Abstracts

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Fats and oils

TRANSBILAYER DISTRIBUTION OF PHOSPHATIDYLETHANOLAMINE IN LARGE AND SMALL UNILAMELLAR VESICLES. J.R. Nordlund, C.F. Schmidt, S.N. Dicken and T.E. Thompson (Dept. of Biochem., Univ. of VA Sch. of Med., Charlottesville, VA) *Biochemistry 20*:3237-3241 (1981). There is much evidence which strongly suggests that most constituents of biological membranes display a transbilayer compositional asymmetry. The tendency of binary mixtures of phospholipid to form compositionally asymmetric bilayers spontaneously has been studied extensively. In small unilamellar vesicles, most mixtures of phospholipids with different head groups have been reported to be nonrandomly arranged across the bilayer. In this study, the influence of the radius of curvature on the transbilayer phospholipid distribution has been investigated. These results suggest that while phospholipids may form asymmetric bilayers spontaneously in highly curved regions of biological membranes, other factors must be responsible for the generalized phospholipid asymmetry seen in these systems.

INTERACTION OF CHOLESTEROL AND CHOLESTEROL ANALOGS WITH EGG PHOSPHATIDYLCHOLINE IN A LIPID SOLVENT. N.J. Oppenheimer and E.H. Cordes (Dept. of Chem., Indiana Univ. Bloomington IN) *J. Biol. Chem. 256*(13):6714-6720 (1981). Cholesterol and several of its derivatives yield highly resolved natural abundance ^{13}C NMR spectra as 0.2 M solutions in triolein over the temperature range, 48-86 C. Over the same temperature range, egg phosphatidylcholine and triolein yield heterogeneous mixtures whose ^{13}C NMR spectra are not distinguishable from that of triolein alone. At 66 and 86 C, preparations containing equimolar, approximately 0.17 M, cholesterol and egg phosphatidylcholine in triolein are optically clear and homogeneous. These findings establish that cholesterol solubilizes egg phosphatidylcholine in triolein.

FLUORESCENCE STUDIES OF DIPALMITOYLPHOSPHATIDYLCHOLINE VESICLES RECONSTITUTED WITH THE GLYCOPROTEIN OF VESICULAR STOMATITIS VIRUS. W.A. Petri, R. Pal, Y. Barenholz, and R.R. Wagner (Dept. of Microbio., Univ. of Virginia Sch. of Med., Charlottesville, VA) *Biochemistry 20*: 2796-2800 (1981). The vesicular stomatitis virus glycoprotein (G) was reconstituted into dipalmitoylphosphatidylcholine (DPPC) vesicles by detergent dialysis. The DPPC gel to liquid-crystalline phase transition of the DPPC-G protein vesicles was monitored by the fluorescence anisotropy of *trans*-paranaric acid, 16-(9-anthroyloxy)palmitoyl-glucocerebroside, 1,6-diphenyl-1,3,5-hexatriene, and 4-heptadecyl-7-hydroxycoumarin. The G protein in addition affected the ionization of the 4-hepta-decyl-7-hydroxycoumarin in lipid vesicles, increasing the apparent p*K* of the prove from 9.05 to 9.45.

THE USE OF GALACTOSE OXIDASE IN LIPID LABELING. N.S. Radin and G.P. Evangelatos (Mental Health Res. Inst. and Dept. of Bio. Chem., Univ. of MI, Ann Arbor, MI) *J. Lipid Res. 22*:536-541 (1981). Galactose oxidase can be used to oxidize the terminal carbon atom of lipids containing galactoase or N-acetylgalactosamine, and the resultant aldehyde group can be reduced back to the original carbinol with radioactive borohydride. The efficiency of the first reaction has been investigated systematically by using (6-^{3}H)galactosyl ceramide as a substrate and measuring the amount of radioactive water formed. This enabled us to establish that the addition of catalase and peroxidase greatly speeded the oxidation, that phosphate and PIPES buffers were the best among those tested, that the reaction continued for 24 hours without a second addition of galactose oxidase, and that the optimum concentration of organic solvent (tetrahydrofuran) was 50%.

APPLICATION OF METHOXY-BROMOMERCURI-ADDUCT FRACTIONATION TO THE ANALYSIS OF FATTY ACIDS OF PARTIALLY HYDROGENATED MARINE OILS. J.-L. Sebedio and R.G. Ackman (Tech. Univ. of Nova Scotia, Fisheries Res. and Tech. Lab., Halifax, Nova Scotia, Canada) *Lipids 16*(6):461-467 (1981). In fatty acids of a refined and of a partially hydrogenated menhaden oil, iodine value (IV) 84.5, were separated into different classes (e.g., monoene, diene, including pentaene and hexaene) by thin layer chromatography (TLC) of their methoxy-bromo-mercuri-adducts (MBM). In the solvent system hexane:dioxane, the separation of fatty acids occurred according to the degree of unsaturattion. No influence was exerted by either the geometry or the position of the ethylenic bonds. The effect of the various chain lengths (C_{14}-C_{22}) was to broaden the bands, but no overlap occurred among the chain length. This confirmed that GLC did not totally separate all groups if isomers of different degrees of unsaturation.

ANALYSIS OF LIPOPROTEIN APOPROTEINS BY SDS-GEL FILTRATION COLUMN CHROMATOGRAPHY. C.E. Sparks and J.B. Marsh (The medical College of Pennsylvanis, Department of Physiology and Biochemistry, Philadelphia, PA 19129) *J. Lipid Res. 22*(3):514-518 (1981). Rat plasma, containing ^{125}I-labeled triglyceride-rich lipoprotein, was mixed following lipid extraction with 10% SDS buffer and analyzed by gel filtration chromatography on columns using an elution buffer containing 1% SDS. Labeled apoproteins were separated into apo B, apo E and apo C radioactivity peaks. Labeled peptides, tyrosine, and iodide were also resolved by this method. Isolated lipoproteins fractions were separated into the same components. The method offers the advantages of quantitative radioactivity recovery, large sample volume, and resolution of two apo B proteins.

AN INVESTIGATION INTO THE POSSIBLE PRESENCE OF VOLATILE *N*-NITROSAMINES IN COOKING OILS, MARGARINE, AND BUTTER. N.P. Sen and S. Seaman (Food Res. Div., Food Directorate, Health Protection Branch, Ottawa, Canada) *J. Agric. Food Chem. 29*:787-789 (1981). Following a report of the occurrence of volatile nitrosamines in various vegetable oils and margarines in Germany, a study was carried out to determine the nitrosamine levels in such products sold in retail outlets in Canada. Thirty-eight samples of various vegetable oils, ten of butter, fourteen of margarine, and six of lard were analyzed. All the oils and lard were negative. Only one butter and five margarine samples contained trace levels (0.2-3.8 ppb) of *N*-nitrosodimethylamine and/or *N*-nitrosomorpholine. Further investigations at the plant level failed to uncover any definite source of the nitrosamine contamination detected in some of the margarine samples. Recent samples of margarine from these plants were, however, either negative or contained insignificant levels of volatile nitrosamines. It was concluded that nitrosamine levels in these products are negative or negligible and, therefore, should not be a matter of concern.

