette Seifen Anstrichm.* 73, 639–42 (1971). Fat- and protein-contents of 9 oilseeds growing wildly in Vietnam were determined, and characteristic values of the fats, including fatty acid composition, were determined. The results are evaluated with respect to possible utilization of these fats.

A PROCESS FOR THE SEPARATION OF PHOSPHATIDE MIXTURES: THE PREPARATION OF PHOSPHATIDYLETHANOLAMINE-FREE PHOSPHATIDES FROM SOYA LECITHIN. R. Aneja, J.S. Chadha and R.W. Yoell (Unilever Res. Lab., The Frythe, Welwyn, Herts./U.K.). *Fette Seifen Anstrichm.* 73, 643–9 (1971). It is commonly accepted that phosphatidylcholine, phosphatidylethanolamine and phosphatidylinositol, the three major phosphatide constituents of soya lecithin, are insoluble in acetone, and that extraction of the soya lecithin with acetone dissolves out the triglyceride oil and leaves a precipitate of a mixture of these three phosphatides. Intimate molecular association between phosphatides and acetone appears to be responsible for this. This paper presents a mechanistic picture for this association, discusses the means for preventing this association, and thereby dissolving phosphatides into acetone. A prospect for dissolving phosphatidylethanolamine into acetone, preferentially over others from a mixture, is thus opened up. This is important since it has practical applications in industry. It has been exploited by the development of a process for the separation of phosphatidylcholine and phosphatidylinositol (mixture) from commercial soya lecithin. The process solves a long standing industrial problem for the preparation of phosphatidylethanolamine-free phosphatides.

A METHOD FOR FRACTIONATION OF CEREBROSIDES INTO CLASSES WITH DIFFERENT FATTY ACID COMPOSITIONS. A.J. Acher and J.N. Kanfer (W.E. Fernald State School, Waltham, Mass. 02154, and Mass. General Hos., Boston, Mass. 02114). *J. Lipid Res.* 13, 139–42 (1972). A method is described for the separation of beef brain cerebrosides into three fractions containing different classes fatty acids: nonhydroxy (I), unsaturated nonhydroxy (II) and hydroxy fatty acid cerebrosides (III). The procedure consists of benzoylation of either crude or purified cerebrosides, followed by column chromatographic separation of benzoylated derivatives containing nonhydroxy acids from those containing hydroxy fatty acids. The benzoyl groups are removed by sodium methoxide-catalyzed transesterification from the reaction mixtures; fractions I and III precipitate. The fraction II present in mother liquor of I was shown to contain mainly short-chain and unsaturated nonhydroxy fatty acid cerebrosides. The fatty acid composition of each fraction was obtained by gas-liquid chromatography.

STABILITY OF UNSATURATED METHYL ESTERS OF FATTY ACIDS ON SURFACES. V. Slawson and J.F. Mead (Lab. of Nuclear Med. and Radiation Biol., Univ. of Calif., Los Angeles, Cal. 90024). *J. Lipid Res.* 13, 143–6 (1972). The stability of unsaturated methyl esters is greater when they are adsorbed on silica gel than when a glass surface is used. Storage of small samples adsorbed on silica gel may be a convenient addition to conventional methods of protecting labile fats against autoxidation.

A SIMPLE AND CONVENIENT PROCEDURE FOR THE HYDROGENATION OF LIPIDS ON THE MICRO- AND NANOMOLE SCALE. L. Appelqvist (Div. of Physiol. Chem., Chem. Center, Univ. of Lund, Lund, Sweden). *J. Lipid Res.* 13, 146–8 (1972). A glass tube of special design has been used as a vessel for the hydrogenation of lipids under slight excess pressure at 50C. Methyl linolenate-1-^{14}C was quantitatively hydrogenated to methyl stearate in less than 30 min. High yields were obtained on

both the micromole scale (mean and standard deviation observed for quadruplicate analyses was 98.2 ± 4.8%) and the nanomole scale (94.3 ± 7.0%). The applicability of the method is demonstrated by radio-gas-liquid chromatographic analyses of nanomole amounts of ^{14}C-labeled fatty acid methyl esters from photosynthetic tissue analyzed before and after hydrogenation.

COMPOSITION OF "OXIDIZED FATTY ACIDS," THEIR CONTENT AS A BASIS FOR THE EVALUATION OF HEATED FATS AND THEIR RELATIONSHIP TO SAPONIFICATION COLOR NUMBER. U.-J. Salzer and J. Wurzider (Hygienic Inst. of Freien and Hanestadt, Hamburg). *Fette Seifen Anstrichm.* 73(12), 705–10 (1971). "Oxidized fatty acids" (OFA) obtained from various thermally oxidized fats according to DGF method C-III 3 (68) have been investigated. Empirical formula determined from molecular weight, and C–H–O content, and the possible structural formulas are discussed. During oxidation the content of OFA parallels the increase in saponification color number $E^{100\%\ 1\ cm.}_{470\ nm}$ It has been proved that the relationship between saponification color number and OFA is not affected by the material fried. Thus it is possible to use saponification color number in combination with acid value as a basis for evaluation of heated fats.

CONSECUTIVE CHROMATOGRAPHIC TECHNICS IN THE COMPONENT FATTY ACID ANALYSIS OF SARDINE OIL. P.H. Gedam, M.R. Subbaram and J.S. Aggarwal (Reg. Res. Lab., Hyderabad, India). *Fette Seifen Anstrichm.* 73(12), 748–53 (1971). Use of argentation TLC, and subsequent GLC analysis using methyl hepadecanoate as an internal standard, coupled with Ackman's method of linear log plot, separation factors and corrections for column loss and detector response, have enabled detailed qualitative and quantitative estimation of the fatty acids of an Indian sardine (*Sardinella longiceps*) body oil. The major components are (in wt. %) myristic 10.9, palmitic 24.8, hexadecenoic 11.1, eicosapentenoic 14.0, and docosahexenoic 9.1. Minor but significant amounts of odd-numbered saturated were found as well as monoenes and polyenoic acids of various even-numbered carbon chain lengths. The method of analysis used in this investigation can be recommended for the component acid analysis of fish oils.

INFLUENCE OF CHLOROPLASTS ON THE FORMATION OF UNSATURATED FATTY ACIDS IN MATURING RAPESEEDS. W. Thies (Inst. for Plant Structure and Breeding, Univ. of Gottingen). *Fette Seifen Anstrichm.* 73(12), 710–15 (1971). In general, seeds that store fats, contain only C_{18} fatty acids which are desaturated to linoleic. Exceptions to this general pattern are the seeds of cruciferae, legumenae and linaceae. Embryos of these seeds develop, especially during the initial stages of maturation, photosynthetically active chloroplasts with a high content of linolenic acid. Therefore, for the breeding of rapeseed plants (cruciferae) having low linolenic acid content in the seed oil, one has to select either seeds in which few chloroplasts are formed during maturation, or seeds in which chloroplasts are reduced at an early stage.

BUTEA MONOSPERMA (DHAK, PALAS), A PROMISING SOURCE OF VEGETABLE OIL. H. Sethi (Directorate of Oilseeds Dev., Hyderabad-29). *Indian Oil & Soap J.* 36(11), 308–10 (1971). *Butea monosperma*, known as the flame of the forest, has been the subject of a pilot scale collection program of the seed pods for potential commercial application. A 17.5% yield of oil can be easily achieved by solvent extraction. Extensive analytical data are given. Indicated uses are in soap making. The deoiled meal is of high protein content.

USE OF THE HALPHEN REACTION FOR THE DETERMINATION OF THE CYCLOPROPENOID CONTENT OF LIPIDS. T.W. Hammonds, J.A. Cornelius and L. Tan (Foreign and Commonwealth Office (Overseas Dev. Adm.), Tropical Products Inst., 56/62 Gray's Inn Road, London, W.C. 1). *Analyst* 96, 659–64 (1971). An application to cottonseed oils of a quantitative version of the Halphen test for the determination of cyclopropenoid material has been published by other workers, but for other oils containing higher levels of cyclopropenoids, although the absorption at the 495 nm peak is linearly related to the concentration of each oil examined, the relationship differs among the oils. However, transmethylation of oil before applying the Halphen reaction has been found to give results that are in better agreement with titration with hydrogen bromide for oils with widely differing cyclopropenoid content. The use of pressurized capsules for carrying out the reaction with reduced loss of solvent has proved advantageous, as flatter peaks are obtained when optical absorption is plotted against time. The application of the modified technique to oils containing a wide range of concentrations of total cyclopropenoid material in the component fatty acids is described and discussed.

LIPID CHANGES ASSOCIATED WITH THE DEGRADATION OF FISH TISSUE. G. Wood, and L. Hintz (Div. of Food Chem. and Technol., FDA, Washington, D.C. 20204). *J. Ass. Offic. Anal. Chem.* 54, 1019–23 (1971). The stability of fish lipids during storage of fish tissue at ice temperatures was investigated. Lipids were extracted from homogenized tissue at intervals and separated into various components by silicic acid column chromatography. Gas chromatographic analyses were run on these components. During storage, there were decreases in the weights of total phospholipids and neutral lipids and an almost equivalent increase in the amount of free fatty acids.

EFFECT OF REDUCED DRYING AND EXTRACTION TIME IN DETERMINING MEAT FAT CONTENT. E.H. Cohen, and C.E. Swift (Meat Lab., Eastern Marketing and Nutrition Res. Div., ARS, USDA, 600 E. Mermaid Lane, Philadelphia, Pa. 19118). *J. Ass. Offic. Anal. Chem.* 54, 1006–8 (1971). The AOAC method for determining the fat content of meat was modified so that it can be applied more rapidly by processors in controlling meat product composition. A savings of 4.25 hours in drying and extraction time was effected without any significant loss in accuracy. Collaborative studies are suggested to reduce the time requirements for the official fat analysis of meat.

WHAT'S HAPPENING WITH FOOD ADDITIVES. J.V. Ziemba (Sr. Assoc. Ed., Food Eng., 120 S. Riverside Plaza, Chicago, Ill. 60606) and J.J. Alikonis. *Food Eng.* 44(1), 80–8 (1972). Many food additives and ingredients are being modified to serve specific needs. One area of focus is tailored fats. These include highly functional fractionated fats, various fat coated salts, fluid shortenings and new emulsifiers. Other areas include flavors, starches, improved syrups and more versatile gums.

A COMPACT EXTRACTION APPARATUS FOR USE WITH THE SEMIMICRO METHOD FOR DETERMINING TOTAL LIPIDS IN FISH MEAL. H. Miller, Jr. and G.M. Knobl, Jr. (National Center for Fish Protein Conc., Bur. of Comm. Fisheries, College Park, Md. 20740). *J. Ass. Offic. Anal. Chem.* 54, 1132–4 (1971). A compact glass extraction apparatus has been designed for use with the semimicro chloroform-methanol extraction method for determining lipids in fish meal. No further handling is required after placing the sample in the extractor; this eliminates manipulative errors and makes the procedure more efficient. Results obtained with the use of this extractor agreed favorably with those from the semimicro method in which a blender was used and with results from AOAC 7.052.

CHEMICAL COMPOSITION OF THE SEED OF SUNFLOWER HYBRIDS AND OPEN POLLINATED VARIETIES. J.A. Robertson, J.K. Thomas and D. Burdick (USDA, R.B. Russell Agr. Res. Ctr. ARS, Athens, Ga. 30604). *J. Food Sci.* 36, 873–6 (1971). The seed of high oil hybrids and open pollinated sunflower varieties from experimental plantings at 9 locations in 6 southern states in 1969 was analyzed for moisture, crude protein, total oil and fatty acid composition. Total oil content ranged from 28.8–44.7% with an average of 35.3% for hybrids and 39.5% for open pollinated varieties. The crude protein ranged from 16.9–25.1%. The average oleic and linoleic acid content of the open pollinated varieties at the 9 locations was 46.6 and 41.6%, respectively, as compared to 49.4 and 39.6% for the hybrids. The linoleic acid content of the sunflower oil varied inversely with temperature during development of the seed. A small number of confectionery and birdfeed sunflower varieties from 4 locations also were analyzed.

COMPOSITION OF THE LIPIDS OF CUCUMBER AND PEPPERS. J.E. Kinsella (Dept. of Food Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Food Sci.* 36, 865–6 (1971). Samples of commercial cucumbers and green peppers contain 103 mg and 400 mg total lipid per 100 g raw vegetable tissue. The neutral lipids, phospholipids and glycolipids comprise 39, 49 and 15% of the cucumber lipids and 82, 2 and 16% of the pepper lipids respectively. The neutral lipids of both were

composed mainly of glycerides. In the peppers the triglycerides accounted for 60% of the total lipids. Cucumber had less glycerides but contained several unidentified sterols. Phosphatidylcholine was the major class in both vegetables accounting for 46 and 76% of the phospholipids of cucumber and pepper, respectively. Palmitic, linoleic and linolenic acids were the principal fatty acid components. The lipids of peppers were very rich in linoleic acid (70%) whereas those of the cucumbers contained relatively more linolenic acid.

RECENT ANALYTICAL METHODS FOR TRACE METALS AND THE EFFECT OF METALS ON THE STABILITY OF OILS. A. Prevot (Inst. des Corps Gras, Paris). *Rev. Franc. Corps Gras* 18, 655–68 (1971). The concentrations of trace metals in crude and refined oils and mechanisms by which they catalyze oxidation are discussed in the first part of this article. Methods of analysis described include microchromatography, colorimetry, polarography, X-ray fluorescence, emission spectroscopy and mass spectrometry. Atomic absorption and activation analysis are discussed in detail. These procedures have the advantage of requiring a small sample size. Finally, some methods for eliminating trace metals form the oils are covered.

FATS AND OILS IN SEASONING PRODUCTS. F. Delmer (Sté Générale Alimentaire, Courbevoie). *Rev. Franc. Corps Gras* 18, 669–77 (1971). The roles of fats and oils in seasoning products, such as mayonnaise, salad dressings, hot sauces, patés such as mustard, flavored oils and dry sauce mixes, are discussed. The emulsification step is critical both to the stability and to the performance of the product.

FATS AND OILS IN BAKING AND COOKING MIXES. B. Pratx (Grands-Moulin de Paris). *Rev. Franc. Corps Gras* 18, 681–94 (1971). The physical and chemical characteristics as well as functional aspects of fats and oils used in baking and cooking mixes are discussed. Various methods and types of mixers for incorporating the fat into the mix are reviewed.

CHARACTERISTICS OF FRENCH VIRGIN OLIVE OILS. M. Cas and J. Estienne (Marseille Lab., Service for the Prevention of Fraud). *Rev. Franc. Corps Gras* 18, 695–701 (1971). Twenty samples of olive oils from different regions of France were analyzed for establishment of the reference standards required by the International Oleiculture Federation. Physical and chemical characteristics reported include density, I.V., saponification value, free fatty acid value and Bellier index. The oils were examined spectrophotometrically, and fatty acid composition by GLC is listed. These characteristics put French olive oils within the limits fixed by the international standards of the I.O.F. or the Codex Alimentarius.

PRODUCTION OF HIGH QUALITY PALM OIL. B. Jacobsberg (Tropical Products Sales Ltd., Brussels). *Oleagineux* 26, 781–8 (1971). The various stages in the production of palm oil are discussed, beginning with harvesting of the fruit, with emphasis on the precautions necessary for production of high quality oil. Restriction of lipase activity as well as chemical and microbial hydrolysis during harvesting helps in maintaining low free fatty acid content. Prevention of oxidation of the extracted oil as well as exclusion of pro-oxidants permits much more effective bleaching and a resultant light colored oil.