EFFECTS OF DIETARY FATY AND VITAMIN E ON THE LIPID COMPOSITION AND STABILITY OF VEAL DURING FROZEN STORAGE. F.B. Shorland, J.O. Igene, A.M. Pearson, J.W. Thomas, R.K. McGuffey, and A.E. Aldridge (Depts. of Foods Science and Human Nutrition and Dairy Science, Michigan State Univ., East Lansing, MI) *J. Agric. Food Chem. 29*:863-871 (1981). Calves were fed either coconut or corn oil as milk fat replacers with or without vitamin E as *d*-α-tocopheryl acetate until slaughtered at 9 weeks of age. The corn oil fed animals generally showed poor growth rates. The lipid composition of the depot fats was altered by the dietary oils; corn oil increased linoleic acid levels and coconut oil raised lauric and myristic acid contents. Vitamin E supplementation enhanced tissue levels and, consistent with chain extension, increased the stearic acid content at the expense of lauric, myristic, and palmitic acids. Supplemental vitamin E retarded lipid oxidation of longissimus dorsi (l. dorsi) tissues during frozen storage, but the reverse was generally true in omental and perinephric tissues. Thus, inhibition of autoxidation by vitamin E was not clearly evident in the more complicated intact tissue systems as has been demonstrated for extracted lipids.

FLUORESCENCE LIFETIME AND TIME-RESOLVED POLARIZATION ANISOTROPY STUDIES OF ACYL CHAIN ORDER AND DYNAMICS IN LIPID BILAYERS. P.K. Wolber and B.S. Hudson (Dept. of Chem., Stanford Univ., Stanford, CA) *Biochemistry 20*:2800-2810 (1981). The time-resolved fluorescence intensity and anisotropy decays of *cis*- and *trans*-parinaric acids and phosphatidylcholines labeled with *trans*-parinaric acid have been characterized in bilayers formed by several phosphatidylcholines and by

dipalmitoylphosphatidylcholine-cholesterol mixtures, at several temperatures. Both a conventional free-running nitrogen flashlamp and the novel synchrotron source at the Stanford Linear Accelerator Center (SLAC) were used as excitation sources for a modified single photon counting fluorescence lifetime apparatus. The measured emission decay kinetics of both isomers of parinaric acid were biexponential in all but one of the lipid systems examined. Experiments conducted with *trans*-parinaroylphosphatidylcholines yielded results virtually identical with those obtained with *trans*-parinaric acid.

PREPARATION OF METHYL *CIS*-9,*CIS*-12-OCTADECADIENOATE-16,16,17,17-d_4. R.O. Adlof and E.A. Emken (Northern Regional Research Center, Agricultural Research, Science and Education Administration, U.S. Dept. of Agriculture, Peoria, IL 61604) *Chem. Phys. Lipids 29*(1):3-9 (1981). An eight-step synthesis is described which gives an overall yield of ~30% methyl *cis*-9, *cis*-12-octadecadienoate-16,16,17,17-d_4. The preparation utilizes easily obtainable starting materials. Tris(triphenylphosphine) chlororhodium (I) catalyst is used for incorporation of the deuterium isotopes. The double bond in the 9 position is created by the Wittig coupling of 1-non-3-enyl-d_4-triphenylphosphonium bromide to methyl 8-formyloctanoate. Various methods for preparation of the intermediate and final products are discussed. Partial argentation resin chromatography was used to remove the ~9% *trans/cis, cis/trans,* and *trans/trans* isomers also produced. Analysis of the final product by mass spectrometry (MS) indicated 96%-d_4.

15-OXYGENATED STEROLS BY *M*-CHLOROPERBENZOIC ACID OXIDATION OF 3β-ACETOXY-5α-CHOLESTA-8, 14-DIENE. M. Anastasia, P. Allevi, A. Fiecchi, and A. Scala (Istituto di Chimica Facoltà di Medicina e Chirurgia, 20133 Milano, Italy) *J. Org. Chem. 46*(16):3265-3267 (1981). The epoxidation of 3β-acetoxy-5α-cholesta-8,14-diene with 1 molar equiv of *m*-chloroperbenzoic acid has been found useful for the synthesis of 15-oxygenated sterols. The major product of the reaction, 3β-acetoxy-14α,15α-epoxy-5α-cholest-8-ene, is decomposed on silica to a (1:1) mixture of 3β-acetoxy-5α-cholesta-8(14),9-(11)-dien-15α-ol and 3β-acetoxy-5α-cholest-8(14)-ene-9α,15α-diol. The minor product obtained in the epoxidation is 3β-acetoxy-8α,9α-epoxy-5α-cholest-14-ene.

SYNTHESIS OF CHOLESTA-5,8-DIEN-3β-OL. M. Anastasia, A. Fiecchi, and G. Galli (Inst. of Chem., School of Med., and Lab. of Applied Biochem., School of Pharm., Univ. of Milan, I-20133 Milano, Italy) *J. Org. Chem. 46*:3421-3422 (1981). Cholesta-5,8-dien-3β-ol was synthesized in two steps by starting from 3β-acetoxycholesta-5,7-diene. Diethyl azodicarboxylate reacts with 3β-acetoxycholesta-5,7-diene to afford 3β-acetoxy-7α-(1,2-dicarbethoxyhydrazo)-cholesta-5,8-diene and 3β-acetoxy-7α-(1,2-dicarbethoxyhydrazo)cholesta-5,8(14)-diene. The former was then reduced with lithium in ethylamine to the title compound.

SYNTHESIS AND SPECTRAL STUDIES OF 2-ALKOXYSTEARIC ACIDS – II. A.A. Ansari, U. Murawski and H. Egge (Inst. of Physiol. Chem., Univ. of Bonn, Nussallee 11, D-5300 Bonn (F.R.G.)) *Chem. Phys. Lipids 29*:37-43 (1981). Seven 2-alkoxystearic acids containing different functional groups in the O-alkyl chain and a new dehydration product were prepared by dehydrohalogenation of 2-iodostearic acid in the presence of different alcohols. Two of the alkoxyacids can be used as intermediates for the preparation of 1-0-(1'-alkyl)glycerols.

STABILITY OF ABDOMINAL FAT AND MEAT OF BROILERS: COMBINED EFFECT OF DIETARY VITAMIN E AND SYNTHETIC ANTIOXIDANTS. I Bartov and S. Bornstein (Division of Poultry Science, Agricultural Research Organization, The Volcani Center, Bet Dagan, Israel) *Poultry Sci. 60*(8):1840-1845 (1981). The effect of α-tocopheryl acetate (ATA) in combination with synthetic antioxidants in a diet without added fat or in a diet containing 4% acidulated soybean-oil soapstock on the α-tocopherol (AT) content of abdominal fat and on the stability of carcass tissues of 8-week-old broilers were determined. Ethoxyquin (EQ), butylated hydroxytoluene (BHT), and Endox-50 consistently (but not significantly, $P > .05$) increased AT levels in carcass fat of birds fed diets with or without ATA supplementation. The stability of abdominal fat and thigh mean increased with the combination of EQ and ATA in birds fed the two basal diets beyond the effect of each of these materials fed alone. The combination of BHT with ATA increased the stability of fat and meat only in birds fed the diet without added fat. Endox-50 did not improve tissue stability either with or without ATA supplementation.