METHODS OF PRE-BREEDING SELECTION FOR OIL CONTENT IN BRASSICA SPECIES. L. Rahman and M. Bechyne (Agricultural Univ., Prague, Czechoslovakia). *Oleagineux* 26, 773–8 (1971). A rapid micro-method was developed for the quantitative determination of oil in one cotyledon of *Brassica* seed (about 0.95 mg). The crushed cotyledon was continuously extracted with refluxing solvent. Petroleum ether, acetone and hexane were used in separate experiments, and 2 hours was found adequate for the extraction. The technique was then used to evaluate the effects of breeding and specific gravity of the seed on oil content for *B. hirta, B. carinata, B. napus, B. campestris, B. juncea* and *B. nigra.*

MEASURING TRIGLYCERIDE AND CHOLESTEROL IN PLASMA OR SERUM. R.B. Smernoff (Oxford Labs.). *U.S. 3,645,688.* A method for detecting and analyzing hyperlipoproteinemia is disclosed. Interfering components are extracted from the blood or plasma with an alumina mixture.

PROCESS OF IMPROVING THE QUALITY OF FATS OBTAINED DURING RENDERING OR REFINING. I. Taussky. *U.S. 3,649,656.* During rendering or refining of freshly rendered fats, a combination of lignin and a calcium silicate or mixture of these two silicates is added to the charge in an amount of at least 0.05%. The combined additives improve the color and odor of the fat, reduce the free fatty acid content and shorten the filtration time.

CRYSTAL MODIFIER AND METHOD FOR SOLVENT SEPARATION OF FATTY MATERIALS. D.D. Staker, R.H. Planholt, and D.J. Kriege (Emery Industries, Inc.). *U.S. 3,649,657.* Crystal modifiers useful in the separation of saturated and unsaturated fractions from mixed triglycerides are disclosed. The modifiers are prepared in an acidolysis reaction in which polybasic acids are reacted with fatty acid esters of polyhydric alcohols.

Erratum

Chester Pedigo, mentioned on p. 45A of the February *JAOCS* as a member of the staff of the Girdler Catalyst Division of Chemetron Corp., is instead vice-president in charge of manufacturing and design for Versa-Cat, Inc., Newark, N.J.

• Fatty Acid Derivatives

RHEOLOGICAL PROPERTIES OF LIPOPHILIC BASES. A. Rutkowski and Z. Elsner (Inst. für Allgemeine Chemie und Pharmazeutischen Inst., Warschau, Polen). *Fette Seifen Anstrichm.* 73, 611–2 (1971). Investigations on suppository bases showed that pharmaceutical properties of these products are dependent on their rheological properties. The authors assume that rheological properties can serve as criteria for useful properties of lipophilic pharmaceutical bases.

INFLUENCE OF METALLIC SOAPS ON RHEOLOGICAL PROPERTIES OF LIPOPHILIC BASES. *Ibid.*, 692–4. Influence of metallic soaps on the rheological properties of lipophilic suppository bases was determined. The investigations revealed that rheological properties of suppository bases are considerably altered by the addition of metallic soaps. Alterations in rheological properties are determined from the ratio of solid to liquid components.

α,β-UNSATURATED QUATERNARY ALKYLATED FATTY ACIDS AND ESTERS USEFUL FOR INSECT CONTROL. J.B. Siddall (Zoecon Corp.). *U.S. 3,651,104.* Methods employing and compositions comprising a quaternary alkylated aliphatic hydrocarbon amide or ester and derivatives of these compounds for the control of insects are disclosed.

• Biochemistry and Nutrition

INVESTIGATION OF THE COMPONENT REACTIONS OF OXIDATIVE STEROL DEMETHYLATION. A.D. Rahimtula and J.L. Gaylor (Sect. of Biochem. and Molecular Biol., and the Grad. School of Nutr., Cornell Univ., Ithaca, N.Y. 14850). *J. Biol. Chem.* 247, 9–15 (1972). Microsomal enzymes of rat liver catalyze the mixed function oxidation of 4α-methyl sterols into the corresponding 4α-carboxylic acids. The 4α-carboxylic acids are further metabolized to carbon dioxide and 3-ketosteroid; the decarboxylation occurs under anaerobic conditions, and NAD^+ is required. Partial purification of a NAD^+-dependent microsomal enzyme that catalyzes decarboxylation of 4α-carboxylic acids has now been accomplished. Solubilization has been achieved with sodium deoxycholate, and the solubilized enzyme has been purified free of other enzymes of methyl sterol demethylase by chromatography on diethylaminoethyl-Sephadex A-50. Removal of bound phospholipid by treatment with either phospholipase A or C results in no loss of enzymic activity.

UTILIZATION OF VOLATILE FATTY ACIDS IN RUMINANTS. IV. RELATIVE ACTIVITIES OF ACETYL CoA SYNTHETASE AND ACETYL CoA HYDROLASE IN MITOCHONDRIA AND INTRACELLULAR LOCALIZATION OF ACETYL CoA SYNTHETASE. S. Quraishi and R.M. Cook (Dept. of Dairy Sci., Michigan State Univ., East Lansing, Mich. 48823). *J. Agr. Food Chem.* 20, 91–95 (1972). The relative activity of acetyl CoA hydrolase and acetyl CoA synthetase was investigated in mitochondria from bovine liver, heart, kidney, lung, brain, mammary gland and skeletal muscle. Acetyl CoA hydrolase activity is high in liver, mammary gland, kidney and brain. The enzyme is much less active in heart, lung and skeletal muscle. Hydrolase

activity relative to synthetase activity is high in liver and brain. The synthetase activity is much greater than the hydrolase activity in the other tissues. The intracellular localization of acetyl CoA synthetase was determined in bovine heart, kidney, mammary gland, liver, and lung. Two-thirds of the enzyme is localized in the cytoplasm and one-third in the mitochondria in heart and mammary gland. Acetyl CoA synthetase activity in kidney is equally divided between mitochondria and cytoplasm. The enzyme in lung and liver is localized predominantly in the mitochondria.

EFFECTS OF DIET ON PROPORTIONS OF BLOOD PLASMA LIPIDS AND MILK LIPIDS OF THE LACTATING COW AND THEIR LONG-CHAIN FATTY ACID COMPOSITION. S.R. Qureshi, D.E. Waldern, R.H. Blosser and R.W. Wallenius (Dept. of Animal Sci., Washington State Univ., Pullman, Wash. 99163). *J. Dairy Sci.* 55, 93–101 (1972). The effects of three types of rations (all hay, hay-grain 50:50, and high grain) on changes in blood and milk lipids and their component long-chain fatty acids (LCFA) was studied in dairy cows in the last trimester of lactation. There were no statistically significant differences in proportions of blood lipids between the three treatment groups at any stage of the experiment. Individual variations in their proportions between animals and within groups were large.

ISOLATION AND PARTIAL CHARACTERIZATION OF A HUMAN VITAMIN D-BINDING PLASMA PROTEIN. P.A. Peterson (Dept. of Nutr., Inst. of Med. Chem., Univ. of Uppsala, Uppsala, Sweden). *J. Biol. Chem.* 246, 7748–54 (1971). Vitamin D circulates in human plasma bound to a specific transport protein. This protein differs from the lipoproteins and has a hydrated density greater than 1.21. The purification of the human vitamin D-binding protein was accomplished by use of ammonium sulfate fractionation, DEAE-Sephadex chromatography, sulfoethyl-Sephadex chromatography and gel chromatography. These procedures resulted in a highly purified preparation of the vitamin D-binding protein which had been purified approximately 15,000 fold. The occurrence of the vitamin D-binding protein in normal serum, normal urine and normal cerebrospinal fluid was established by Ouchterlony immunodiffusion analyses with use of a specific antiserum against the vitamin D-binding protein. Indirect estimates indicated that the normal concentration of this protein in serum is approximately 5 μg per ml.

OCCURRENCE OF LONG-CHAIN FATTY ACIDS AND GLYCOLIPIDS IN THE CELL ENVELOPE FRACTIONS OF BAKER'S YEAST. T. Nurminen and H. Suomalainen (Res. Lab. of State Alcohol Monopoly, Helsinki 10, Finland). *Biochem. J.* 125, 963–9 (1971). The total yield of fatty acids from the whole envelopes was markedly higher than that obtained from the ordinary cell walls. In both samples the major fatty acids were C_{16} and C_{18} acids. The whole envelopes contained C_{18} acids and longchain (C_{19}–C_{26}) fatty acids, in a higher proportion than did the ordinary cell walls. Fifteen fatty acids with more than 18 carbon atoms were identified, among which 2-hydroxy-C-20:0 and C-26:0 acids predominated. A complex sphingolipid containing inositol, phosphorus and mannose was isolated from the whole cell envelopes. The main fatty acids of this lipid were 2-hydroxy-C-26:0 and C-26:0 acids. It was concluded that this sphingolipid is present both in the ordinary cell wall and in the plasma membrane of baker's yeast. The neutral lipids amounted to over 50% and the glycerophosphatides to about 30% of the total fatty acid content of the whole envelope. The major fatty acids in these lipids were C-16:1, C-18:1, and C-16:0. The proportion of fatty acids with more than 18 carbon atoms was lowest in the neutral lipids, whereas the neutral glycolipids contained the highest percentage of these fatty acids. Acidic glycolipids amounted to 14% of the total fatty acid content of the whole envelope. The presence of a cerebroside sulphate in this lipid fraction was demonstrated, whereas the high content of 2-hydroxy-C-26:0 acid found is caused by the complex inositol- and mannose-containing sphingolipid.

CONVERSION OF RETINYL METHYL ETHER INTO RETINOL IN THE RAT IN VITRO. S. Narindrasorasak and M.R. Lakshmanan (Biochem. Dept., Faculty of Sci., Mahidol Univ., Bangkok, Thailand). *Biochemistry* 11, 380–84 (1972). In rats retinyl methyl ether (RME) is converted into retinol by everted intestinal sacs, liver slices and liver homogenates. The RME cleavage enzyme of liver is localized in the microsomal fraction, and can be solubilized and stabilized by the preparation of an acetone powder. Mg^{2+} and EDTA have an additive stimulatory effect on the fresh microsomal enzyme but not on the acetone powder preparation. The K_m for RME was found to be 4×10^{-4} M from kinetic studies. Tetrahydropteridine is a required cofactor, also with a K_m of 4×10^{-4} M. The pteridine analog, tetrahydroquinazoline, inhibits the reaction by competing with tetrahydropteridine, and has a K_i of 4.25×10^{-4} M. Molecular oxygen is also required, and NADPH enhances the enzyme activity, presumably by reducing dihydropteridine. Thus, the microsomal enzyme which catalyzes the cleavage of RME to retinol appears to be a typical pteridine requiring monooxygenase.

FURTHER STUDIES ON THE EFFECT OF DIETARY CARBOHYDRATE AND FAT ON PROTEIN METABOLISM IN RATS. K. Nakano, M. Katsuzaki, M. Mizutani and K. Ashida (Lab. of Nutr. Biochem., Dept. of Agr. Chem., Nagoya Univ., Chikusa, Nagoya, Japan). *J. Nutr.* 102, 283–90 (1972). A systematic experiment has been carried out in attempting to elucidate the biochemical mechanism underlying "protein sparing" action of dietary carbohydrate and fat. A more simplified experimental condition was employed in the present investigation in comparison with that in our previous experimental design; the effect of dietary carbohydrate and fat on the body protein metabolism was examined in the absence of any protein in the diet. Feeding of either carbohydrate or fat caused a marked decrease in the level of urinary nitrogen and urea. The ingestion of either carbohydrate or fat by rats resulted in a reduction of the rate of ureogenesis in the rat liver with the concomitant decrease in the activities of hepatic amino acid-catabolizing enzymes, e.g., threonine dehydratase, tryptophan pyrrolase, arginase, glutamic-pyruvic transaminase, glutamic-oxalacetic transaminase and glutamic dehydrogenase (except in fat-fed animals). The feeding of either carbohydrate or fat did not result in changes in the level of free amino nitrogen in blood, indicating that the supply of amino acid may not exert an important role in the ureogenesis in liver. The overall results indicate that the reduction of the activities of hepatic amino acid-catabolizing enzymes elicited by the feeding of either carbohydrate or fat may govern protein metabolism in the rat body.

PERFORMANCE AND MILK AND BLOOD LIPIDS OF MILK FAT-DEPRESSED COWS FED TALLOW AND SUCROGLYCERIDE. E.G. Moody (Div. of Agr., Arizona St. Univ., Tempe, Ariz. 85281). *J. Dairy Sci.* 54, 1817–23 (1971). A double reversal trial with 12 Holstein cows evaluated the addition of 6% tallow and 5.5% tallow plus 0.5% sucroglyceride (a nonionic surface active agent) to the concentrates supplementing alfalfa hay (1.25% of the body weight fed daily) to provide net energy at 110% of Morrison's standard. Added dietary fats showed no effect on measures of digestibility of feed dry matter, protein and acid-detergent fiber although ether extract was 15% more digestible. Dietary additions showed no effect on urine pH, rumen pH and volatile fatty acid amounts or ratios; milk and milk fat yields, fatty acid profile in the blood serum fractions (total lipids, cholesterol esters, triglycerides, free fatty acids, diglycerides, monoglycerides and phospholipids) or in milk fat.

(Continued on page 206A)

• *New Books . . .*

(Continued from page 188A)

rather limited since the current CRC Handbooks are adequately indexed.

The main advantage of the Index is that it provides a quick reference to the information and data available in several handbooks.

The disadvantages of this edition are: (a) does not cover all the present CRC Handbooks; (b) will incur a significant expense; (c) will soon be outdated by a revised edition.

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Deuterium Labeling in Organic Chemistry, Alan F. Thomas (Appleton-Century-Crofts, Educational Division, Meredith Corp., New York, 1971, 518 p.).

This text is an interesting blend of theory and practical application. The author has utilized a technique of including a description of the experimental procedure within the paragraph detailing the theory of the reaction. The various methods of deuterium labeling are covered in the nine chapters of the text. Each chapter is followed by an extensive bibliography which provides one of the greatest values of the book. Three indexes (author, subject and formula) allow for easy recovery of specific information. Previous work on this topic has been too brief and with little attention to critical evaluation of the methods listed. The work by Murray and Williams also suffered from the disadvantage of describing the methods devised before the application of mass spectrometry. The text should be valuable to those first approaching the application of deuterium isotopes as well as those who have some experience in the field.

Chapter 1 presents a discussion of the exchange reactions between water and organic compounds, the "active" hydrogen exchange. Chapter 2 covers the deuterium exchange involving carbanions, discussing labeling of hydrocarbons, sulfones, sulfoxides, thioketals, heterocyclic and quaternary compounds. Short dissertations on acidity and deuterium exchange, stereochemistry, S-bond character, inductive effects and anion stability are included.

Chapter 3 deals with the acid-catalyzed deuterium exchange involving carbonium ions. The mechanism of carbonium ion exchange is discussed, as well as polar addition of hydrogen halides and acid-catalyzed cyclizations.

A review of the methods of exchange labeling of carbonyl-containing substances is presented in Chapter 4. Both base-catalyzed and acid-catalyzed reactions are discussed. The use of metal deuterides is discussed thoroughly in Chapter 5. The stereochemical aspects of metal hydride reduction are covered by a brief survey of the published theories. Homogeneous and heterogeneous catalysts and their role in deuteration of organic molecules by exchange and addition to the double bond are discussed in Chapter 6. In Chapter 7, techniques which have not been discussed previously are presented. Reductive, photochemical, metalation, methylation and oxidation, are some of the types of methods reviewed.

The last two chapters present a discussion of the role of isotope effects in the determination of deuterium in a labeled molecule, Chapter 8, and biochemical deuteration in Chapter 9.

This book has been needed for some time and gathers together much of the information necessary for an intelligent effort in the use of deuterium isotopes. Over 2000 references cover the literature through 1970. The lipid chemist may be disappointed, as there are few references and little mention of methods for the preparation of specifically deuterated unsaturated fatty acids.