DETERMINATION OF FATTY ACID COMPOSITION VIA CHEMICAL IONIZATION-MASS SPECTROMETRY. W.L. Erdahl, W. Beck, C. Jones, D.E. Jarvis and O.S. Privett (The Hormel Institute, University of Minnesota, Austin, MN 55912) *Lipids 16*(8):614-622 (1981). The analysis of fatty acid methyl esters by chemical ionization-mass spectrometry via a new interface system is described. The sample is applied to the interface system in dichloromethane containing trideuteromethyl (CD_3) fatty acid esters as internal standards and dodecanol as a carrier. The esters are evaporated into a carrier gas of nitrogen in the interface and then drawn through a transfer system where residual traces of solvent are removed and the esters are concentrated by a porous silver membrane separator. The sample, now enriched in the carrier gas, is passed into the mass spectrometer where it is analyzed by selective multiple ion monitoring using isobutane as the reagent gas. The method, which takes less than a minute, is computerized for the quantitative analysis of the 19 most common fatty acids occurring in major portions in animal and plant tissues. The accuracy and precision of the method was demonstrated and compared to fatty acid analysis by gas liquid chromatography on several fats.

ANALYSIS OF THE PHOSPHOLIPID OF THE NUCLEAR ENVELOPE AND ENDOPLASMIC RETICULUM OF LIVER CELLS BY HIGH PRESSURE LIQUID CHROMATOGRAPHY. J.L. James, G.A. Clawson, C.H. Chan, and E.A. Smuckler (Department of Pathology, University of California, San Francisco, CA 94143) *Lipids 16*(7):541-545 (1981). A method is described for the separation and analysis of phospholipids from rat-liver nuclear envelope and endoplasmic reticulum. The procedure employs a liquid environment, to which antioxidants can be added, and results in separation of NL, PE, PI, PS, and PC in 99% purity in 12 min; analytical columns and a radial compression system may be employed. The procedure results in phospholipids with a large proportion of highly unsaturated fatty acids; some differences in fatty acid distributions were found when nuclear envelope phospholipid fractions were compared with the corresponding fractions from endoplasmic reticulum.

CHAIN LENGTH DEPENDENT THERMODYNAMICS OF SATURATED SYMMETRIC-CHAIN PHOSPHATYLCHOLINE BILAYERS. J.T. Mason and C-H Huang (Department of Biochemistry, University of Virginia School of Medicine, Charlottesville, VA 22908) *Lipids 16*(8):604-608 (1981). A molecular interpretation for the chain length dependent thermotropic behavior of saturated symmetric-chain phosphatidylcholine bilayers is proposed. It is suggested that the bilayer interface region and conformationally inequivalent terminal ends of the fatty acyl chains perturb the packing associations of the rest of the hydrocarbon chains in the gel phase of the bilayer. These perturbing effects, which are seen to increase with decreasing acyl chain length, have been quantitatively defined by a perturbation parameter, P. The thermodynamic parameters of the thermal phase transition of these phosphatidylcholines are found to be linearly correlated to P and these linear relationships can be used to predict the minimum number of carbon atoms in the acyl chain necessary in order for a bilayer phase transition to occur.

FIELD DESORPTION MASS SPECTROMETRY OF LIPIDS. I. THE APPLICATION OF FIELD DESORPTION MASS SPECTROMETRY TO THE INVESTIGATION OF NATURAL WAXES. K.E. Murray and H.-R. Schulten (Division of Food Research, CISRO, North Ryde, P.O. Box 52, New South Wales, 2113, Australia) *Chem. Phys. Lipids 29*(1):11-21 (1981). Field desorption mass spectra have been recorded of *n*-dotriacontane, *n*-tetracosanoic acid and hexadecyl hexadecanoate as representatives of long straight-chain alcohols, acids and esters respectively. Molecular or quasimolecular ions were formed almost exclusively with fragmentation at a low level. Mixtures of long chain compounds have also been examined and the components characterized as their molecular ions. These included a fraction of higher α-ω diols from hydrolysed carnauba wax, unhydrolysed carnauba wax and a previously uninvestigated wax from a *Livistonia* sp. Results have shown that field desorption mass spectrometry has a most promising role in wax investigation by the ready characterization of constituents up to molecular weights of 2000 and greater.

HIGH PERFORMANCE REVERSED PHASE CHROMATOGRAPHY OF CHOLESTEROL AND CHOLESTERYL ESTERS OF HUMAN PLASMA LIPOPROTEINS. E.G. Perkins, D.J. Hendren, J.E. Bauer, and A.L. El-Hamdy (Dept. of Food Science, Burnsides Research Laboratory, University of Illinois, 1208 W. Pennsylvania Ave., Urbana, IL 61801) *Lipids 16*(8):609-613 (1981). Cholesterol and cholesteryl esters were separated according to their carbon number and number of double bonds by high performance reversed-phase chromatography (HPRC) using acetonitrile-chloroform/methanol (1:1:1, v/v) as a mobile phase. It was found that within the same equivalent carbon number (ECN) category, cholesteryl esters with the highest number of double bonds eluted ahead of those with a lower number of double bonds, and with the *cis* isomers eluting ahead of their *trans* partners. Thus, cholesteryl oleate (C27-18:1*c*) elutes ahead of cholesteryl palmitate (C27-16:0)

and ahead of cholesteryl elaidate (C27-18:1*t*). Human lipoprotein, as well as rat liver cholesteryl esters, were separated using this technique.

TRANSFORMATION OF ARACHIDONIC ACID INTO MONO-HYDROXY-EICOSATETRAENOIC ACIDS BY MOUSE PERITONEAL MACROPHAGES. H. Rabinovitch, J. Durand, M. Rigaud, F. Mendy, and J-C. Breton (Faculte de medecine et de Pharmacie, 2 rue du docteur Marcland – C.H.U. Dupuytren, 87031 Limoges, Laboratoire de Biochimie) *Lipids 16*(7):518-524 (1981). Mouse peritoneal macrophages synthesize 6 monohydroxylated eicosatetraenoic acids when incubated with exogenous arachidonic acid. These compounds were identified by chromatographic techniques (high pressure liquid chromatography and high efficiency glass capillary column gas chromatography and mass spectrometry. The chromatographic and spectrometric data are presented. These results show that peritoneal macrophages constitute one of the best systems to study in evaluating the metabolism of oxygenated products of arachidonic acid.

SELENOSTEROIDS AS POTENTIAL ESTROGEN-RECEPTOR SCANNING AGENTS. S.A. Sadek, S.M. Shaw, W.V. Kessler, and G.C. Wolf (Department of Bionucleonics and the School of Health Sciences and the Department of Medicinal Chemistry and Pharmagognosy, Purdue University, West Lafayette, Indiana 47907) *J. Org. Chem. 46*(16):3259-3262 (1981). In an effort to produce effective breast tumor imaging agents, a series of selenium-labeled steroids have been synthesized and characterized. Starting with natural estrone, derivatives containing (nonradioactive) selenium at positions 3, 16, and 17 were obtained. Estrogen-receptor assays reveal 17α-[(phenylseleno)methyl]-17β-estradiol, 8c, retains approximately 12% of the binding activity of 17β-estradiol.

LIPID-PROTEIN CONSTITUENTS OF HUMAN CORNEAL ARCUS. G.A.K. Sheraidah, A.F. Winder and A.R. Fielder (Institute of Ophth. and Moorfields Eye Hosp., London and the Royal Infirmary, Derby, Great Britain) *Atherosclerosis 40*(1):91-98 (1981). Extracts of fresh senile human peripheral cornea with varying degrees of arcus were prepared by soaking minced tissue in buffered saline/EDTA. Apolipoprotein B was, at most, an occasional feature of these extracts; interactions involving glycosaminoglycans were not evident; and the lipid composition, particularly of the cholesterol ester fraction, was also not consistent with a recent origin from plasma components and particularly from low density lipoprotein. Assuming this origin, substantial secondary changes must follow insudation, involving protein loss and lipid reesterification, as is described for lipid deposits forming intracellularly at other sites. The manner of these changes in a deposit forming extracellularly in the avascular peripheral cornea is not clear.

RESOLUTION OF PARTITION COEFFICIENTS IN THE TRANSVERSE PLANE OF THE LIPID BILAYER. K.A. Sikaris, K.R. Thulborn and W.H. Sawyer (Russell Grimwade School of Biochemistry, University of Melbourne, Parkville, Victoria 3052, Australia) *Chem. Phys. Lipids 29*(1): 23-26 (1981). The distribution of a small lipid soluble molecule across a lipid bilayer has been determined using fluorescence quenching techniques. The neutral form of the amine, N,N-dimethylaniline (DMA) quenches the fluorescence of a series of *n*-(9-anthroyloxy) fatty acids (n = 2,6,9,12, 16) which place a fluorophore at a graded series of positions from the surface to the centre of the lipid bilayer. A method is described for determining the partition coefficient of a quencher at each transverse position. The results show that DMA is located at all depths within the bilayer leaflet but that it is concentrated at the bilayer centre and to a lesser extent at the bilayer surface.

OCCURRENCE OF MIXTURES OF GEOMETRICAL ISOMERS OF CONJUGATED OCTADECATRIENOIC ACIDS IN SOME SEED OILS: ANALYSIS BY OPEN-TUBULAR GAS LIQUID CHROMATOGRAPHY AND HIGH PERFORMANCE LIQUID CHROMATOGRAPHY. T. Takagi and Y. Itabashi (Department of Chemistry, Faculty of Fisheries, Hokkaido University, Hakodate, Japan) *Lipids 16*(7):546-551 (1981). Analytical methods to obtain the detailed compositions of the fatty acids in oils containing more than one conjugated octadecatrienoic acid by open-tubular gas liquid chromatography (GLC) and by reversed-phase high performance liquid chromatography (HPLC) were established. Effective GLC separations of *cis, trans, trans*-9,11,13-octadecatrienoic acid ttt-9,11,13-18:3, *ttc*-8,10,12-18:3, and *ttt*-8,10,12-18:3 were obtained with an open-tubular column coated with the nonpolar liquid phase OV-1 using an instrument having all-glass carrier gas pathways. The HPLC method also gave satisfactory separations for the isomeric conjugated octadecatrienoates on the basis of number of the *cis* and *trans* double bonds. Two or three minor conjugated trienoic acids were found along with the principal conjugated trienoic acid in tung oil, and seed oils of cherry, *Prunus sp., Momordica charantia, Trichosanthes anguina, Punica granatum, Catalpa ovata,* and *Calendula officinalis.* The mechanism for the formation of the conjugated trienoic acid mixtures in the seed oils is discussed. The *C. ovata* seed oil also contained *ct* and *tt*-9,12-octadecadienoic acids. The *tt* isomer is presumed to be a precursor of *ttc*-9,11,13-18:3, the main conjugated trienoic acid in this oil.

MAJOR HYDROCARBONS OF THE POST-PHARYNGEAL GLANDS OF MATED QUEENS OF THE RED IMPORTED FIRE ANT *SOLENOPSIS INVICTA.* M.J. Thompson, B.M. Glancey, W.E. Robbins, C.S. Lofgren, S.R. Dutky, J. Kochansky, R.K. Vandermeer, and A.R. Glover (Insect Physiology Laboratory, AR, SEA, USDA, Beltsville, MD 20705 and Insects Affecting Man and Animal Research Laboratory, AR, SEA, USDA, Gainesville, FL 32604) *Lipids 16*(7):485-495 (1981). Thin layer and column chromatographic analyses showed that hydrocarbons were the major lipoidal components of post-pharyngeal glands of mated queens of the red imported fire ant, *Solenopsis invicta.* Gas liquid chromatographic analyses on an OV-17 column showed four major hydrocarbons which have been identified and confirmed by synthesis and comparative mass spectral analyses as 13-methylheptacosane, 13,15-dimethylheptacosane, 3-methylheptacosane, and 3,9-dimethylheptacosane. When microgram quantities of the natural alkanes on filter paper were placed in colonies of ants, the ants clustered on the paper about the sample and proceeded to masticate the paper in the area containing the alkanes.

TISSUE CULTURE OF COCOA BEAN (*THEOBROMA CACAO* L.): CHANGES IN LIPIDS DURING MATURATION OF BEANS AND GROWTH OF CELLS AND CALLI IN CULTURE. C.H. Tsai and J.E. Kensella (Institute of Food Science, Cornell University, Ithaca, NY 14853) *Lipids 16*(8):577-582 (1981). Callus cultures of *Theobroma cacao* L., initiated from explants of immature cocoa bean cotyledons, contained 5.3%-6.4% lipids (dry wt basis). The major fatty acids were palmitic, oleic and linoleic acids. Cell suspensions contained 5.7-7.7% total lipids which had a higher polyunsaturated fatty acid content than total lipids of the calli. Phospholipids and glycolipids were the predominant lipid classes of calli and cell suspensions. Immature cocoa beans at early stages of development contained much higher polyunsaturated fatty acids, higher polar lipids and lower triglycerides than did mature ripe beans. Ripe cocoa beans contained 54% total lipids of which 96.8% were triglycerides. The fatty acid composition of total lipids of calli and cell suspensions were similar to those of the immature cocoa beans.

NEW PROCESSES IN DEGUMMING, BLEACHING, DEACIDIFICATION-DEODORIZATION AND WINTERIZING OF EDIBLE OILS. Z. Leibovitz and C. Ruckenstein. Rev. Franc. Corps Gras, vol. 28, no 7-8, 1981, p. 303-308, angl. RFCG 81-23. The authors describe the advantages of the so called physical refining and the processing of the different steps of this refining. The degumming is performed with a food grade acid (H.L.S. Patent) by a dry or wet process. The bleaching earth used for the next step is Tonsil optimum or Tonsil Supreme. The deacidification deodorization is achieved in an apparatus which saves energy (H.L.S. D-D-System). The results obtained are shown for sunflower, maize, soybean, peanut and rice bran oils. Winterization which allows the removal of waxes and stearin is performed with a special apparatus well adapted to sunflower and cotton oils.