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• *Abstracts . . .*

(Continued from page 205A)

On the mode of interaction of β-hydroxydecanoyl thioester dehydrase with allenic acid derivatives. M. Morisaki and K. Bloch (J.B. Conant Lab., Harvard Univ., Cambridge, Mass. 02138). *Biochemistry* 11, 309–14 (1972). As a model system for the inhibition of β-hydroxydecanoyl thioester dehydrase by allenic compounds, the reaction between 2,3-decadienoyl thioesters and histidine derivatives has been investigated. Refluxing S-ethyl 2,3-decadienoate with N-acetylhistidine in methanol for 3 hr affords an adduct (Ia) which has been characterized as a β,γ-olefinic enamine on the basis of ultraviolet and nuclear magnetic resonance spectroscopy, by analysis of ozonolysis products and by mass spectrometry. Under the same conditions, the allenic thioester reacts with histidine methyl ester to form an α,β-olefinic enamine. Comparison of various derivatives of 2,3-decadienoic acid as dehydrase inhibitors established the following order of activities: thioester > oxygen ester > free acid > amide. It is also shown that an allene system conjugated with a carbonyl group is required for enzyme inhibition. The structural features in allenes necessary for enzyme inhibition and for adduct formation with histidine derivatives are compared.

The effects of pregnancy on biliary lipids in rhesus monkeys. D.E. Martin, R.C. Wolf and R.K. Meyer (Dept. of Physiol. and Wisconsin Reg. Primate Res. Center, Univ. of Wisconsin, Madison, Wis. 53706). *Proc. Soc. Exp. Biol. Med.* 139, 115–7 (1972). In an effort to determine whether alterations in biliary excretion of lipids could aid in explaining the marked hypolipemia seen during pregnancy in the rhesus monkey, the concentrations of cholesterol, phospholipids and total lipids were measured at selected stages of gestation. No significant changes in biliary lipid levels were observed, indicating that increased biliary concentration of lipids probably does not occur during pregnancy.

Metabolism of pyruvate and malate by isolated fat-cell mitochondria. B.R. Martin and R.M. Denton (Dept. of Biochem., Univ. of Bristol, Bristol BS8 1TD, U.K.). *Biochem. J.* 125, 105–13 (1971). Metabolism of pyruvate and malate by isolated fat-cell mitochondria incubated in the presence of ADP and phosphate has been studied by measuring rates of pyruvate uptake, malate utilization or production, citrate production and oxygen consumption. These results are in agreement with earlier conclusions that in adipose tissue acetyl units for fatty acid synthesis are transferred to the cytoplasm as citrate and that this transfer requires malate presumably for counter transport. They also support the view that oxaloacetate for citrate synthesis is preferentially formed from pyruvate through pyruvate carboxylase rather than malate through malate dehydrogenase and that the mitochondrial metabolism of citrate in fat-cells is restricted.

The biosynthesis of gangliosides. H.J. Maccioni, A. Arche and R. Caputto (Dept. de Quimíca Biológica, Facultad de Ciencias Químicas, Univ. Nacional de Córdoba, Ciudad Universitaria, Córdoba, Argentina). *Biochem. J.* 125, 1131–7 (1971). After injection of (6-^{3}H)glucosamine into 8-day-old rats it was found that all the major brain gangliosides and their sialyl groups were labelled at essentially the same rate, except the hematoside, which was the least labelled. In 18-day-old rats it was found that the two major gangliosides with the sialyl (2 → 8)-sialyl linkage, and their sialyl groups were more labelled than the hematoside, the Tay-Sachs ganglioside, the two major gangliosides and their respective sialyl groups. No difference was found in any of the cases studied between the specific radio-activities of the neuraminidase-resistant and -labile sialyl groups belonging to the same ganglioside. The same was found for the specific radioactivities of the galactosyl groups proximal and distal to the ceramide moiety of total brain gangliosides from rats injected with (U-^{14}C)glucose. From this it was concluded that partial turnover of the ganglioside molecule does not occur. A model for the synthesis of gangliosides is presented that accounts for results from previous experiments in vitro and the lack of precursor-product relationships observed in experiments in vivo.

Enzymatic action of sialidase of Vibrio cholerae on brain gangliosides above and below the critical micelle concentration. V. Lipovac, G. Bigalli and A. Rosenberg (Dept. Biol. Chem., M.S. Hershey Med. Center, Penn. State Univ., Hershey, Pa. 17033). *J. Biol. Chem.* 246, 7642–48 (1971). The activity of *Vibrio cholerae* sialidase was studied as a function of the physical state of ganglioside substrate. This study provides a model for the interaction of end group

hydrolases with highly polar anionic complex lipids. Sialyl groups of gangliosides are hydrolyzed by *Vibrio* sialidase whether the substrate is in disperse or in micellar form. The action of *Vibrio* sialidase on gangliosides appears, in this regard, to differ from the reported action of other end group hydrolases on complex lipids. Ultracentrifugal analyses indicate that a substantial proportion of sialidase in aqueous buffer adheres to and can be precipitated with ganglioside micelles, but the enzyme remains in solution in the presence of monodisperse substrate, as does monodisperse substrate alone.

CEREBRAL LIPIDS AND AMINO ACIDS IN THE VITAMIN B_6-DEFICIENT SUCKLING RAT. D.J. Kurtz, H. Levy and J.N. Kanfer (Eunice K. Shriver Center for Mental Retardation, Walter E. Fernald State School, Waverley, Mass. 02178). *J. Nutr.* 102, 291–8 (1972). Neonatal vitamin B_6 deficiency was established in the rat. Coenzyme levels of the brain of the suckling rats from the dams fed a B_6-deficient diet after parturition were determined by the (1-^{14}C) tyrosine-tyrosine apodecarboxylase method and found to be approximately one-third normal in deficient animals 18 days old. Cerebral sphingolipids were reduced 30 to 50% in animals 18 to 20 days old. Minor alterations were observed in glycerophosphatides and plasmalogens. Cystathionine accumulated to 16 times normal levels. Glycine, citrulline, taurine and the branched-chain amino acid levels were also elevated while gamma aminobutyric acid and serine were reduced. The role of vitamin B_6 in sphingolipid metabolism has been the subject of much interest. The amino acid changes are largely explicable by reduced activity of known B_6-requiring apoenzymes.

THE EFFECTS OF REDUCED NICOTINAMIDE ADENINE DINUCLEOTIDE PHOSPHATE, ITS STRUCTURAL ANALOGUES, AND COENZYME A AND ITS DERIVATIVES ON THE RATE OF DISSOCIATION, CONFORMATION, AND ENZYME ACTIVITY OF THE PIGEON LIVER FATTY ACID SYNTHETASE COMPLEX. S. Kumar and J.W. Porter (Lipid Metabolism Lab., Veterans Admin. Hosp. & Dept. of Physiol. Chem., Univ. of Wisconsin, Madison, Wis. 53706). *J. Biol. Chem.* 246, 7780–89 (1971). The fatty acid synthetase complex of pigeon liver is completely dissociated to half-molecular weight subunits of either negligible or no enzyme activity in the presence of 35 mM glycine, 5 mM Tris, 1 mM EDTA and 1.0 mM 2-mercaptoethanol at pH 8.3 (μ = 0.008). This dissociation and loss of enzyme activity can be prevented by the addition of 0.2 M KCl or 20 μM NADPH to the above incubation medium. The results reported in this paper are discussed in relation to the stability and integrity of the enzyme complex and the type of forces which may hold the subunits of the complex together. The possibility of NADPH and CoA acting as metabolic regulators of fatty acid synthesis through their effect on the stability of the complex has been considered.

MEMBRANES OF MAMMARY GLAND. III. LIPID COMPOSITION OF GOLGI APPARATUS FROM RAT MAMMARY GLAND. T.W. Keenan, C.M. Huang and D.J. Morré (Depts. of Animal Sci., Botany and Plant Pathol., and Biological Sci., Purdue Univ., Lafayette, Ind. 47907). *J. Dairy Sci.* 55, 51–57 (1972). Purified Golgi apparatus fractions were obtained from mammary glands of lactating rats and were characterized morphologically and enzymologically. The lipid composition of the isolated fraction was determined and compared to rough endoplasmic reticulum and milk fat globule membranes. On a protein basis, Golgi apparatus and endoplasmic reticulum contained approximately the same amount of phospholipid. The Golgi apparatus fraction was rich in neutral lipid, most of which was due to triglyceride-rich lipid droplets which adhered to the membranes. The same fatty acids were found in both Golgi apparatus and milk fat globule membrane phospholipid classes. Results are compatible with the concept of Golgi apparatus-mediated cytomembrane differentiation.

PHOSPHORUS DEPRIVATION: THE METABOLISM OF VITAMIN D_3 AND 25-HYDROXYCHOLECALCIFEROL IN RATS. J.G. Haddad, Jr., V. Boisseau and L.V. Avioli (Dept. of Med. The Jewish Hos. of St. Louis and Washington Univ. Schl. of Med. St. Louis, Mo. 63110). *J. Nutr.* 102, 269–82 (1972). The metabolism of intravenously administered ^{3}H-vitamin D_3 (D_3-^{3}H) and ^{3}H-25-hydroxycholecalciferol (25-HCC-^{3}H) was examined in young rats following dietary depletion of phosphorus. Depleted animals, in contrast to controls given phosphate supplements in their drinking water, exhibited poor growth, hypercalcemia, hypophosphatemia and florid rickets. The acute plasma disappearance and hepatic uptake of a radioactive vitamin D_3 preparation were similar in both groups. A similar lipid and aqueous distribution of plasma radioactive vitamin D_3 metabolites was observed as well. Following intravenous doses of 25-HCC-^{3}H, silicic acid column chromatography of chloroform-extracts of intestinal mucosa and kidney revealed comparable patterns in each of these tissues. In both groups, higher tissue/plasma ratios of 25-HCC-^{3}H were found in kidney compared to intestinal mucosa. The generation of more polar metabolites, previously shown to contain 1,25-hydroxycholecalciferol, was not impaired in test animals. In vitro transfer of ^{45}Ca across inverted intestinal loops was significantly greater in phosphorus-deprived animals. These observations suggest that the intestinal transfer of calcium is enhanced and the metabolism of vitamin D_3 apparently unaltered in the phosphorus-deprived rachitic animal in which profound abnormalities of growth and skeletal mineralization occur.

DYE-SENSITIZED PHOTOOXIDATION OF TOCOPHEROLS. CORRELATION BETWEEN SINGLET OXYGEN REACTIVITY AND VITAMIN E ACTIVITY. G.W. Grams and K. Eskins (No. Reg. Res. Lab., A.R.S., U.S.D.A., Peoria, Ill. 61604). *Biochemistry* 11, 606–8 (1972). The singlet oxygen reactivity of α-, β-, γ- and δ-tocopherol was determined in methanol with methylene blue as the photosensitizer. The disappearance of tocopherol was followed colorimetrically according to the Emmerie-Engel method. Of the four tocopherols, α was the most reactive and δ was the least. α-Tocopherol is one of the most reactive compounds toward singlet oxygen reported in the literature. The reactivity of each tocopherol (α, β, γ and δ = 1, 0.50, 0.26 and 0.10) correlates well with its vitamin E activity.

PORCINE PANCREATIC LIPASE. C.W. Garner, Jr. and L.C. Smith (Dept. of Biochem., Baylor College of Med., Houston, Tx. 77025). *J. Biol. Chem.* 247, 561–5 (1972). Porcine pancreatic lipase has been purified to homogeneity as determined with analytical polyacrylamide gels. Both isoenzymes of lipase were shown to be glycoproteins containing 3.8 moles of mannose and 2.9 moles of N-acetyl-glucosamine per mole of enzyme.

EFFECTS OF PENTOBARBITAL OF PLASMA GLUCOSE AND FREE FATTY ACIDS IN THE RAT. R.L. Furner, E.D. Neville, K.S. Talarico and D.D. Feller (Environmental Biol. Div., Ames Res. Center, NASA, Moffett Field, Cal. 94035). *Proc. Soc. Biol. Med.* 139, 231–4 (1972). Hyperglycemia and hypolipemia were observed in rats after the injection of sodium pentobarital (Nembutal). The observed changes were independent of whether the blood was collected by decapitation or by needle puncture of the aorta. The hyperglycemic response was caused by two factors, the stress of the injection per se and the pharmacological action of the drug. Hyperlipemia was observed at 5 min postinjection; however, pentobarbital decreased plasma free fatty acids by 15 min postinjection. Both the hyperglycemia responses were dose dependent.

MEASUREMENTS OF THE MOLECULAR WEIGHT VARIABILITY OF PLASMA LOW DENSITY LIPOPROTEINS AMONG NORMALS AND SUBJECTS WITH HYPER-β-LIPOPROTEINEMIA. DEMONSTRATION OF MACROMOLECULAR HETEROGENEITY. W.R. Fisher, Mary Granade Hammond and G.L. Warmke (Dept. of Med. and Biochem., Coll. of Med., Univ. of Florida, Gainesville, Fl.). *Biochemistry* 11, 519–25 (1972). The structural variability of human plasma low density lipoprotein (LDL) has been evaluated using hydrodynamic methods. The study was undertaken to determine whether there were macromolecular structural differences among the LDL of normals and of hyper-β (type II)-hyperlipoproteinemic subjects. In none of the physical parameters measured can a difference be demonstrated between the LDL of normal subjects and of subjects with hyper-β(type II)-lipoproteinemia, nor is there a difference in the lipid composition of these lipoproteins. Immunologically, the apoproteins are only precipitated by anti-LDL antibody. These findings indicate that the LDL apoprotein from a given subject shows striking consistency in its lipid binding properties but that the apoprotein from various individuals differ in their capacity to bind lipid and hence in their molecular weights. It would appear that structural variations in the

plasma LDL may be a frequent finding, possibly reflecting genetic variability among individual subjects.

BIOSYNTHESIS OF LIVER MEMBRANES. W.H. Evans and J.W. Gurd (Nat. Inst. for Med. Res., Mill Hill, London NW7 1AA, U.K.). *Biochem. J.* 125, 615–24 (1971). The smooth- and rough-microsomal and the light and heavy plasma-membrane fractions of mouse liver homogenates were prepared and characterized by using biochemical markers. The hexosamine/protein ratio was threefold higher in the plasma membranes than in the smooth-microsomal fraction. Glucosamine was bound only to protein, and galactosamine was attached mainly to lipids. (^{3}H)-Leucine and (^{14}C)glucosamine were injected into animals and the rates of incorporation of radioactivity into the fractions were determined. Both precursors were rapidly incorporated into the microsomal fractions, but plasma membranes showed a slower rate of synthesis which reached a maximum at 2 to 4h after intravenous administration. The light- and heavy-plasma-membrane fractions showed similar patterns of incorporation, and therefore a precursor-product relationship appears unlikely. Plasma membranes, especially the light subfraction, showed appreciable incorporation of hexosamine into chloroform methanol-soluble components which were shown to be mainly glycolipids. The results indicate that liver plasma-membrane proteins and glycoproteins are synthesized at similar rates. However, glycolipid synthesis in plasma membranes occurred more rapidly.

INSECT LIPOVITELLIN. CHEMICAL AND PHYSICAL CHARACTERISTICS OF A YOLK PROTEIN FROM THE OVARIES OF LEUCOPHAEA MADERAE. R.K. Dejmal and V.J. Brookes (Dept. of Entomol., Oregon St. Univ., Corvallis, Ore. 97331). *J. Biol. Chem.* 247, 869–74 (1972). A lipoglycoprotein fraction extracted and purified from the ovaries of the cockroach, *Leucophaea maderae*, contains two components with sedimentation constants 28.1 S and 14.5 S. The lipid moiety consists of phospholipid and represents about 6.9% of the total weight. The carbohydrate is made up of mannose and hexosamine comprising 6.4 to 7.0% and about 1.6%, respectively, of the total weight. The hexosamine is primarily glucosamine but a trace of a second hexosamine was detected. The amino acid composition of each component is the same. The molecular weights determined by sedimentation equilibrium are 5.59×10^5 for the 14 S component and 1.59×10^6 for the 28 S component. The large fraction can be disaggregated under mild alkaline conditions and by temperatures of 65C to give several fragments, one of which has sedimentation characteristics similar to those of the 14 S component. The data support earlier work which suggested that the 28 S component was formed somewhere in the follicle from the 14 S component.