PHYSICAL AND CHEMICAL REFINING OF THE SOYBEAN OIL. J.M. Klein. Rev. Franc. Corps Gras, vol. 28, no 7-8, 1981, p. 309-313, french. RFCG 81-24. The physical refining (PR) and the alkali refining (AR) of the soybean oil have been compared in order to obtain equivalent oils with respect to organoleptic characteristics and stability. These two processes have been compared economically: the advantage of PR with regard to AR is not obvious, below 1% oleic acidity.

DETERMINATION OF MELTING CURVES FOR BAOBAB OILS BY LOW RESOLUTION NMR. A. Ralaimanarivo, M.P. Bianchini and E.M. Gaydou. Rev. Franc. Corps Gras, vol. 28, no 7-8, 1981, p. 315-317, french. RFCG 81-25. The solid fat index has been determinated by low resolution NMR in four samples of baobab oils from two Madagascar varieties. The obtained results have been compared for Adansonia grandidieri three samples and A. suarezensis. Every sample is converted into a definite crystalline form, to prevent the effects of previous thermical treatments. Significant differences have been shown for the A. grandidieri same variety.

CHEMICAL COMPOSITION OF THE SIMAROUBA GLAUCA D.C. ENDOCARP. G. Lognay, A. Ergo, J.P. Wathelet and M. Severin. Rev. Franc. Corps Gras, vol. 28, no 7-8, 1981, p. 319-321, french. RFCG 81-26. Simarouba glauca D.C. (Simaroubaceae) is a little tree which grows in tropical areas. The seeds of this species are a potential source of lipids. In a first work the authors investigated on the fat from the kernels. In this work, lipids of the endocarp are

measured and complete triglyceride structure is calculated. Main triglycerides are: LnLL (11.88%), OOO (9.87%), LLL (8.63%), StOP (7.23%), LnLnL (6.77%), OOP (6.47%).

CONTROL OF A LEAF SPOT ON OIL PALM IN HONDURAS WITH INSECTICIDES. J.C. Vessey. Oleagineux – 1981, 36, no 5, p. 229-232. Field observations indicated that fungal leaf spot lesions on *Elaeis guineensis* started at insect feeding wounds. Weekly foliar applications to run-off of a mixture of Sevin, 6 g/l active ingredient (a.i.), and diazinon, 4 g/l a.i., reduced the number of infected leaflets from 26 p. 100 to 1 p. 100 on 2-year-old palms. In an experiment with 13-year-old palms, five systemic insecticides were injected into the trunk or applied to soil at 10 week intervals for 40 weeks. Trunk injections with monocrotophos at a rate of 10 g a.i. per tree was the best treatment with a reduction in the average number of fungal lesions per leaf from 427 to 50. It was concluded that control of the disease by application of insecticides was probably the result of a reduction in the number of infection courts caused by insect feeding.

HARVEST CHECKS IN AN OIL PALM PLANTATION. Conseils de l'I.R.H.O.–214. Oleagineux, Vol. 36, no 5–Mai 1981, p. 233-234.

TRUNK INJECTION OF SYSTEMIC INSECTICIDES AGAINST THE COCONUT BLACK HEADED CATERPILLAR *NEPHANTIS SERINOPA* MEYRICK. L. Nadarajan and G.P. Channabasavanna. Oleagineua–1981, 36, no 5, p. 239-245. Control of *Nephantis serinopa*, a serious pest on coconut is difficult with the present methods viz. parasite release and spraying of insecticides. Among six systemic insecticides tried by trunk injection, monocrotophos (Nuvacron 40 p. 100 EC) and dicrotophos (Bidrin 24 p. 100 EC) are found to be very effective. Injection of monocrotophos 3.5 ml a.i. to the younger palms of 5 year old and 7.0 ml a.i. to the older palms provides a complete control up to 90 and 60 days respectively. Phosphamidon (Dimecron 100 EC) which is not effective at low concentration is proved to be phytotoxic at higher concentrations. Residues of insecticides in coconut water and coconut meat are within tolerance limits set by WHO/FAO three weeks after treatment indicating the safety to use the nuts. Trunk injection does not affect the vigour of the coconut tree, is easy to adopt by farmers and can be effectively integrated with the existing biological control.

FIELD STUDY OF THE EVOLUTION POPULATIONS OF THE NEMATODE *SCUTELLONEMA CAVENESSI* AND OF THE KINETIC OF THE FIXATION OF N_2 ON 3 GROUNDNUT CULTIVARS. G. Germani, Oleagineux, 1981, 36, no 5, p. 247-249. In a field experiment, the population dynamic of the plant parasitic nematode *Scutellonema cavenessi* was studied on three groundnut cultivars (55-437; 28-206; GH 119-20). During this experiment, the nitrogen fixing activity of these three cultivars was studied, with or without nematodes, as a function of time. It appeared that the variety 55-437 was the better host for *S. cavenessi* and its nitrogen fixing activity was more reduced by this parasite than those of the two others. It is conceivable that these two phenomena are in relation; this could explain that the chlorosis appears only on this cultivar.

RELATIONSHIP BETWEEN LIPOPEROXIDE AND AGING. K. Fukuzumi. Oleagineux–1981, 36, no 5, p. 251-253. The lipoperoxide theory is proposed to explain aging through the free-radical and the cross-linking theories combined. Lipoperoxide theory states aging is generated by lipoperoxides in a living body. The author described the phenomena of aging in the papers on lipoperoxides and geriatric diseases published in 1965 and 1969. By the reaction with lipoperoxides, the –SH group of coenzyme A necessary for β-oxidation changes into inactive –S–S– group. Thus, lipoperoxides are accumulated in a living body. Then, under "lipoperoxide theory", aging may advance. Almost all phenomena about aging – wrinkles, senile pigment, presbyopia; decreases of moisture outside cells, total moisture of a living body, mucopolysaccharide, and cell number; and a lowering of organ function – can be elucidated by "lipoperoxide theory."

Biochemistry and nutrition

HEPATIC CONTRIBUTION TO NEWLY MADE FATTY ACIDS IN ADIPOSE TISSUE IN RATS AND INHIBITION OF HEPATIC AND EXTRAHEPATIC LIPOGENESIS FROM GLUCOSE BY DIETARY CORN OIL. N. Baker, J. Mead, Jr., and R. Kannan (Veterans Administration, Wadsworth Medical Center, Los Angeles, CA 90073) *Lipids 16*(8):568-576 (1981). We have reexamined an earlier rat study in which the authors concluded that 60 min after [U-^{14}C]-glucose injection half of labeled fatty acids found in adipose tissue had been made in liver and then transported to the adipose tissue. We have shown that even under conditions in which the lipogenic role of the liver is optimized (fed-refed rats on a fat-free, high-carbohydrate diet), almost none of the labeled fatty acids found in adipose tissue of rats 60 min after they were fed a labeled glucose test meal was derived from the liver. This conclusion was based experimentally on (a) the use of the blocking agent Triton WR 1339 to measure the total labeled triglyceride fatty acids (TGFA) synthesized and secreted by the liver in 60 min and (b) comparison of plasma TGFA-^{14}C data with radioactivity found in liver and in adipose tissue in 60 min. Without using Triton WR 1339, mathematical analysis of plasma TGFA-^{14}C following the glucose test-meal leads one to the same conclusion: 97% of ^{14}C-labeled fatty acids found in adipose tissue at 60 min was made in situ. Additional studies in rats established that the source of error in the earlier studies was an incorrect assumption that dietary corn oil could inhibit hepatic lipogenesis from glucose C without inhibiting fatty acid synthesis in adipose tissue. In our studies, 10% corn oil inhibited equally both hepatic and adipose tissue fatty acid synthesis from glucose C under conditions that precluded any significant transport of labeled TGFA-^{14}C from liver to adipose tissue.