THE EFFECTS OF TEMPERATURE ON THE COMPOSITION AND PHYSICAL PROPERTIES OF THE LIPIDS OF PSEUDOMONAS FLUORESCENS. J. Cullen, M.C. Phillips and G.G. Shipley (Unilever Res., Colworth/Welwyn Lab., The Frythe, Welwyn, Herts., U.K.). *Biochem. J.* 125, 733–42 (1971). *Pseudomonas fluorescens* was grown at various temperatures between 5C and 33C. The extractable lipids from organisms at various stages of growth and grown at different temperatures were examined. The extractable lipids contained phosphatidylethanolamine, diphosphatidylglycerol, phosphatidylglycerol, phosphatidylcholine and an ornithine-containing lipid. The relative amounts of these lipids did not vary significantly during growth or with the changes in growth temperature. The major fatty acids were hexadecanoic, hexadecenoic and octadecenoic acids and the cyclopropane acids methylene-hexadecanoic and methylene-octadecanoic acids. The molecular packing of cyclopropane acids is intermediate between that of the corresponding cis- and trans-monoenoic acids. However, substitution of a cyclopropane acid for a cis-unsaturated acid has insignificant effects on the molecular packing of phospholipids containing these acids.

PROPERTIES OF THE INSULIN RECEPTOR OF ISOLATED FAT CELL MEMBRANES. P. Cuatrecasas (Dept. of Med. and Dept. of Pharmacol. and Exp. Therapeutics, Johns Hopkins Univ. School of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 246, 7265–74 (1971). The interaction of ^{125}I-insulin with crude membrane preparations from isolated fat cells has many properties in common with the interaction of insulin with biologically significant receptors in intact fat cells. Specific binding of ^{125}I-insulin to the membranes is a saturable process with respect to insulin and to membranes, and native insulin competes for binding in a way expected from the biological indentity of the 2 molecules. Reduced and desoctapeptide insulins do not compete with ^{125}I-insulin for binding, and desalanine insulin is indistinguishable from native insulin. Proinsulin binds to the membranes with an affinity which is 20 times less than that of native insulin. Modification of the membranes with several protein reagents suggests that tyrosyl and possibly histidyl residues may be important in the binding interaction. No evidence is present for the involvement of sulfhydryl, tryptophanyl or carboxyl groups of the membrane.

PREFERENTIAL RETENTION OF TAURINE-CONJUGATED BILE SALTS BY CHOLESTYRAMINE IN THE RAT ILEUM. D.A. Cook, L.M. Hagerman and D.L. Schneider (Dept. of Nutr. Res., Mead Johnson Res. Center, Evansville, Ind. 47721). *Proc. Soc. Exp. Biol. Med.* 139, 70–73 (1972). In the absence of cholestyramine both glycine- and taurine-conjugated bile salts were rapidly absorbed from the rat ileum. Equilibration of bile salts with the resin prior to ileal instillation retarded, but did not completely interrupt, bile salt absorption. Cholestyramine retained the taurine conjugates of both the dihydroxy and the trihydroxy bile salts in the ileum more effectively than the corresponding glycine conjugates, and preferentially retained dihydroxy bile salts compared with trihydroxy bile salts.

THE EFFECT OF VITAMIN E ON THE INTRACELLULAR DISTRIBUTION OF THE DIFFERENT OXIDATION STATES OF SELENIUM IN RAT LIVER. Christine Caygill, J.A. Lucy and A.T. Diplock (Dept. of Biochem., Royal Free Hosp. School of Med., Univ. of London, London WC1N 1BP, U.K.). *Biochem. J.* 125, 407–16 (1971). In adequately fed rats, selenide was particularly associated with the mitochondrial fractions; in vitamin E-deficient rats, little selenide was found and the buoyant density of the mitochondria was increased, whereas in re-feeding with vitamin E showed a restoration of the normal pattern. In vitamin E- and selenium-deficient rats,

Erratum

The abscissa of Figure 3 ("Critical Unit Operations of the Aqueous Processing of Fresh Coconuts" by Hagenmaier et al., JAOCS 49:179 [1972]) was incorrectly labeled. The corrected figure is printed below.

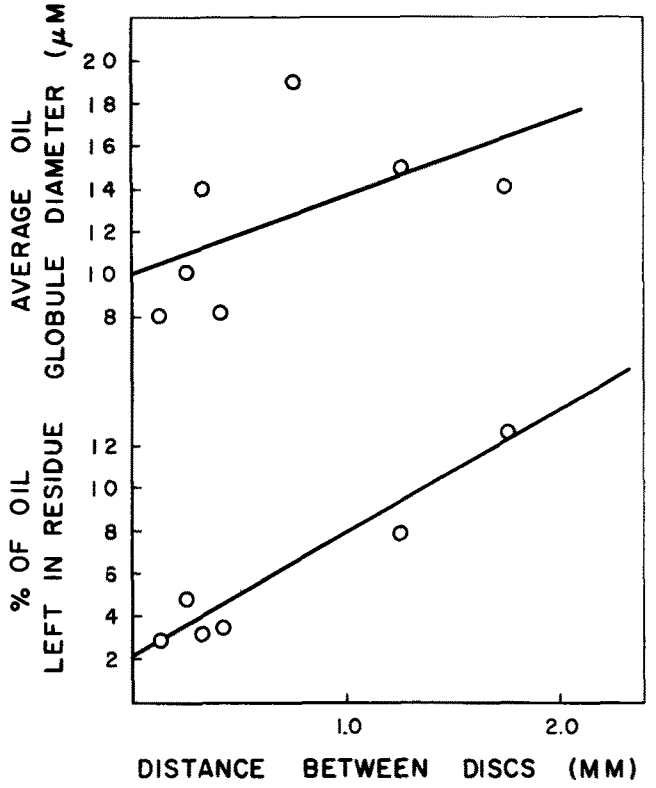

FIG. 3. Effect of disc spacing in Bauer Mill on oil globule size and oil retention of residue.

re-fed with vitamin E, there was no tendency for selenide to be localized in the mitochondria. In the microsomal regions of the gradients, adequately fed rats showed a concentrations of selenide, particularly in the smooth endoplasmic reticulum fractions, and to a lesser extent in the rough endoplasmic reticulum fractions. This was not observed in vitamin E-deficient rats, and the normal pattern was restored on re-feeding with vitamin E, both in rats given the vitamin E-deficient diet and the vitamin E-deficient and selenium-deficient diet.

THE AGE-DEPENDENT RESPONSE OF SERUM TRIGLYCERIDES TO DIETARY FRUCTOSE. M. Chevalier, J.H. Wiley and G.A. Leveille (Lab. of Nutr. Biochem., Dept. of Animal Sci., Univ. of Ill. at Urbana-Champaign, Urbana, Ill. 61820). *Proc. Soc. Exp. Biol. Med.* 139, 220–2 (1972). Diets containing 70.1% glucose, starch, sucrose or fructose were fed to weanling and mature rats. Dietary fructose or sucrose increased serum triglyceride levels in the mature but not in the weanling rats. The results help to explain some of the conflicting reports found in the literature.

EFFECTS OF ESSENTIAL FATTY ACID DEFICIENCY ON COCCIDIOSIS IN THE DOMESTIC FOWL. M.Z. Charney, W.M. Reid, L.R. McDougald and Joyce Johnson (Dept. of Poultry Sci., Univ. of Georgia, Athens, Ga. 30601). *Poultry Sci.* 50, 1801–05 (1971). The effects of essential fatty acid (E.F.A.) deficiency upon the susceptibility of chicks to *Eimeria tenella* and *E. mivati* coccidial infections were studied in chicks raised on an E.F.A.-deficient diet and compared with chickens fed non-deficient rations. Four dietary treatments were used consisting of: (1) practical diet containing essential fatty acids, (2) a purified fat-deficient basal diet, (3) a basal fat-deficient diet supplemented with 5% corn oil (which contains essential fatty acids) and (4) a basal fat-deficient diet supplemented with 5% hydrogenated coconut oil (which is essential fatty acid deficient). The severity of coccidial infection (lesions and mortality) was significantly less in chicks fed the fat-deficient or hydrogenated coconut oil supplemented diets when compared to the chicks fed diets containing essential fatty acids.

OXIDATION OF GLYCEROL 3-PHOSPHATE BY THE PERFUSED RAT LIVER. Hilda H. Carnicero, C.L. Moore and H.D. Hoberman (Dept. of Biochem., A. Einstein College of Med., Bronx, N.Y. 10461). *J. Biol. Chem.* 247, 418–26 (1972). Detritiation of (2-^{3}H)glycerol-3-P by isolated liver mitochondria can be used to assay the activity of mitochondrial glycerol-3-P dehydrogenase. The method differs from measurements of dihydroxyacetone-3-P formation only by the isotope effect on the reaction rate. Under assay conditions liver mitochondria of hyperthyroid rats detritiated (2-^{3}H)glycerol-3-P 16 times faster than those of normal controls. However, the value of K 0.5S (the concentration of glycerol-3-P giving 0.5 V_{max}) for the oxidation of glycerol-3-P by mitochondria of hyperthyroid rats was 5 times higher than for the reaction catalyzed by mitochondria of normal animals. The results described in this communication do not support the concept of a glycerol-3-P cycle in liver regulated by thyroid hormones but indicate that the pathway of oxidation of extramitochondrial hydrogen leads through respiratory chain-linked NADH dehydrogenase.

SUBSTRATE-INDUCED DIFFERENCE SPECTRA AND CHOLESTEROL TO PREGNENOLONE CONVERSION WITH ADRENAL HEME PROTEIN P-450. S. Burstein, Nana Co, M. Gut, H. Schleyer, D.Y. Cooper and O. Rosenthal (Div. of Steroid Chem., Inst. Muscle Disease, New York, N.Y. 10021). *Biochemistry* 11, 573–77 (1972). A correlative study was made between the enzymatic rates of conversion of cholesterol to pregnenolone and the substrate-induced difference spectra (in the 390- to 420-nm range) observed with cholesterol-oxygenated derivatives using various heme protein P-450 preparations from bovine adrenocortical mitochondria. The type of the difference spectra observed with some of the sterols depended on the technique used in the preparation of the heme protein P-450 fractions. These results suggest that great caution must be exercised in deriving mechanistic enzymatic conclusions from substrate-induced difference spectra as these may drastically vary both with respect to magnitude and affinity without significantly affecting, in certain cases, the enzymatic activities.

STUDIES ON THE MECHANISM AND REGULATION OF C-4 DEMETHYLATION IN CHOLESTEROL BIOSYNTHESIS. D.P. Bloxham, D.C. Wilton and M. Akhtar (Dept. of Physiol. and Biochem., Univ. of Southampton, Southampton, S09 5NH, U.K.). *Biochem. J.* 125, 625–34 (1971). An assay for demethylation has been developed based on the release of tritium from 4,4-dimethyl (3α-^{3}H)cholest-7-en-3β-ol (II). The maximum release of ^{3}H from 3α-^{3}H-labelled compound (II) in a rat liver microsomal preparation occurs in the presence of NADPH and NAD^+ under aerobic conditions. Incubation of 3α-^{3}H-labelled compound (II) with NADPH under aerobic conditions leads to the formation of a 3α-^{3}H-labelled C-4 carboxylic acid. This compound undergoes dehydrogenation on subsequent anaerobic incubation with NAD^+. The ^{3}H released from the steroid was located in (4-^{3}H)nicotinamide and the medium. Incubation with synthetic (4-$^3H_2$) NADH gave a similar result. In the presence of glutamate dehydrogenase and α-oxoglutarate part of the ^{3}H released from the steroid was transferred to glutamate. A series of 3-oxo steroids were reduced equally well by (4-$^3H_2$)NADH and (4-$^3H_2$)NADPH. The reduction of 5α-cholest-7-en-3-one was shown to use the 4B H atom from the nucleotide. 3′:5′-Cylic AMP was shown to be a competitive inhibitor of the 3β-hydroxy dehydrogenase enzyme in the demethylation reaction.

THE FEEDBACK CONTROL OF HEPATIC CHOLESTEROL SYNTHESIS IN UGANDAN PATIENTS WITH LIVER DISEASE. D.M. Bissell and E. Alpert (Thorndike Memorial Lab., Harvard Med. Unit, Boston City Hosp., Boston, Mass. 02118). *Cancer Res.* 32, 149–52 (1972). Hepatic cholesterol synthesis is thought to be under the influence of a feedback inhibition by dietary cholesterol, except in the case of primary hepatoma. This feedback mechanism has been studied in Ugandan patients with hepatoma and with nonneoplastic liver disease. A control study of a group of patients in Boston was also carried out. The functioning of the feedback mechanism in Ugandans with hepatoma could not be analyzed in that all hepatoma biopsies synthesized very low amounts of cholesterol. Cholesterol synthesis by hepatoma tissue was significantly less than that of Ugandan controls and was also less than that of the previously studied hepatomas in the United States. In patients with nonneoplastic liver disease, the feedback mechanism in several cases appeared to be absent. This finding was in contrast to results from the group of control patients in Boston, which findings verified the cholesterol feedback phenomenon previously reported in Westerners. The Ugandan patients lacking the feedback mechanism did not appear to fall into any single clinical or histological category. The reasons for this finding are uncertain, although a possible role of aflatoxin is suggested.

METABOLISM OF FATTY ACIDS BY ADIPOSE TISSUE AND LIVER OF COWS FED NORMAL, RESTRICTED ROUGHAGE OR MgO SUPPLEMENTED RATIONS. J.D. Benson, E.W. Askew, R.S. Emery and J.W. Thomas (Dairy Sci. Dept., Michigan St. Univ., East Lansing, Mich. 48823). *J. Dairy Sci.* 55, 83–92 (1972). Two Latin square experiments used 11 lactating cows to study dietary effects on fatty acid metabolism in serum, liver and adipose tissue. Lipoprotein lipase and fatty acid esterifying activities from adipose tissue homogenates were increased and milk fat depressed when the ration was switched from normal to restricted-roughage, high-grain. Mammary gland uptake of triglycerides from dextran-sulfate precipitable lipoproteins and milk fat percentage was greater for cows fed MgO supplemented rations than for cows fed the other rations. Cholesterol linoleate increased in the dextran sulfate precipitable lipoproteins when rations were switched from normal to restricted-roughage, high-grain. Changes in both serum lipids and tissue enzymes are associated with an increased flux of fatty acids toward adipose tissues during restricted-roughage, high-grain feeding.

ISOLATION OF GLYCOPEPTIDES FROM LOW- AND HIGH-DENSITY PLATELET PLASMA MEMBRANES. A.J. Barber and G.A. Jamieson (Blood Res. Lab., Am. Nat. Red Cross, Bethesda, Md. 20014).

Biochemistry 10, 4711–17 (1971). Glycopeptides have been isolated from both the low-(d 1.090) and high-(d 1.120) density membranes isolated by the glycerol-lysis technique. Three size classes of glycopeptide were obtained on treatment with trypsin which were identical with those obtained by proteolytic digestion using intact platelets. However, a chondromucopeptide obtained from intact platelets by trypsin treatment was not obtained using isolated membranes suggesting that it is a product of the platelet "release reaction." Brief digestion of intact platelets with chymotrypsin, which does not induce the release reaction, did not yield the chondromucopeptide and in this case the isolated macroglycopeptide was larger than that obtained by treatment. These results show that both types of membrane vesicle are derived from the outer surface of the platelet and may reflect areas of anatomical specialization on the platelet surface, as previously suggested from electron microscopy.

STEROL AND TRITERPENE SYNTHESIS IN THE DEVELOPING AND GERMINATING PEA SEED. D.J. Baisted (Dept. of Biochem. and Biophysics, Oregon St. Univ., Corvallis, Ore. 97331). *Biochem. J.* 124, 375–83 (1971). Developing and germinating pea seeds were compared with respect to their capacity to incorporate mevalonate into sterols and triterpenes. The capacity for sterol synthesis is greatest in the least mature fruits and decreases during their development. Label is shown, by gas-liquid chromatography and counting the radioactivity of trapped fractions, to be associated with campesterol, β-sitosterol and isofucosterol. During early stages of germination sterol synthesis is insignificant. The triterpene fraction becomes heavily labelled during both development and germination. The label is associated almost exclusively with β-amyrin during germination but with cycloartenol and 24-methylenecycloartanol during development. It is only in the terminal stages of maturation that β-amyrin becomes significantly labelled. At the same time an unidentified radioactive polar compound appears. The possible significance of the appearance of this polar compound and the regulation of the synthesis of these higher terpenoids is discussed.