STRUCTURE OF BILIARY PHOSPHATIDYLCHOLINE IN CHOLESTEROL GALLSTONE PATIENTS. A. Cantafora, M. Angelico, A. DiBiase, U. Pieche, F. Bracci, A.F. Attili, and L. Capoccaccia (III Clinica Medica, University of Rome, Italy) *Lipids 16*(8):589-592 (1981). The fatty acid composition of biliary phosphatidylcholine was analyzed in 13 patients with radiolucent gallstones undergoing elective cholecystectomy, and in 11 normolipemic patients without gallstones undergoing abdominal surgery. The only difference in the percentage fatty acid composition between the two groups was a significantly ($p < 0.05$) higher percentage arachidonic acid in the first group. The acid was exclusively located in the *sn*-2 position of phosphatidylcholine (PC), accounting for 13.0 ± 4.9% in the first group and 8.2 ± 4.9% in the second ($p < 0.05$). The percentage arachidonic acid of PC was negatively correlated ($p < 0.001$) with the percentage biliary chenodeoxycholate in gallstone patients, but not in controls. Explanation of these findings is, at present, only speculative.

DISTRIBUTION OF LIPIDS & MOLECULAR SPECIES OF PHOSPHATIDYL CHOLINE & PHOSPHATIDYL ETHANOLAMINE OF GOAT LIVER. S. Disa and U.K. Misra (Department of Biochemistry, College of Basic Sciences, G.B. Pant University of Agriculture & Technology, Pantnager) *Indian J. Biochem. Biophys. 18*(1):51-55 (1981). Distribution of various neutral lipids, phospholipids and the molecular species of phosphatidyl choline and phosphatidyl ethanolamine has been studied in goat liver. *In vitro* incorporation of [1-^{14}C] acetate and $NaH_2^{32}PO_4$ has also been studied in the above lipid components of goat liver. The distribution of cholesterol, triglycerides and phospholipids in goat liver lipids was 18, 19 and 52%, respectively, and that of phosphatidyl choline, phosphatidyl ethanolamine and sphingomyelin among phospholipids 41, 29 and 10% respectively. Phosphatidyl choline gave six molecular species and phosphatidyl ethanolamine eight molecular species on argentina *thin layer chromatography*. The distribution of mono, di, tri, tetra and hexaenoic molecular species was 12, 21, 14, 33 and 7% respectively in PC and 6, 22, 5, 29 and 22% respectively in PE. [1-^{14}C] Acetate was actively utilized for both lipogenesis and cholesterogenesis. The newly formed fatty acids were used in the formation of glycerides and phosphoglycerides. The incorporation of [1-^{14}C] acetate into various molecular species of phosphatidyl choline and phosphatidyl ethanolamine indicated that goat liver could synthesize polyenoic fatty acids from [1-^{14}C] acetate. Incorporation of $NaH_2^{32}PO_4$ into goat liver phosphatidyl choline and phosphatidyl ethanolamine and their molecular species showed that synthesis of these *via* CDP pathways was quite active but the formation of hexaenoic PC *via* N-methylation of PE was relatively slower.

RELATIONSHIP BETWEEN PLASMA HIGH-DENSITY LIPOPROTEIN CONCENTRATIONS AND LIPOPROTEIN LIPASE AND HEPATIC LIPASE ACTIVITIES IN CHILDREN WITH HYPERLIPIDAEMIA. T.R. Gamlen, E. Layward, F. McTaggart, and D.P.R. Muller (Department of Child Health, Institute of Child Health, London, U.K.) *Clin. Sci. 61*(2):235-240 (1981). Significant positive correlations were found between the lipoprotein lipase and hepatic lipase activities of post-heparin plasma samples and plasma high-density-lipoprotein (HDL) cholesterol concentrations in 21 children with hyperlipidaemia and six normal adult males. A significant positive correlation was also observed between the two lipase activities and the ratio of HDL cholesterol to apoprotein AI (apo AI) concentrations. These findings provide further evidence that a significant proportion of HDL and possibly the HDL_2 subfraction is formed during the clearance of triglyceride-rich lipoproteins.

HYPERLIPIDEMIA IN RATS FED RETINOIC ACID. L.E. Gerber and J.W. Erdman, Jr. (Department of Food Sci., Univ. of Illinois, Urbana, IL 61801) *Lipids 16*(7):496-501 (1981). This report de-

scribes a series of experiments that attempt to characterize the lipidemia accompanying retinoic acid administration. After feeding young adult male Sprague-Dawley rats, 1.2 Retinol Equivalents (R.E.) retinyl acetate plus supplemental retinoic acid (100 μg/g dry diet) for three days and fasting for 6-8 hr, triglyceride, cholesterol, and phospholipid content of various serum lipoprotein fractions were determined. When compared to unsupplemented controls, both the serum very low density lipoprotein (VLDL) and the high density lipoprotein (HDL) fractions of the retinoic acid-fed rats were found to harbor an elevated triglyceride content. While VLDL cholesterol and phospholipid content were also elevated, total serum cholesterol and phospholipids were not statistically altered. The detergent Triton WR-1339 was used to depress serum triglyceride clearance in order to assess the effects of retinoic acid feeding on serum triglyceride levels. Triglyceride accumulation started earlier after Triton treatment and was greater when rats were fed 100 μg/g retinoic acid for three days prior to testing. Red and white gastrocnemius muscle, cardiac ventricular muscle, and perirenal adipose tissue were removed from rats following retinoic acid feeding. Analysis of these tissues for lipoprotein lipase (EC 3.1.1.3) activity showed a decrease in adipose tissue, a large depression in both areas of gastrocnemius muscle and no change in cardiac muscle as a result of retinoic acid feeding.

MICROSOMAL PHOSPHATIDYLETHANOLAMINE METHYLTRANSFERASE: INHIBITION BY S-ADENOSYLHOMOCYSTEINE. D.R. Hoffman, J.A. Haning and W.E. Cornatzer (Department of Biochemistry, Ireland Research Laboratory, University of North Dakota, Grand Forks, ND 58202) *Lipids 16*(8):561-567 (1981). Inhibition by S-adenosylhomocysteine (AdoHcy) of the three reaction of phosphatidylethanolamine methyltransferase which catalyzes the production of phosphatidylcholine from phosphatidylethanolamine in guinea pig and rat liver microsomes has been evaluated. Five of the six methylation reactions in these two species exhibit greater affinity for inhibitor, AdoHcy, than for substrate, S-adenosylmethionine (adoMet). The Ki values for the rate-limiting reactions were 3.8μM and 68 μM in rat and guinea pig livers, respectively. An AdoMet:AdoHcy ratio of 12:1 in developing liver was found to decline to a constant value in the adult of 5:1. The concentration of AdoHcy in rat and guinea pig liver increases markedly following death of the animal. A concomitant decrease in the AdoMet level was observed in guinea pig liver. A comparison of phosphatidylethanolamine methyltransferase activity with the hepatic concentrations of AdoMet and AdoHcy in mouse, rat, rabbit and guinea pig is presented. Regulation of the methylation pathway is discussed.