ANTITUMOR ACTIVITY OF GLYCERYL ETHERS. K. Ando, K. Kodama, A. Kato, G. Tamura and K. Arima (Lab. of Microbiol., Dept. of Agr. Chem., Univ. of Tokyo, Bunkyo-ku, Tokyo, Japan). *Cancer Res.* 32, 125–9 (1972). Antitumor activity of fatty alcohols and α-glyceryl ethers of fatty alcohols was examined with Ehrlich carcinoma in mice. Significant antitumor activity was exerted against Ehrlich ascites carcinoma by i.p. administration of capryl, lauryl and myristyl α-glyceryl ethers. Capryl and lauryl glyceryl ethers suppressed the growth of solid tumor when administered through various routes. Administration s.c. was the most effective.

HUMAN SERUM LIPOPROTEINS. EVIDENCE FOR THREE CLASSES OF LIPOPROTEINS IN S_f 0–2. J.J. Albers, Chi-Hong Chen and F. Aladjem (Dept. of Microbiol., Univ. So. California Med. School, Los Angeles, Cal. 90033). *Biochemistry* 11, 57–63 (1972). The lipoprotein composition of the S_f 0–2 lipoproteins from the serum of individuals and from pooled serum was studied. S_f 0–2 was found to contain three classes of lipoproteins: high density lipoproteins (HDL_1), low density lipoproteins (LDL_3) and a lipoprotein which shares antigenic determinants with LDL, LDL-a-1. HDL_1 has a sedimentation coefficient at d 1.002 g/cm³ of 4.6 S, and a molecular weight by Agarose gel chromatography of 0.5×10^6. The electrophoretic and immunological properties of HDL_1 are similar to those of HDL_2.

6,11-DIHYDRO-11-HYDROXY-6-OXO-2,2,5-TRIMETHYL-2*H*-NAPHTHO(1,2-*b*)PYRAN. A STABLE QUINONE HEMIKETAL RELATED TO VITAMIN K AND OF SPECIAL INTEREST CONCERNING OXIDATIVE PHOSPHORYLATION. N.I. Bruckner and N.L. Bauld (Dept. Chem., Univ. Texas, Austin, Tx. 78712). *J. Org. Chem.* 36, 4045–6 (1971). Argentic oxide oxidation of 6-methoxy-2,2,5-trimethyl-2*H*-naphtho(1,2-*b*)pyran gives the title compound in 35% yield. The latter is a stable hemiketal of special interest because it is structurally analogous to an intermediate proposed for oxidative phosphorylation. The hemiketal is isolated from an acidic medium and is isomerized only slowly and partially by triethylamine in refluxing benzene. Various attempts to prepare phosphate esters of the ketal hydroxyl function were unsuccessful.

FURTHER STUDIES OF THE LIPID COMPOSITION AND BIOCHEMICAL PROPERTIES OF TETRAHYMENA PYRIFORMIS MEMBRANE SYSTEMS. G.A. Thompson, Jr., R.J. Bambery and R.Y. Nozawa (Dept. Botany, Univ. Texas, Austin, Tx. 78712). *Biochemistry* 10, 4441–7 (1971). Each of several membrane systems of *Tetrahymena* has been found to have a characteristic lipid distribution. The triterpene alcohol tetrahymonol is present in surface membranes at a concentration more than seven times that found in the cell's endoplasmic reticulum. The surface membranes also contain a threefold enrichment in alkyl glyceryl ether phospholipids. However, it appears that the lipid mixture arriving at these surface locations from the sites of their synthesis has not yet become enriched in these species. Possible mechanisms for achieving the selective accumulations are discussed.

A MEMBRANE-BOUND PHOSPHOLIPASE A1 PURIFIED FROM ESCHERICHIA COLI. C.J. Scandella and A. Kornberg (Dept. of Biochem., Stanford Univ. School of Med., Stanford, Calif. 94305). *Biochemistry* 10, 4447–56 (1971). Phospholipase A1 bound tightly in the cell membrane hydrolyzes membrane phospholipids following heat treatment, lysis or aging (48 hr at 0C) of *E. coli* cells. This enzyme may be responsible for phospholipid breakdown and for changes in membrane integrity which have been observed following phage infection, the addition of antibody and complement or colicin action. The enzyme was purified approximately 5000-fold to near homogeneity by solubilization with sodium dodecyl sulfate (SDS)-butanol, isoelectric precipitation, acetone fractionation and SDS-acrylamide gel electrophoresis. The enzyme is stable in 3% SDS and tends to aggregate in the absence of detergent. Neither detergent nor the lipids which copurify with the enzyme are necessary for activity. The enzyme hydrolyzes the 1-acyl chain of phosphatidylcholine, phosphatidylethanolamine, phosphatidylglycerol (PG) and diphosphatidylglycerol at comparable rates. The K_m for PG is 3×10^{-7} M. Hydrolysis of L-phosphatidylcholine but not D-phosphatidylcholine or triglyceride identifies the enzyme as phospholipase A1 and distinguishes it from known lipases.

BLOOD GROUPS AND SERUM CHOLESTEROL AMONG 10,000 ADULT MALES. J.H. Medalie, C. Levene, C. Papier, U. Goldbourt, F. Dreyfuss, D. Oron, H. Neufeld and E. Riss (Dept. of Family Med., Tel Aviv Med. School, Tel Aviv, Israel). *Atherosclerosis* 14, 219–29 (1971). An analysis of blood groups and cholesterol has been made as part of a long-term prospective investigation of ischemic heart disease among 10,000 Israeli males, aged 40 and over. The total mean serum cholesterol level for men of blood group A1 was found to be significantly higher than the mean for the combined ABO groups, although this did not hold for every individual country of origin. Among the Rh, MN, Kell, Duffy and Kidd blood groups, Kell was the only one which showed a significant association with mean serum cholesterol. Men with both A1 and Kell + exhibited a higher mean cholesterol level than either group separately. The question is raised whether the significant statistical associations in this study population have biological implications.

CORRELATIVE STUDY OF BLOOD COAGULATION AND SERUM LIPIDS IN DIABETICS WITHOUT CLINICALLY RECOGNIZABLE COMPLICATIONS. M.H. Ghanem, S. Tawfik, F.K. Guirgis and M. El-Sawy (Depts. of Med. & Clinical Pathol., Faculty of Med., Univ. of Alexandria, Alexandria, U.A.R.). *Atherosclerosis* 14, 277–81 (1971). Blood coagulability and serum lipids have been studied in 28 diabetic patients without clinically recognizable complications. Changes of plasma FFA were correlated with platelet adhesiveness and thromboplastic activity. Positive correlation was also obtained between serum phospholipids on one hand and whole blood coagulation and re-

• *Meetings* . . .

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trophoresis, Park Sheraton Hotel, New York. Contact: Program Director, CAMAG, Inc., 2855 S. 163 St., New Berlin, Wis. 53151.

June 20–27, 1973—Achema '73 and the European Meeting of Chemical Engineering, Frankfurt/Main, Germany.

July 2–6, 1973—Second Congress of the *Association Internationale de la Couleur,* University of York, England.

Oct. 29–Nov. 2, 1973—Fourth International Conference on Atomic Spectroscopy, Toronto, Ontario, Canada.

calcification times on the other hand. Although these results showed that changes in blood coagulability and blood lipids are closely associated yet they are probably two separate phenomena coexisting in the same disease.

ESSENTIAL FATTY ACIDS IN THE DIET OF RAINBOW TROUT (SALMO GAIRDNERI): GROWTH, FEED CONVERSION AND SOME GROSS DEFICIENCY SYMPTOMS. J.D. Castell, R.O. Sinnhuber, J.H. Wales and D.J. Lee (Dept. of Food Science & Technol., Oregon State Univ., Corvallis, Ore. 97331). *J. Nutr.* 102, 77–86 (1971). Experiments are described to define further the fatty acid requirements of rainbow trout (*Salmo gairdneri*). In all cases, feeding semipurified diets containing no polyunsaturated fatty acids resulted in poor growth and feed conversion. Linolenic acid was superior to linoleic in stimulating growth and improving feed conversion. The requirement of linolenic acid (ω3 fatty acids) for rainbow trout is 1% of the diet or approximately 2.7% of the dietary calories. Essential fatty acid deficiency symptoms that were cured or prevented by linolenic acid included fin erosion, heart myopathy and a shock syndrome. It is concluded that linolenic acid has an essential role in rainbow trout similar to that assigned to linoleic acid to man and higher animals.

ESSENTIAL FATTY ACIDS IN THE DIET OF RAINBOW TROUT (SALMO GAIRDNERI): PHYSIOLOGICAL SYMPTOMS OF EFA DEFICIENCY. J.D. Castell, R.O. Sinnhuber, D.J. Lee and J.H. Wales. *Ibid.*, 87–92. Certain physiological changes in rainbow trout which may be attributed to a dietary insufficiency of the essential fatty acids of the linolenic or ω3 series are described. A greatly increased mitochondrial swelling rate was induced in fish fed a fat-free diet. Linolenic acid was most effective in reducing the swelling phenomenon. Diets without ω3 fatty acids showed an increased liver respiration rate, a slightly lower hemoglobin content and increased muscle water.

ESSENTIAL FATTY ACIDS IN THE DIET OF RAINBOW TROUT (SALMO GAIRDNERI): LIPID METABOLISM AND FATTY ACID COMPOSITION. J.D. Castell, D.J. Lee and R.O. Sinnhuber. *Ibid.*, 93–100. The fatty acid composition of the liver, heart, kidney, brain and body lipids of fish fed either a fat-free diet or those containing known amounts of oleic, linoleic or linolenic acid was determined. A fat-free diet or one containing oleic acid as a sole lipid source resulted in elevated levels of eicosatrienoic acid (20:3ω9). Dietary linoleate and linolenate both depressed the triene levels. The former acid elevated 20:4ω6 and 22:5ω6 concentrations and the latter increased 22:6ω3 tissue levels. Dietary lipids affected the fatty acid composition of phospholipids to a greater degree than those in the neutral lipids. The demonstrated requirement for the ω3 fatty acids by fish suggest that the 20:3ω9/22:6ω3 ratio in the phospholipid fraction be used as an index of essential fatty acid nutrition. Fish receiving 0.7% or more of linolenate in the diet had 20:3ω9/22:6ω3 ratios of less than 0.4. Diets which produce this ratio value or less appear to be adequate in the ω3 fatty acids (linolenate series) and fulfill the nutritional requirements of young fish as judged by growth and other physiological parameters.

ON THE METABOLISM OF PROSTAGLANDIN $F_{2\alpha}$ IN FEMALE SUBJECTS. Elizabeth Granstrom and B. Samuelsson (Dept. Chem., Royal Veterinary College, S-10405 Stockholm 50, Sweden). *J. Biol. Chem.* 246, 7470–84 (1971). (9β-^{3}H)Prostaglandin $F_{2\alpha}$ was injected intravenously into female subjects and the structures of metabolites appearing in the urine were determined. Apart from the earlier identified main urinary metabolite, 5α,7α-dihydroxy-11-ketotetranorprosta-1,16-dioic acid and its δ-lactone, the following metabolites were found: 7α,9α-18-trihydroxy-13-ketodinorprost-3-enoic acid, 7α,9α-dihydroxy-13-ketodinorprost-3-3n-1,18-dioic acid, 7α,9α-dihydroxy-13-keto-(dinor, ω-dinor)prost-3-en-1,16-dioic acid, the δ-lactone of 7α,9α-13-trihydroxy-(dinor,ω-dinor)-prost-3-en-1,16-dioic acid, 5α,7α-11-trihydroxytetranorprosta-1,16-dioic acid and 5α,7α-16-trihydroxy-11-ketotetranorprostanoic acid. The two latter metabolites were also present as δ-lactone derivatives.

SOLUBILIZATION AND PURIFICATION OF TRANS-FARNESYL PYROPHOSPHATE-SQUALENE SYNTHETASE. I. Shechter and K. Bloch (J.B. Conant Lab., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* 246, 7690–96 (1971). A trans-farnesyl pyrophosphate-squalene synthetase has been isolated in a soluble form from yeast extracts and purified 45-fold. The molecular weight of the enzyme estimated from sucrose density gradient centrifugation and gel filtration chromatography is 426,000. Solubilization of the squalene synthetase is achieved with deoxycholate. Treatment with the detergent markedly lowers squalene synthetase activity but when deoxycholate is removed by Amberlite XAD-2, the soluble enzyme regains full activity. Such synthetase preparations are relatively labile. They can be stabilized by glycerol and 2-mercaptoethanol. Both TPNH and DPNH serve as electron donors for the squalene synthetase. Their K_m values are 122 μM and 310 μM, respectively. The two pyridine nucleotides differ somewhat in their effects on the Hill coefficient for the bimolecular condensation of farnesyl pyrophosphate to squalene. With DPNH the Hill slope is 2.0 and with TPNH 1.4. The purified synthetase catalyzes not only the formation of squalene from farnesyl pyrophosphate but also accumulates presqualene pyrophosphate (in the absence of pyridine nucleotide) and converts biosynthetic presqualene pyrophosphate to squalene.

SPECIFIC INHIBITION OF CHOLESTEROL ABSORPTION BY SULFAGUANIDINE. H.J. Eyssen, J.F. Van den Bosch, G.A. Janssen and H. Vanderhaeghe (Univ. of Leuven, Rega Inst. for Med. Res., B-3000, Louvain, Belgium). *Atherosclerosis* 14, 181–92 (1971). Feeding of 1% sulfaguanidine to mice on a cholesterol-supplemented diet lowered liver cholesterol concentrations about 50%. This phenomenon was obtained with commercial diet, and with formula diets containing different carbohydrates. Single oral doses of sulfaguanidine promoted the fecel excretion of simultaneously given (4-^{14}C)cholesterol. Fecal excretion of fatty acid was not affected by sulfaguanidine. Fecal excretion of bile salts was slightly depressed. The effect of sulfaguanidine was most pronounced when the drug and cholesterol were fed simultaneously. Prior feeding of sulfaguanidine for 1 week did not alter cholesterol absorption after withdrawal of sulfaguanidine. The inhibition of cholesterol absorption does not depend on the antibacterial action of sulfaguanidine, since it also reduced liver cholesterol in germfree mice. Compounds with chemical structures resembling that of sulfaguanidine were inactive.

STUDIES ON THE FATE OF DIETARY LINOLEIC ACID IN THE NEONATAL RAT. D.M. Derry (Dept. of Pharmacol., Univ. of Toronto, Toronto 5, Ontario, Canada). *J. Nutr.* 102, 109–116 (1971). The method of total body autoradiography combined with thin-layer chromatography has been used to follow the distribution of dietary linoleic acid in the neonatal rat. The bulk of the linoleic acid was stored in brown and white fat as triglycerides. Lesser amounts were found in the skin.

STUDIES ON THE FLUORESCENCE OF THE HUMAN VITAMIN A-TRANSPORTING PLASMA PROTEIN COMPLEX AND ITS INDIVIDUAL COMPONENTS. P.A. Peterson and L. Rask (Dept. of Nutr., Inst. of Med. Chem., Univ. of Uppsala, Sweden). *J. Biol. Chem.* 246, 7544–50 (1971). The fluorescence properties of the human prealbumin retinol-binding-protein (RBP) complex and of its individual components are described. At neutral pH, RBP and the protein complex have two fluoresence bands: one at 335 nm and the other, associated with the retinol, at 470 nm. Prealbumin has only a fluorescence at 335 nm (quantum yield 0.11). The quantum yield of retinol increased by 50% and the emission spectrum was blue shifted on RBP forming a complex with prealbumin. RBP, at low ionic strength where the binding of RBP and prealbumin is abolished, exhibited a decrease in the quantum yield of retinol. With the protein fluorescence of RBP and the fluorescence of its cofactor, it was also possible to show the occurrence of transfer of excitation energy from the protein moiety to the retinol (efficiency of transfer: 60%). Studies on the accessibility of the aqueous medium (or protons) to the retinol site revealed that on complex formation between RBP and prealbumin most of the retinol-solvent interactions are abolished, suggesting that one of the functions of prealbumin is to stabilize the retinol-binding site of RBP. The estimated apparent association constant is 2×10^7 M^{-1} for the interaction of retinol-containing RBP and prealbumin. The binding constant of prealbumin and vitamin A-free RBP was also determined. A similar value was found and it is thus concluded that retinol has no major influence on the tertiary structure of RBP.

THE CHEMISTRY OF CARPESTEROL, A NOVEL STEROL FROM SOLANUM XANTHOCARPUM. J.A. Beisler and Y. Sato (Lab. of Chem., National Inst. of Arthritis & Metabolic Diseases, National Inst. of Health, Bethesda, Md. 20014). *J. Org. Chem.* 36, 3946–50 (1971). The structure of carpesterol has recently been shown to be (22R)-22-hydroxy-6-oxo-4α-methyl-5α-stigmast-7-en-3β-yl benzoate. The present work describes some chemical transformations of the sterol as well as its degradation to 4α-methyl-5α-stigmast-8(14)-en-3β-ol from which the 24R configuration of the stigmasterol ethyl group was confirmed. The possible implications of carpesterol to the biogenesis of steroidal alkaloids and sapogenins are presented. The ORD spectra of carpesterol and some of its derivatives are contrasted with the spectra of the ecdysterols.

USE OF AN ANTIBODY TO STUDY THE LOCATION OF CARDIOLIPIN IN MITOCHONDRIAL MEMBRANES. M. Guarniere, B. Stechmiller and A.L. Lehninger (Dept. of Physiol. Chem., Johns Hopkins Univ. School of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 246, 7526–32 (1971). Rabbit antiserum to cardiolipin, which is reactive with the polar head but not the nonpolar fatty acid moieties of cardiolipin, was used to explore the location of the polar head of cardiolipin in mitochondrial membranes. Only a few percent of the cardiolipin in intact mitochondria from rat liver, blowfly flight muscle, *Saccharomyces cerevisiae*, and *Neurospora* and none of the cardiolipin in intact beef heart miochondria are available for binding of anticardiolipin antibody. Freezing and thawing, aging at 45C or sonication, in the absence or presence of the antibody, increased only slightly the anticardiolipin antibody binding activity of various types of mitochondria. The only mitochondrial preparation showing complete ability to bind anticardiolipin antibody was a mitochondrial precursor fraction isolated from glucose-repressed, anaerobic yeast cells. The isolated outer and inner membrane fractions from rat liver mitochondria also showed very little capacity to bind the antibody; both the cytoplasmic side and the matrix side of the inner membrane, which contains most of the cardiolipin showed little antibody binding activity. Removal of the F_1 ATPase molecules from inner membrane vesicles of beef heart mitochondria also failed to unmask antibody binding activity. Neither oxidative phosphorylation nor energy-linked Ca^{++} transport in intact rat liver mitochondria were influenced by addition of excess anticardiolipin antibody. It is concluded that the polar heads of most of the cardiolipin molecules in the mitochondrial membranes are buried within the structure of the membrane or shielded by the binding of other membrane components.

ω-OXIDATION OF FATTY ACIDS. I. MECHANISM OF MICROSOMAL ω1- AND ω2-HYDROXYLATION. M. Hamberg and I. Bjorkhem (Dept. of Med. Chem., Royal Veterinary Coll.; Dept. of Chem., Karolinska Inst., Stockholm, Sweden). *J. Biol. Chem.* 246, 7411–16 (1971). Rat liver microsomes in the presence of NADPH and 0_2 catalyzed ω1- as well as ω2-hydroxylation of decanoic acid. 10-Hydroxydecanoic acid accounted for 92% of the products formed, L-9-hydroxydecanoic acid for 6% and D-9-hydroxydecanoic acid for 2%. Incubations of (9-$^2H_2$)- and (10-$^2H_3$)decanoic acids followed by mass spectrometric analyses of the products showed that the hydroxylations occurred with loss of 1 hydrogen atom from the carbon hydroxylated. The two hydroxylations at carbon 9 both proceeded stereo-specifically with retention of the absolute configuration. Significant isotope effects were present in the formation of D-9- and L-9-hydroxydecanoic acids from (9-$^2H_2$)decanoic acid. The formation of 10-hydroxydecanoic acid from (10-$^2H_3$)decanoic acid occurred without isotope effect.

II. ENZYMATIC OXIDO-REDUCTION OF 17-HYDROXYSTEARIC ACID. I. Bjorkhem and M. Hamberg. *Ibid.*, 7417–20. The oxido-reduction of 17-hydroxystearic acid by enzymes present in the microsomal and soluble fractions of homogenates of rat and guinea pig liver was studied. The rate of oxidation of L-17-hydroxystearic acid into 17-ketostearic acid by the 100,000 × *g* supernatant fluid of rat and guinea pig liver homogenate was 2.2 and 6 times, respectively, faster than the rate of oxidation of D-17-hydroxystearic acid. In the presence of microsomal fraction of rat liver homogenate, D-17-hydroxystearic acid was oxidized 1.4 times faster than L-17-hydroxystearic acid. Reduction of 17-ketostearic acid by the 100,000 × *g* supernatant fluid of rat and guinea pig liver homogenate yielded 17-hydroxystearic acid of which 72% and 91%, respectively, was the L-17-enantiomer. Reduction by the microsomal fraction of rat liver homogenate yielded 68% of D-17- and 32% of L-17-hydroxystearic acids. The soluble enzyme was found to utilize the 4A-hydrogen in NADPH whereas the microsomal enzyme utilized the 4B-hydrogen in NADPH.

GENETIC VARIATION IN FATTY ACID COMPOSITION AND STABILITY OF ARACHIS HYPOGAEA L. OIL. R.E. Worthington and R.O. Hammons (Univ. of Georgia). *Oleagineux* 26, 695–700 (1971). A total of 110 peanut genotypes, obtained from many areas of the world and grown in Tifton, Georgia, were examined for effects of genetic diversity of the fatty acid composition and stability of the oil at 60C. Year to year differences in oil stability were large and could not be accounted for by relatively small variations in fatty acid composition. Correlation coefficients among fatty acids showed significant positive correlations between linoleic acid and palmitic, behenic and lignoceric acids, and significant negative correlations between linoleic and stearic and oleic acids.

INCORPORATION OF TRANS FATTY ACIDS IN THE BODY LIPIDS OF RATS FED MARGARINES CONTAINING RAPESEED OIL. J. Budzynska-Topolowska, M. Kuliszewski, A. Rutkowski and S. Ziemlanski (Inst. of Food and Nutr., Warsaw, Poland). *Oleagineux* 26, 701–6 (1971). Rats were fed margarines (18% by weight of the diet) containing hydrogenated rapeseed oils with either high or low contents of erucic acid for 7 and 12 months. Incorporation of trans fatty acids in the body lipids was greater when the diet contained more of them. The quantity of trans double bonds incorporated in the liver phospholipids was the same in all experiments. The greatest quantities of trans isomers were stored in the fatty tissues while their incorporation in the heart lipids was small. The rate of incorporation of trans bonds in the three fractions of the liver lipids differed: the lowest quantities were incorporated in the phospholipids. Feeding the experimental margarines for the longer period did not significantly increase the incorporation of trans fatty acids in the tissues.

EFFECT OF DIETARY FATS ON THE FATTY ACID CONTENTS OF CHICKEN ADIPOSE TISSUE. J.J. Jen, W.P. Williams, Jr., J.C. Acton and V.A. Paynter (Dept. of Food Sci., Clemson Univ., Clemson, S.C. 29631). *J. Food Sci.* 36, 925–9 (1971). Broiler-type chicks were reared from hatching to 4 weeks of age on a low-fat ration and then fed diets containing 10% of either corn oil, lard, beef tallow or hydrogenated coconut oil. The fatty acid content of extracted total lipids was characteristic of the dietary fats, and dietary fatty acid patterns were incorporated into the adipose tissue within 2 weeks after the experimental diets were fed. The total lipids, when separated into solid fats and liquid oils, also reflected the fatty acid pattern of the experimental diets. Neutral triglycerides from the adipose tissue contained less linoleic acid and more

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palmitic acid and oleic acid than the total lipid fraction. High amounts of palmitic and oleic acids were observed in all of the fractions analyzed. Cooking losses, TBA values and taste panel studies did not reveal any significant effect of dietary treatment on 10-week old broiler carcasses.

FATS IN THE ANIMAL FEEDING INDUSTRIES. G. Arnaud (S.N.I.A.). *Rev. Franc. Corps Gras* 18, 741–6 (1971). The use of fats, and especially tallow, in the preparation of weaning diets for calves is discussed in terms of quantities used and also specific areas of usage. Over 100,000 tons of tallow were used for this purpose in 1970. Different diets are used depending on the purpose for which the calf is being raised.

FATS IN POULTRY RATIONS. B. Leclercq (I.N.R.A., Nouzilly, 37). *Rev. Franc. Corps Gras* 18, 753–68 (1971). Factors pertaining to fats suitable for use in poultry rations are discussed. Iodine value is the most important factor affecting digestibility. Carcass quality depends more on the total energetic value of the diet than on the fat content or the specific fat used. The laying hen can tolerate a higher fat diet when the overall energetic value is moderate.

QUANTITATIVE REQUIREMENTS OF ANIMAL FEED MANUFACTURERS WITH REFERENCE TO FATS. J.P. Bougon (Specialait-Serval, La Mothe-St-Heray, 79). *Rev. Franc. Corps Gras* 18, 747–52 (1971). The chemical and physical properties and various quality factors pertaining to fats used in weaning diets for calves are discussed. Since tallow represents over 90% of the fat used by this industry, much of the specific information presented pertains to this fat.

EFFECTS OF A FATTY ACID DEFICIENCY ON LIPIDS OF WHOLE BRAIN, MICROSOMES AND MYELIN IN THE RAT. Grace Y. Sun (Lab. of Neurochem., Cleveland Psychiatric Inst., Cleveland, Ohio 44109). *J. Lipid Res.* 13, 56–62 (1972). The lipid compositions of whole brain homogenates and microsomal and myelin fractions isolated from the brains of 6-month-old rats raised on a lab. chow diet, a fatty acid-deficient diet and a deficient diet supplemented with 5% (w/w) corn oil were determined. Brain and body weights were significantly lower in the fatty acid-deficient group. The composition of alk-1-enyl groups and phospholipids of whole brain homogenates of rats maintained on the three diets were not different. However, marked alterations were found in the acyl group compositions of the major phosphoglycerides from whole brain homogenates and from the myelin and microsomal fractions of rats maintained on the fatty acid-deficient diet. With the deficient diet, 20:3(n — 9) was found in the major phosphoglycerides as well as in the myelin and microsomal fractions. In addition, the levels of 20:4(n — 6) and 22:4(n — 6) were decreased. The levels of 20:4(n — 6), 22:4(n — 6), and 22:5(n — 6) were higher in the brain phosphoglycerides of rats maintained on the corn oil-supplemented diet than on the lab. chow control diet, and the elevation in these acyl groups was more evident in the microsomal fraction than in the myelin fraction.

EFFECT OF ETHANOL ON CHOLESTEROL AND BILE ACID METABOLISM. A.F. Lèfevre, L.M. Decarli and C.S. Lieber (Dept. of Med., Mt. Sinai School of Med. of the City Univ. of New York, VA Hospital, Bronx, N.Y. 10468). *J. Lipid Res.* 13, 48–55 (1972). Ethanol feeding increased significantly levels of hepatic esterfied cholesterol and serum free and esterified cholesterol in rats. Incorporation of intraperitoneally administered (^{14}C)-acetate into cholesterol was significantly increased. Labeling of cholesterol was also enhanced in liver slices from animals pretreated with ethanol and incubated with (^{14}C)-acetate. Ethanol consumption prolonged the half-excretion time of labeled cholic or chenodeoxycholic acids, increased slightly the pool size and decreased daily excretion. By contrast, supplementation of the diet with cholesterol shortened the half-excretion time, did not modify pool size and increased daily excretion. When ethanol and cholesterol feeding were combined, the effects of ethanol prevailed and there was suppression of the adaptive changes in bile acid metabolism induced by cholesterol feeding. There was also a greater accumulation of esterified cholesterol in the liver than that produced by cholesterol alone, ethanol administration alone or the summation of both effects.

FAT TRANSPORT AND LYMPH AND PLASMA LIPOPROTEIN BIOSYNTHESIS BY ISOLATED INTESTINE. H.G. Windmuller and A.E. Spaeth (National Inst. of Arthritis and Metabolic Diseases, National Inst. of Health, Bethesda, Md. 20014). *J. Lipid Res.* 13, 92–105 (1972). An apparatus and procedure are described for investigating fat transport and lipoprotein biosynthesis in isolated, lymph-cannulated rat intestine perfused with blood under physiological conditions. The small bowel, cecum, proximal half of the colon and attached mesentery were removed into a tissue bath and perfused vascularly in a recycling system free of blood-air interfaces. When 70 μmoles of soybean oil and 9 μmoles of lecithin were infused luminally, more than 50% of the fatty acids were recovered in the lymph, 90% as triglycerides of which 75% appeared in chylomicrons with average diameters estimated to be 100–200 nm, based on their phospholipid content. The preparation incorporated lysine-^{3}H into the protein moieties of lipoproteins of $d < 1.006$ g/ml (chylomicrons plus very low density lipoproteins) which appeared in lymph and accounted for more than 30% of all labeled lymph protein. No labeled $d < 1.006$ lipoproteins appeared in the perfusate. Lysine-^{3}H was also incorporated into the d 1.006–1.21 lipoproteins of both lymph and perfusate, but the specific activity of the former was 500 times as high as the latter, indicating that d 1.006–1.21 as well as $d < 1.006$ lipoproteins are produced by gut and reach the blood via mesenteric lymph. Most of the labeled d 1.006–1.21 protein appeared to be high density lipoprotein (d 1.063–1.21).

CELLULARITY OF ADIPOSE DEPOTS IN SIX STRAINS OF GENETICALLY OBESE MICE. P.R. Johnson and J. Hirsch (Rockefeller Univ., N.Y., N.Y. 10021). *J. Lipid Res.* 13, 2–11 (1972). Adipocyte size and number of three adipose depots (gonadal, subcutaneous, and retroperitoneal) were determined in several strains (*aA^{y}*, *aA^{iy}*, *dbdb*, *obob*, and NZO) of adult genetically obese male and female mice and in male gold thioglucose-treated mice. Epididymal pad cellularity was determined during development in yellow and viable yellow obese mice and their lean littermates, as well as in the NCS/R mouse. Cell number in the mouse epididymal pad in both lean and genetically obese animals is determined early in development, i.e., before weaning. Cell enlargement is the consistent and usually dominant morphological explanation for adipose depot enlargement in genetic and in gold thioglucose-induced mouse obesity. In some instances, hyperplasia accompanied the hypertrophy, occurring most often in the subcutaneous depot. Cell number in the subcutaneous pad of the obese-hyperglycemic female is four times that of the lean control and represents the most extreme case of hyperplasia observed. In fact, hyperplasia was consistently seen in the *obob* mouse. A classification for genetic obesity based primarily upon the cellularity characteristics of the adipose depots is proposed.