MICROSOMAL PHOSPHATIDYLETHANOLAMINE METHYLTRANSFERASE: SOME PHYSICAL AND KINETIC PROPERTIES. D.R. Hoffman and W.E. Cornatzer (Department of Biochemistry, Ireland Research Laboratory, University of North Dakota, Grand Forks, ND 58202) *Lipids 16*(7):533-540 (1981). Some physical and kinetic properties of the microsomal enzyme(s) that convert phosphatidylethanolamine to phosphatidylcholine in rat and guinea pig livers have been investigated. The pH optima of the reactions were 9.8, 9.3 and 9.5 for the first, second and third methylation reactions, respectively. In complete heat denaturation of the protein catalyzing the first reaction contrasts with inactivation at 60 C of the enzymes catalyzing the second and third methylations. The maximal velocity of the first reaction of the guinea pig liver enzyme is 48 pmol/min/mg protein, substantially less than exhibited rate-limiting reaction of the three step methylation sequence in rat liver, 114 pmol/min/mg. The affinity of the microsomal enzyme for S-adenosylmethionine is greater in rat liver (Km = 18.2 μM) than in guinea pig liver (Km = 302 μM).

EFFECT OF DIABETES AND INSULIN REPLACEMENT OF THE LIPID PROPERTIES OF HEPATIC SMOOTH ENDOPLASMIC RETICULUM. C.T. Holloway and S.A. Garfield (Department of biochemistry, University of Virginia, Charlottesville, VA 22908) *Lipids 16*(7):525-532 (1981). This study is a characterization of the lipid properties of the smooth and rough endoplasmic reticulum (SER, RER) of liver from streptozotocin-induced diabetic rats. A significant decrease in membrane microviscosity was observed in the SER but not the RER of diabetic rats when compared to that of normal controls. This decrease in SER membrane microviscosity correlated with a decrease in cholesterol/phospholipid ratio of these membranes that could be accounted for solely by a change in the membrane cholesterol content. Changes in phospholipid fatty acyl chain composition were also observed in the SER membranes but these changes were small when compared to the large change in cholesterol content observed. Insulin treatment for only one day did not significantly alter the microviscosity of the SER but after 2, 4 and 6 days of treatment both membrane microviscosity and membrane cholesterol content were restored to values similar to those for normal animals. No significant changes in the RER lipid composition were observed. It is well known that increases in glucose-6-Pase (G-6-Pase) activity of liver ER membranes are associated with diabetic onset. An increase in the specific activity of G-6-Pase was observed in both SER and RER membrane preparations, although the observed increase in the SER membrane is higher. The changes in the G-6-Pase activity of the SER membranes were correlated with the alterations in the microviscosity and lipid composition of these membranes. It is postulated that lipid properties of the SER membranes may contribute to the regulation of G-6-Pase activity in that membrane.

THE EFFECT OF BEZOFIBRATE AND CLOFIBRATE ON CHOLESTEROL ACCUMULATION, ESTERIFICATION AND REMOVAL IN CULTURED 3T3 FIBROBLASTS. K. Hudson and A.J. Day (Dept. of Physiol., Univ. of Melbourne, Parkville, Vic 3052 Australia) *Atherosclerosis 40*(1):53-63 (1981). 3T3 mouse fibroblasts were used to determine the effect of bezafibrate and clofibrate on the cellular metabolism of cholesterol. In cells incubated in normal medium these agents decreased the incorporation of ^{3}H-labelled oleic acid relative to ^{14}C-labelled linoleic acid into the cholesterol ester fraction. When the 3T3 fibroblasts were incubated with cationised low density lipoprotein (LDL) the amount of esterified cholesterol which accumulated in the cells was greatly increased. This accumulation of cholesterol ester was reduced by bezafibrate and clofibrate. These agents decreased the incorporation of both ^{3}H-labelled oleic acid and ^{14}C-labelled linoleic acid into the cholesterol ester fraction of the cells, with a preferential effect on oleic acid as indicated by a reduction in the ^{3}H/^{14}C ratio. When cells which had been preincubated with cationised LDL were reincubated in normal medium, the removal of esterified cholesterol from the cells was increased by both bezafibrate and clofibrate. The mechanism of the effects of these agents on the metabolism of cellular cholesterol is discussed.

INCREASED HEPATIC FIBROGENESIS IN THE CHOLESTEROL-FED MOUSE. S.P. Lee (Gastroenterology Section, Department of Medicine, University of Auckland, Auckland, New Zealand) *Clin. Sci. 61*(2):253-256 (1981). Mice when fed a cholesterol/choline-supplemented diet for 4 weeks developed histologically fatty livers. This lipid overloading was associated with an increase in hepatic concentration of connective tissues. Both histological and biochemical abnormalities regressed on stopping the cholesterol diet for another 4 weeks. With continuing feeding for 24 weeks these abnormalities were sustained. In the absence of available evidence that cholesterol is "toxic" to the liver, it is concluded that lipid loading alone increases hepatic fibrogenesis.

ESSENTIAL FATTY ACIDS IN TROUT SERUM LIPOPROTEINS, VITELLOGENIN AND EGG LIPIDS. C. Leger, L. Fremont, D. Marion, I. Nassour, and M-F. Desfarges (Station de Recherches de Nutrition, Centre National de Recherches Zootechniques, I.N.R.A., 78350 Jouy-en-Josas, France) *Lipids 16*(8):593-600 (1981). This paper describes evidence of (n-3) and particularly of 22:6 (n-3) fatty acid enrichment in trout lipoproteins as well as in vitellogenin, egg lipovitellin and oil globule. Among the lipoproteins, HDL and LDL were the main forms of blood lipid transport, whereas phospholipids and cholesteryl esters are the preferential chemical carriers for (n-3) fatty acid transport. However, cholesteryl esters were less important as esterified fatty acid carriers than in man. Taken together with the data obtained in mammals, our results suggest that there may be a relationship between EFA activity and the distribution of the EFA among the lipoprotein lipid fractions in vertebrates, irrespective of the EFA series. Administration of an (n-3) fatty acid deficient diet for three months prior to trout spawning produced a significant increase in egg lipid content, primarily as a result of the increase of the oil globule composed almost exclusively of triacylglycerols. This diet decreased the 22.6 (n-3), as well as the (n-3) fatty acid contents of lipoproteins, lipovitellin, vitellogenin and the oil globule. In contrast, the (n-3) fatty acid level was always higher in lipoproteins and lipovitellin than in the vitellogenin and the oil globule. Moreover, the relative levels of 22:6 (n-3) and total (n-3) fatty acids were quite similar in lipoproteins and lipovitellin on the one hand, and in vitellogenin and oil globule on the other. These findings suggest a direct relationship between the two forms of plasma lipid transport and the two egg compartments. During ovogenesis, dietary lipids seemed to be diverted from the adipose tissue and essentially deposited in the egg.