SELECTIVE LOSS OF ADIPOSE CELL RESPONSIVENESS TO GLUCAGON WITH GROWTH IN THE RAT. V. Manganiello and Martha Vaughan (National Heart and Lung Inst., National Inst. of Health, Bethesda, Md. 20014). *J. Lipid Res.* 13, 12–16 (1972). In isolated fat cells, the same maximal rate of glycerol production can be induced by epinephrine or ACTH, alone or in combination with each other or with glucagon. With fat cells from rats weighing 150–175 g, the maximal rate of lipolysis attained with glucagon was 75–80% of that produced by epinephrine or ACTH, and with increasing size of the donor rat, the magnitude of the effect of glucagon relative to that of the other hormones declined markedly. In particulate preparations from fat cells of rats weighing 100–125 g, the maximal effect of glucagon on adenyl cyclase activity was about 60% of that of epinephrine, and was significantly less (30%) in preparations from 350–400 g rats. These data are consistent with the hypothesis that with growth of the rat there is selective decline in the number of glucagon receptors relative to those for epinephrine or ACTH in the fat cell membrane.

EFFECT OF ADRENALECTOMY ON THE DIURNAL VARIATION OF HEPATIC CHOLESTEROGENESIS IN THE RAT. P.E. Hickman, B.J. Horton and J.R. Sabine (Dept. of Animal Physiol., Waite Agr. Res. Inst., Univ. of Adelaide, Adelaide, S.A., Australia). *J. Lipid Res.* 13, 17–22 (1972). The diurnal variation in cholesterol synthesis exhibited by rat liver has been examined in fed, fasted and adrenalectomized animals. Fasting for 3 days caused a lowering of the rate of synthesis but did not abolish the diurnal rhythm. Adrenalectomy abolished the diurnal variation, and caused synthesis to remain at a uniformly high level. We suggest that corticosterone may play an essential role in the daily rhythm of cholesterogenesis.

REDUCTIVE AND OXIDATIVE SYNTHESIS OF SATURATED AND UNSATURATED FATTY ALDEHYDES. W.J. Ferrell and Kuo-Ching Yao (Dept. of Chem., Univ. of Detroit, Detroit, Mich. 48221). *J. Lipid Res.* 13, 23–6 (1972). Saturated and unsaturated fatty aldehydes were synthesized 99+% pure with yields of up to 80% by the reduction of 1-acylaziridines with lithium aluminum hydride, and in yields of up to 87% by oxidation of the corresponding alcohol with 1-chlorobenzotriazole. It was found for the reduction that optimum aldehyde yield was obtained with a mole ratio of reactants, consisting of acid chloride-ethylenimine-triethylamine-$LiAlH_4$, equal to 1:2:2:2. Optimum conditions for alcohol oxidation were found to be a mole ratio of oxidant to alcohol of 1:1.3 with refluxing for 45 min in methylene chloride containing 25% pyridine. Methods for the purification of the final product are also described. Purity criteria were thin-layer and gas-liquid chromatography and infrared and nuclear magnetic resonance spectroscopy.

FATTY LIVER INDUCTION: INVERSE RELATIONSHIP BETWEEN HEPATIC NEUTRAL LIPID ACCUMULATION AND DIETARY POLYUNSATURATED FATTY ACIDS IN OROTIC ACID-FED RATS. L.A. Witting (L.B. Mendel Res. Lab., Elgin St. Hosp., Elgin, Ill. 60120). *J. Lipid Res.* 13, 27–31 (1972). The levels of hepatic neutral lipids in the orotic acid-fed rat were inversely related to the dietary levels of polyunsaturated fatty acids, as in the choline-deficient rat. Hepatic microsomal protein and phospholipid and total hepatic phospholipid were increased in orotic acid-induced fatty livers. The increase in phospholipid was largely restricted to the phosphatidylethanolamines.

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

STUDIES ON THE REGULATION OF PLASMA CHOLESTEROL LEVELS IN SQUIRREL MONKEYS OF TWO GENOTYPES. H.B. Lofland, Jr., T.B. Clarkson, R.W. St. Clair and N.D.M. Lehner (Arteriosclerosis Res. Cen., Bowman Gray School of Med., Winston-Salem, N.C. 27103). *J. Lipid Res.* 13, 39–47 (1972). Certain individual squirrel monkeys ("hyporesponders") are able to remain normocholesterolemic when fed diets containing cholesterol (0.5 mg/kcal). Other squirrel monkeys ("hyperresponders") when fed the same diet become hypercholesterolemic. The purpose of these studies was to identify the mechanisms which allow hyporesponders to compensate for dietary cholesterol. Using formula diets and sterol balance techniques, we have compared cholesterol absorption, synthesis, excretion and turnover in hypo- and hyperresponding monkeys. Cholesterol absorption was essentially identical in the two groups (about 55 mg/day). Cholesterol synthesis was likewise similar in the two groups (about 35 mg/day) and there was no evidence of feedback inhibition at the level of cholesterol fed. Hyporesponders had faster turnover rates and smaller body cholesterol pools than did hyperresponders. Excretion of neutral steroids was similar for hypo- and hyperresponders and did not change with cholesterol feeding. In contrast, hyporesponders increased bile acid excretion shortly after cholesterol feeding was begun.

Erratum

In Reference 2 of "Preparation of Lot Samples of Nut Meats for Mycotoxin Assay" by Stoloff and Dantzman (JAOCS 49: 264 [1972]), the page number was incorrectly cited as 88. The reference should have read: Dickens, J.W., and J.B. Satterwhite, Food Technol. 23: 950 (1969).

SEPARATION OF MOLECULAR SPECIES OF LIPOPROTEIN LIPASE FROM ADIPOSE TISSUE. Arlene S. Garfinkel and M.C. Schotz (Veterans Admin. Hosp. Wadsworth, Los Angeles, Cal. 90073). *J. Lipid Res.* 13, 63–8 (1972). When NH_4OH-NH_4Cl extracts of adipose acetone powder were applied to agarose gel chromatography columns, two peaks of lipoprotein lipase were eluted. The first activity peak (LPL_a) was eluted with an elution volume of a protein of molecular weight approximately five times that of the second (LPL_b). Addition of heparin to the eluted fractions markedly stimulated activity of LPL_a, but suppressed that of LPL_b. Both lipases had the characteristics that distinguish lipoprotein lipase from other tissue lipases: a requirement for serum for substrate activation, inhibition by 1 M NaCl, and an alkaline pH optimum (pH 8.0). It is concluded that these fractions represent two species of lipoprotein lipase.

STIMULATION OF CHOLESTEROL 7α-HYDROXYLASE BY PHENOBARBITAL IN TWO STRAINS OF RATS. S. Shefer, S. Hauser and E.H. Mosbach (Dept. of Lab. Diagnosis, Public Health Res. Inst. of the City of New York, Inc., and the Bureau of Lab., N.Y., N.Y. 10016). *J. Lipid Res.* 13, 69–70 (1972). The effect of phenobarbital administration on the in vitro activity of cholesterol 7α-hydroxylase was investigated in two strains of rats. In rats of the Wistar strain the daily injection of phenobarbital (100 mg/kg per day ip for 5 days) produced a 33% increase in hepatic microsomal protein and a sixfold stimulation of specific activity of the enzyme. In rats of the Charles River colony (Sprague-Dawley derived) identical treatment with phenobarbital resulted in a 45% increase in hepatic microsomal protein and no change in the specific activity of cholesterol 7α-hydroxylase. Plasma phenobarbital concentrations were three to four times greater in the Wistar rats, suggesting that these strains differ also in their capacity to metabolize phenobarbital.

BILE ACIDS. XXXV. METABOLISM OF 5α-CHOLESTAN-3α-OL IN THE MONGOLIAN GERBIL. B.W. Noll, L.B. Walsh, E.A. Doisy, Jr. and W.H. Elliott (Dept. of Biochem., St. Louis Univ. School of Med., St. Louis, Mo. 63104). *J. Lipid Res.* 13, 71–7 (1972). The principal bile acid of Mongolian gerbil bile is cholic acid, although small amounts of chenodeoxycholic and lesser amounts of deoxycholic acids are identified. Muricholic acids were not found in gerbil bile. The ratio of trihydroxy to dihydroxy bile acids in gerbil bile is approximately 11:1. After administration of (4-^{14}C)5α-cholestan-3β-ol to gerbils with bile fistulas, 4–7% of the administered ^{14}C was recovered in bile and 16% in urine on the first 6 days. Alkaline hydrolysis of the bile afforded the biliary acids which were separated by partition chromatography. The ^{14}C ratio of trihydroxy to dihydroxy bile acids was 11:1. Allocholic acid was identified as the major acidic biliary metabolite. From analysis of ^{14}C retained in selected tissues, the adrenal gland appears to be an important site for retention of cholestanol or its metabolites.

INHIBITION OF LIPID SYNTHESIS BY CLOFIBRATE: COMPARATIVE STUDY OF HUMAN SKIN, RAT SKIN, AND RAT LIVER IN VITRO. J.E. Fulton, Jr. and S.L. Hsia (Depts. of Dermatol. and Biochem., Univ. of Miami School of Med., Miami, Fl. 33136). *J. Lipid Res.* 13, 78–85 (1972). The effects of clofibrate (ethyl p-chlorophenoxyisobutyrate) on lipid synthesis by human skin were studied in vitro. The drug was found to inhibit lipid synthesis from acetate-1-^{14}C or glucose-U-^{14}C. While the synthesis of all classes of lipids was suppressed, inhibition of sterol synthesis was more pronounced than that of fatty acids and glycerides. By comparison, sodium p-

chlorophenoxyisobutyrate was less effective as an inhibitor. The addition of glucose to the incubation medium enhanced lipid synthesis from both acetate-1-^{14}C and glucose-U-^{14}C. The inhibitory effect of clofibrate could be partially reversed by increasing the glucose concentration in the incubation medium. Rat skin and rat liver were studied similarly, using acetate-1-^{14}C as a tracer for lipid synthesis, and the inhibitory effect of clofibrate was also demonstrated. Of the three tissues studied, human skin was the most sensitive to the drug and yielded more reproducible results.

CERAMIDE-LIKE SYNTHETIC AMIDES THAT INHIBIT CEREBROSIDE GALACTOSIDASE. R.C. Arora and N.S. Radin (Mental Health Res. Inst., Univ. of Michigan, Ann Arbor, Mich. 48104). *J. Lipid Res.* 13, 86–91 (1972). Amides resembling ceramide (fatty acyl sphingosine) were synthesized and tested for their effects on rat brain cerebrosidase (galactosyl ceramide β-galactosidase). The best inhibitor was N-decanoyl DL-erythro-3-phenyl-2-aminopropanediol, which exhibited a K_i of 0.4 mM. A Lineweaver-Burk plot indicated that the amide acted as a noncompetitive inhibitor, presumably by attachment to a site other than the substrate-active site. Preincubation did not affect the degree of inhibition, and inhibition was independent of incubation duration; these observations suggest that the inhibitor does not combine with the enzyme irreversibly. Structural variations produced decreased inhibitory activity: loss of one of the hydroxyl groups, replacement of the aromatic side chain with an aliphatic or substituted phenyl group, or isomeric inversion of the 3-hydroxyl group. It appears that the best activity is obtained with a substance most closely resembling natural ceramide. The cerebrosidases of fat spleen, kidney and liver are also inhibited by the same amide.

AN INTERSTRAIN DIFFERENCE IN CHOLESTEROL SYNTHESIS IN VITRO IN MICE, DEPENDENT UPON A DIFFERENCE IN ENDOGENOUS NADPH-GENERATING CAPACITY. Felicia Gaskin and R.B. Clayton (Dept. of Psychiatry, Stanford Univ. School of Med., Stanford, Cal. 94305). *J. Lipid Res.* 13, 106–14 (1972). Earlier experiments have shown that significantly more endogenously generated NADPH is available for reduction of corticosterone in liver homogenates from C57BL/10 male mice than in those from DBA/2 strain. To test the effect of this interstrain difference upon a representative NADPH-requiring biosynthetic pathway in vitro, the biosynthesis of cholesterol from mevalonic acid was studied in homogenates of livers from the two strains of mice, with and without addition of an NADPH-generating system. The incorporation of mevalonic acid into cholesterol in homogenates from the C57BL/10 strain is little affected by omission of the NADPH-generating system, but in the DBA/2 strain, addition of an NADPH-generating system is necessary to elevate the level of cholesterol synthesis to that of the C57BL/10 strain. Without this addition, the DBA/2 homogenate mainly produces lanosterol and other precursors of cholesterol which require NADPH for their further metabolism.

FINE STRUCTURE OF FROZEN-ETCHED LIPID GRANULES IN THE FAT BODY OF AN INSECT. T.P. Liu and D.M. Davies (Dept. of Biol., McMaster Univ., Hamilton, Canada). *J. Lipid Res.* 13, 115–8 (1972). Lipid storage in fat-body cells of adult female black flies was examined using freeze-etching electron microscopy. Frozen-etched lipid granules exhibited a laminated structure. The molecular arrangement of the lipid granule may depend on the physiological condition of the insect and may be involved in the control of lipid metabolism in the fat-body cell.

IMMUNOCHEMICAL STUDIES OF ORGAN AND TUMOR LIPIDS. XIX. CYTOLYTIC ACTION OF ANTIBODIES DIRECTED AGAINST CYTOLIPIN R. K. Inoue, L. Graf and M.M. Rapport (Div. of Neuroscience, N.Y. St. Psychiatric Inst., and Dept. of Biochem. and Pathol., Columbia Univ. College of Physicians and Surgeons, N.Y., N.Y. 10032). *J. Lipid Res.* 13, 119–27 (1972). Rabbit antisera to rat lymphosarcoma contain antibodies that are cytolytic for rat erythrocytes in the presence of complement. The reaction can be inhibited completely by pure cytolipin R showing that (a) immune hemolysis can be mediated through lipid determinants in the membrane, and (b) that cytolipin R determinants are present in the intact erythrocyte membrane and exposed on the surface. Optimal conditions for measurement of cytolysis in this system based on release of ^{51}Cr are described. Degrees of specificity of a number of different antilymphosarcoma sera are shown, based on inhibtion of cytolysis by cytolipin R, cytolipin K, cytolipin H, cytolipin F (F-hapten), glucocerebroside, galactocerebroside, ceramide trisaccharide (cer-glu-gal-gal) and a mixed brain ganglioside preparation. The data suggest that cytolytic antibodies and agglutinating antibodies in these antisera are distinctive despite their common specificity for cytolipin R. Lymphosarcoma cells are more effective than erythrocytes in absorbing cytolytic antibodies.

GENERALIZED ACCUMULATION OF NEUTRAL GLYCOSPHINGOLIPIDS WITH G_{M2} GANGLIOSIDE ACCUMULATION IN THE BRAIN. P.D. Snyder, Jr., W. Krivit and C.C. Sweeley (Dept. of Biochem., Michigan St. Univ., East Lansing, Mich. 48823, and Dept. of Pediatrics, Univ. of Minnesota Med. School, Minneapolis, Minn. 55455). *J. Lipid Res.* 13, 128–38 (1972). Analyses have been made of glycosphingolipids from visceral organs and brain of a patient with an unusual lipid storage disorder diagnosed initially as classical Tay-Sachs disease. Levels of the lipids from fresh-frozen sections of gray and white matter, kidney, spleen, liver and heart from this patient were compared with those of normal juvenile controls, and the fatty acid composition of accumulated glycosphingolipids was compared with reference compounds. This patient was found to have abnormally high concentrations of a globoside in liver, kidney, and spleen, a sialo G_{M2} ganglioside in brain and liver, and G_{M2} ganglioside in the brain. On the basis of these findings along with the clinical manifestations of Tay-Sachs disease with visceral involvement (hepatosplenomegaly) and demonstration of total deficiency of both A and B components of β-N-acetylhexosaminidase activity, this glycosphingolipidosis is the same as two previously reported cases of G_{M2} gangliosidosis with globoside accumulation and total β-N-acetylhexosaminidase deficiency.