NATURE OF THE EXTRAMETABOLIC EFFECT OF SUPPLEMENTAL FAT USED IN SEMEPURIFIED DIETS FOR LAYING HENS. G.G. Mateos and J.L. Sell (Department of Animal Science, Iowa State University Ames, Iowa 50011) *Poultry Sci. 60*(8):1925-1930 (1981). An experiment involving 20 birds was conducted to quantitate the extrametabolic effect of yellow grease used in semisynthetic diets for laying hens. Four diets were arranged as a 2 X 2 factorial with two levels of fat (0 and 7%) and two carbohydrate sources (sucrose and starch). The nitrogen-corrected metabolizable energy (ME_n) of yellow grease was calculated from

lipid digestibility data and from actual determination of dietary ME_n. The ME_n of yellow grease varied with the dietary carbohydrate source and with the procedure used for estimation. When yellow grease was added to a starch-containing diet, the ME_n of the fat was 8497 and 9714 kcal/kg from the lipid digestibility data and actual ME_n determination, respectively. In the sucrose-containing diet of ME_n of yellow grease was 8210 and 10071 kcal/kg, respectively. The data suggest that supplemental fat facilitated energy utilization from nonlipid constituents of the diet. The mechanism is unknown but may be related to a decrease in rate of food passage as a consequence of fat supplementation.

POSITIONAL SPECIFICITY OF *TRANS* FATTY ACIDS IN FETAL LECITHIN. C.E. Moore and G.A. Dhopeshwarkar (Laboratory of Nuclear Medicine and Radiation Biology, Univ. of California, 900 Veteran Ave., Los Angeles, CA 90024) *Lipids 16*(7):479-484 (1981). Differences in the positional incorporation of 9-*trans*[1-^{14}C] octadecenoic (elaidic) and 9-*trans*, 12-*trans*[1-^{14}C] octadecadienoic (linoelaidic) acids in fetal lecithin of rats were demonstrated. On the 20th day of gestation, a ^{14}C-labeled albumin complex of elaidic or linoelaidic acid was injected into the jugular vein of pregnant rats. For comparative purposes, 9-*cis*[1-^{14}C] octadecenoic (oleic) or 9-*cis*, 12-*cis*[1-^{14}C] octadecadienoic (linoleic acid) was injected into the maternal circulation of rats. Animals were killed 6 hr later. Distribution of label in total lipids and phospholipids (PL) of fetal tissue was measured by TLC. Irrespective of the label, the highest percentage of total radioactivity was associated with PL-59 to 67%. Within PL, the major portion of radioactivity was found in choline phosphoglycerides (CPG)-53 to 67%, and in ethanolamine phosphoglycerides (EPG)-18 to 33%. While linoelaidic acid was predominantly esterified in the 2-position of CPG, elaidic acid was nearly equally distributed between positions 1 and 2 of lecithin. Distribution of radioactivity within fatty acid methyl esters (FAME) of CPG measured by radio-GLC suggested that oleic and possibly linoleic acids may be converted to nervonic and arachidonic acid, respectively, in the rat by the 20th day of gestation. Following injection of elaidate, radioactivity of FAME was distributed between palmitate and elaidic acid indicating that rat fetal tissue may metabolize elaidic acid via β-oxidation. In contrast, following injection of linoelaidate, radioactivity of FAME was primarily associated with *tt*-18-2, suggesting little biotransformation to other fatty acids by fetal tissues.

AN APPARENT RACHITOGENIC EFFECT OF EXCESSIVE VITAMIN E INTAKES IN THE CHICK. T.P. Murphy, K.E. Wright, and W.J. Pudelkiewicz (Department of Nutritional Sciences, University of Connecticut, Storrs, Connecticut 06268) *Poultry Sci. 60*(8):1873-1878 (1981). Three replicates (pens of 10 birds each) of a 2 X 2 factorial design experiment (25 and 10,000 IU vitamin E/kg diet on 25 and 500 IU vitamin D/kg diet) were utilized in order to assess effects of excessive intakes of vitamin E on calcium metabolism in the growing chick. A one-week equilibration period was followed by a two-week experimental period. Excessive vitamin E supplementation resulted in reduced calcium and phosphorus in blood plasma, in dry fat-free bone, and in bone ash, calcium, and phosphorus. Inadequate vitamin D supplementation reduced total feed consumption, terminal body weight, plasma calcium, dry fat-free bone, bone ash, bone calcium, and bone phosphorus. Significant vitamin E X vitamin D interactions were noted for plasma calcium, dry bone, and bone ash, excessive vitamin E apparently interfering with vitamin D utilization.

DIETARY FAT EFFECTS ON BLOOD INSULIN, GLUCOSE UTILIZATION, AND MILK PROTEIN CONTENT OF LACTATING COWS. D.L. Palmquist and E.A. Moser (Dept. of Dairy Science, The Ohio Agricultural Research and Development Center, Wooster 44691) *J. Dairy Sci. 64*(8): 1664-1670 (1981). Relationships among dietary fat, glucose and insulin in blood plasma, and milk protein were investigated to determine mechanisms by which high fat diets depress milk protein percentage of lactating cows. Glucose clearance, determined by intravenous glucose infusion tolerance tests, of cows fed high fat diets was lower and insulin release higher than of control cows. Negative relationship between glucose utilization rate and insulin release was linear (correlation -.85), suggesting that fat feeding induced insulin resistance. Feeding lipid in a protected supplement did not change production of milk or milk fat. Concentrations of total lipids in blood plasma were increased whereas glucose and insulin were reduced by protected lipid supplement. Dietary fat may impair amino acid transport into the mammary gland and milk protein synthesis by inducing insulin resistance.

MYELIN SUBFRACTIONS ISOLATED FROM MOUSE BRAIN: ANALYSIS OF THE LIPID COMPOSITION AT THREE DEVELOPMENTAL STAGES. L.D. Rhein and J. Sampugna (Colgate-Palmolive Company, Piscataway, NJ 08854; and Department of Chemistry, University of Maryland, College Park, MD 20742) *Lipids 16*(7):502-507 (1981). Lipids were examined in whole myelin and 8 myelin subfractions isolated from mouse brain at 18-24, 44-48 and 80-90 days of age. Relative to protein, total lipid was lowest in whole myelin isolated from the oldest animals as well as from subfractions isolated at greater sucrose densities, thus partially accounting for the observed myelin subfraction distribution pattern which shifted during development from an average peak density banding between 0.55 and 0.65 M sucrose to one banding between 0.60 and 0.70 M sucrose. Whole myelin and each myelin subfraction isolated at one age contained nearly the same ratio of sterol and phospholipid to galactolipid; these ratios decreased uniformly during development suggesting enrichment with galactolipid in all myelin subfractions. Sulfatide, as percentage of total galactolipid, was relatively constant during development and appeared to be slightly enriched in the denser myelin subfractions. The findings suggest that regardless of the origin(s) of the subfractions, an age-related mechanism exists in the central nervous system which modified myelin lipid composition relatively uniformly.

EFFECTS OF DIETARY FAT ON FEED EFFICIENCY, REPRODUCTIVE PERFORMANCE, AND *IN VITRO* LIPOGENESIS BY THE TURKEY HEN. R.W. Rosebrough, N.C. Steele, and L.T. Frobish (US Department of Agriculture, SEA, AR, Animal Science Institute, Nonruminant Animal Nutrition Laboratory, Beltsville,