THERMAL AND pH STABILITY OF Δ^2-ISOPENTENYL PYROPHOSPHATE. D.M. Logan (Dept. of Biol., York Univ., Toronto, Ontario, Canada). *J. Lipid Res.* 13, 137–8 (1972). The isoprenoid precursors Δ^3-isopentenyl pyrophosphate and γ,γ-dimethylallyl pyrophosphate (Δ^2-isopentenyl pyrophosphate) have been separated by thin-layer chromatography. The products from Δ^2-isopentenyl pyrophosphate incubated under various conditions of pH and temperature have been separated, and the survival of Δ^2-isopentenyl pyrophosphate under these conditions has been calculated. The acid-labile Δ^2-isopentenyl pyrophosphate can be stored indefinitely at pH 11.5 and −100C.

Lehigh Offers Short Course on High Polymer Latexes

A week-long short course, entitled "Recent Advances in Emulsion Polymerization and Latex Technology," will be held at Lehigh University, June 12–16, 1972. The course is an in-depth study of the synthesis and properties of high polymer latexes. The subject matter includes a balance of theory and applications, as well as a balance between chemical and physical problems. Lectures will be given by leading academic and industrial workers, and will begin with introductory material and reviews, progressing through recent research results.

The course is designed for engineers and scientists who are actively involved in emulsion work, as well as for those who wish to develop expertise in the area. A basic background in chemistry will be assumed. More advanced and experienced participants may elect to attend only those days in which material of specific interest is being presented. All participants will receive a set of course notes for the lectures attended.

Cost for the 5 day course is $250, or $50 per day for any portion of the course attended. For details contact course organizers, G.W. Poehlein, Dept. of Chemical Engineering, and J.W. Vanderhoff, Center for Surface and Coatings Research, Lehigh University, Bethlehem, Pa. 18015, phone (215) 691-7000.

STUDIES ON DRUG-INDUCED LIPIDOSIS. III. LIPID COMPOSITION OF THE LIVER AND SOME OTHER TISSUES IN CLINICAL CASES OF "NIEMANN-PICK-LIKE SYNDROME" INDUCED BY 4,4'-DIETHYLAMINOETHOXYHEXESTROL. A. Yamamoto, S. Adachi, K. Ishikawa, T. Yokomura, T. Kitani, T. Nasu, T. Imoto and M. Nishikawa (Second Dept. of Internal Med., Osaka Univ. Med. School, Fukushima-ku, Osaka, Japan). *J. Biochem.* 70, 775–84 (1972). Lipid composition of liver and some other tissues was determined in seven cases of "foam cell syndrome" which was induced by the administration of 4,4'-diethylaminoethoxyhexestrol dihydrochloride. Free cholesterol and total phospholipids were increased in the liver. Phospholipid analysis showed marked increases in lysobisphosphatidic acid and phosphatidylinositol in liver. An increase in lysobisphosphatidic acid was also detected in spleen, muscle, lymph nodes and urinary sediment. However, this phospholipid was not increased in leucocytes. Accumulation of 4,4'-diethylaminoethoxyhexestrol itself was detected by thin-layer chromatography of total lipids. Gas chromatographic analysis of the total sterol showed an increase in desmosterol in tissues and in blood serum. The syndrome resembles Niemann-Pick disease in some respects. Discussion is made on the mechanism of accumulation of the peculiar glycerophospholipid, lysobisphosphatidic acid.

EFFECT OF MAGNESIUM ION ON BRAIN MITOCHONDRIAL RESPIRATION. I. ACTIVATION OF BRAIN MITOCHONDRIAL PHOSPHOTRANSFERASES BY MAGNESIUM ION. T. Sugano and Otoji Nagia (Dept. of Physiol., Wakayama Med. College, Wakayama, Japan). *J. Biochem.* 70, 417–27 (1971). The mechanism of respiratory control by ADP in brain mitochondria was analyzed from both respiratory activity and introconversion of adenine nucleotides. The respiration of tightly coupled brain mitochondria was stimulated by added magnesium. The experiments performed under various metabolic conditions indicated that the stimulatory effect of added magnesium ion on state 4 respiration depended on the activation of adenylate kinase and creatine kinase, whereas various other factors participated in the stimulation of state 3 respiration. The influence of hexokinase or ATPase on the stimulation of the state 4 respiration by added magnesium was not observed in the experimental condition studied. These results indicate that in brain mitochondria the reactions catalyzed by adenylate kinase and creatine kinase act as a secondary mechanism of respiratory control, and that the reaction catalyzed by creatine kinase competes with the oxidative phosphorylation system for ADP.

CHEMICAL STRUCTURE OF LIPID A OF SELENOMONAS RUMINANTIUM. Y. Kamio, K.C. Kim and H. Takahashi (Dept. of Agricultural Chem., Faculty of Agr., Tohoku Univ., Sendia 980, Japan). *J. Biochem.* 70, 187–91 (1971). The lipid A component of lipopolysaccharides from *Selenomonas ruminantium* was extracted and purified from the solvent and acid treated cells. The basic structure of lipid A was identified as β-glucosaminyl-1,6-glucosamine with ester and amide linked fatty acids. The major fatty acid component was β-OH $C_{13:0}$ acid, when the cells were grown with added valerate.

METABOLIC RESPONSE DURING IMPENDING MYOCARDIAL INFARCTION. L.H. Opie (Ischaemic Heart Disease Lab., Dept. of Med., Univ. of Cape Town, Groote Schuur Hosp., Cape Town, South Africa). *Circulation* 45, 483–90 (1972). Both glucose and free fatty acids (FFA) are major fuels for the normally oxygenated heart with the dominant contribution being derived from glucose in the resting, fed state and FFA in the resting, fasted state. In anoxia, all energy must be produced anaerobically from glycogen or glucose. Anoxia by itself accelerates glycolysis, but further increases may follow an increased circulating glucose concentration and the addition of insulin. Even maximal rates of anaerobic glycolysis, achieved at high coronary flow rates, can only sustain the energy needs of the K^+-arrested heart but not of the working heart. FFA cannot be utilized for energy in anoxia and may accumulate intracellularly as triglyceride or FFA. From these and other animal data have grown the concepts that glucose is "good" for the survival of the ischemic heart, and that FFA is "bad." However, glucose-fatty acid interaction has not been well studied in the infarcting, ischemic myocardium. While a "toxic" effect of FFA has been shown in many experimental models, there are other reports of increased FFA concentrations having no harmful effect or even a beneficial effect on the infarcting myocardium. The possible benefits of administration of glucose (with insulin) to patients with acute myocardial infarction could only be assessed by a controlled therapeutic trial.

ISOLATION AND IDENTIFICATION OF 6-METHOXY-2-NONAPRENYLPHENOL AS AN INTERMEDIATE IN THE BIOSYNTHESIS OF UBIQUINONE-9 IN THE RAT. H.G. Nowicki, G.H. Dialameh and R.E. Olson (Dept. of Biochem., St. Louis Univ. School of Med., St. Louis, Mo. 63104). *Biochemistry* 11, 896–904 (1972). 6-Methoxy-2-nonaprenylphenol (6-MNPP) has been identified as an intermediate in the biosynthesis of ubiquinone-9 rat liver. This metabolite has been purified from the neutral lipids of rat liver and analyzed by spectrometry. Its mass spectrum, ultraviolet absorption spectrum and chromatographic properties correspond to those of an authentic synthetic specimen of 6-MNPP. It is enriched with radioactivity from benzoate-U-^{14}C, *p*-HBA-G-^{3}t, methionine-methyl-^{14}C in liver slices engaged in the biosynthesis of ubiquinone-9 from these precursors. Synthetic 6-MNPP labeled in its methoxyl with tritium and administered intravenously was efficiently converted to hepatic ubiquinone-9 by intact rats.

EFFECTS OF ORGANOCHLORINE INSECTICIDES ON METABOLISM OF CHOLECALCIFEROL (VITAMIN D_3) IN RACHITIC COCKEREL. H.G. Nowicki, J.F. Myrtle and A.W. Norman (Dept. of Biochem., Univ. of California, Riverside, Cal. 92502). *J. Agr. Food Chem.* 20, 380–4 (1972). The metabolic pathway involved in the conversion of cholecalciferol (CC) to its biologically active form is: CC $\xrightarrow{\text{liver}}$ 25-OH-CC $\xrightarrow{\text{kidney}}$ 1,25-diOH-CC. The predominant form of the steroid in the target intestine is 1,25-diOH-CC. It is known that CC must undergo at least these two conversions prior to stimulating intestinal calcium transport. Using the blood levels of 25-OH-CC as an indication of liver function, it was found that organochlorine pesticide treatment did not influence this hydroxylation step, whereas the amount of 1,25-diOH-CC in intestine of chicks exposed to pesticide was slightly more than in untreated chicks. 1,25-diOH-CC was shown to be homogenous and the same in control and organochlorine insecticide-treated intestines by both sensitive silicic acid and Celite column chromatography. It is concluded from this data that cholecalciferol is converted to its biologically active forms in sufficient quantity in the presence of organochlorine insecticides to maintain normal calcium metabolism in the chick. These results do not then explain how organochlorine insecticides impair the biological responses to cholecalciferol.

ENZYME HISTOCHEMICAL OBSERVATIONS ON THE EFFECT OF PYRIDINOL CARBAMATE ON CHOLESTEROL-INDUCED ATHEROSCLEROSIS. M. Mottonen, M. Pantio and L. Nieminen (Dept. of Forensic Med., Dept. of Pathol. Anatomy, Univ. of Turku, and Med. Res. Lab., Turku, Finland). *Atherosclerosis* 15, 77–82 (1972). The effect of pyridinol carbamate on cholesterol-induced atherosclerosis in the rabbit was investigated in 28 animals. The diet was given for 8 months. The effect of pyridinol carbamate on lactate-NAD-tetrazolium reductase and ATPase activities of the abdominal and thoracic aortae was examined histochemically. The animals were divided into 4 dietary groups: 1. regular diet (commercial rabbit food pellets, Orion). 2. regular diet + pyridinol carbamate (100 mg/kg). 3. regular diet + cholesterol (1%). 4. regular diet + cholesterol (1%) + pyridinol carbamate (100 mg/kg). Lactate-NAD-tetrazolium reductase and ATPase were identical in the samples taken from the thoracic and abdominal aortae in all groups. No atherosclerotic formation was noted in dietary groups 1 and 2. Lactate-NAD-tetrazolium reductase and ATPase activities were identical in these two groups. Pyridinol carbamate was not observed to have any effect on lactate-NAD-tetrazolium reductase and ATPase activities of the aorta and atheroma plaques of the rabbit.

METABOLISM OF C_{19}-STEROIDS BY HOMOGENATES OF NORMAL FAT AND MOUSE ADRENAL TISSUE AND OF THE SNELL TRANSPLANTABLE RAT ADRENOCORTICAL TUMOUR 494. P.V. Maynard and E.H.D. Cameron (Tenovus Inst. for Cancer Res., Welsh National School of Med. Heath, Cardiff CF44XX, U.K.). *Biochem. J.* 126, 99–106 (1972). C_{19}-steroid metabolism in homogenates of adrenal tissue from rats and mice has been studied. Production of these compounds from (7α-^{3}H)-cholesterol by rat adrenal tissue appeared to follow a route independent of pregnenolone. The major products of (7α-^{3}H)-dehydroepiandrosterone metabolism by rat adrenal tissue were 5α-reduced steroids, principally androsterone, epiandrosterone and 5α-androstandedione. No differences in metabolism of (7α-^{3}H)-dehydroepiandrosterone or (4-^{14}C)-pregnenolone were detected between adrenal tissue from Sprague-Dawley, Wistar and Osborne-Mendel rats, but experiments with the Snell rat adrenocortical tumour 494 showed that this tissue had low 5α-reductase activity. In contrast, the major products of

(7α-^{3}H)-dehydroepiandrosterone metabolism by mouse adrenal tissue were 5β-reduced steroids.

THE EFFECT OF PHOSPHOLIPID FATTY ACID COMPOSITION ON MEMBRANOUS ENZYMES IN ESCHERICHIA COLI. R.D. Mavis and P.R. Vagelos (Dept. of Biological Chem., Washington Univ. School of Med., St. Louis, Mo. 63110). *J. Biol. Chem.* 247, 652–9 (1972). The shape of an Arrhenius plot of glycerol 3-phosphate acyltransferase activity of an unsaturated fatty acid auxotroph of *Escherichia coli* is identical in membranes containing cis-vaccenic, oleic, linoleic or linolenic acid as sole unsaturated fatty acid. The curve is linear at low temperatures with a continuous decrease in slope above 15C. In membranes containing trans-unsaturated fatty acids as the sole unsaturated fatty acid, the decrease in slope occurs at 20C. Membranes from cells grown in the presence of oleic acid and then grown for one generation in the absence of unsaturated fatty acids contained 79% saturated fatty acids and 21% oleic acid. Temperature dependence of the enzyme activity in these membranes was intermediate between that observed in membranes containing trans-unsaturated fatty acids and those containing normal amounts of cis-unsaturated fatty acids. 1-Acylglycerol 3-phosphate acyltransferase activity exhibited a linear Arrhenius plot identical in slope in membranes containing cis-unsaturated fatty acids of varying degrees of unsaturation. Membranes from cells deprived of unsaturated fatty acids for one generation or those containing trans-unsaturated fatty acids exhibited a steeper slope. Membranous glycerol 3-phosphate dehydrogenase activity appeared to be independent of membrane fatty acid composition. Linear Arrhenius plots of identical slope were observed in all membrane preparations described above.

RELATIONSHIP BETWEEN PLASMA CHOLESTEROL LEVEL AND CORONARY ATHEROSCLEROSIS IN CHOLESTEROL-OIL FED COCKERELS. C. Kakita, P.J. Johnson, R. Pick and L.N. Katz (Cardiovascular Inst. and Div. of Cardiovascular Diseases, Dept. of Med., Michael Reese Hosp. and Med. Center, Chicago, Ill. 60616). *Atherosclerosis* 15, 17–29 (1972). In short-term experiments in cockerels, elevation of plasma cholesterol from threshold to excessively high levels induces coronary atherosclerosis in a curvilinear fashion with the largest effect occurring in the lower ranges (from 100–500 mg/100 ml). Similar increments of plasma cholesterol have a progressively smaller effect on coronary atherosclerosis as the plasma cholesterol levels become higher. However, the results of long-term experiments may differ from the short-term ones used in these experiments. These experiments have a possible bearing on the efficacy of hypocholesterolemic procedures clinically. The nomogram established in this report can serve in this species (and at this age and over this duration of the experiment) to distinguish coronary atherogenesis dependent on hypercholesterolemia (per se) from that produced independently by the agent or procedure employed.

LIPOGENESIS IN MONKEY LIVER AND ADIPOSE TISSUE. J. Glennon, E. Gordon and E. Shrago (Dept. of Med., Lemuel Shattuck Hosp., Tufts Univ. Med. School, Boston, Mass. 02111). *Proc. Soc. Exp. Biol. Med.* 139, 673–676 (1972). Monkey liver has been used as a model system to study adaptive lipogenesis in primates. Fasting and refeeding produced marked fluctuation in over-all fatty acid synthesis and related lipogenic enzyme activity. Adaptive enzyme formation does not appear to play a regulatory role in lipogenesis from monkey adipose tissue. Rates of incorporation of citrate-1,5-^{14}C relative to other substrates appears to be sufficiently high in both monkey liver and adipose tissue to account for the citrate pathway in fatty acid biosynthesis.

ROLE OF LIPOPHAGES IN THE DEVELOPMENT OF RAT ATHEROMA. A. Bálint, B. Veress, Z. Nagy and H. Jellinek (Second Dept. of Pathol., Semmelweis Univ. Schl. of Med., Budapest (Hungary)). *Atherosclerosis* 15, 7–15 (1972). Aortic specimens from rats maintained on an atherogenic diet were examined electron-microscopically for the role of lipophages in the evolution of atheroma, with special reference to the mode of migration of these cells into the vessel wall. Lipophages were found to enter the vessel wall actively by pushing apart the endothelial cells, and to settle in the subendothelial space where they helped to form the arteriosclerotic changes. On the basis of ultrastructural characteristics, these lipophages were distinguishable from foam cells which arose from endothelial cells.