Abstracts

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Fats and oils

STUDIES ON THE COMPOSITION OF THE PROTEIN PART OF TRIGLYCERIDE RICH LIPOPROTEINS OF HUMAN SERUM: ISOLATION OF POLYMORPHIC FORMS OF β_2-GLYCOPROTEIN. I.E. Polz, H. Wurm, and G.M. Kostner (Inst. of Medical Biochemistry and Physiology, University of Graz, A-8010 GRAZ, Austria) *Artery 9*(4):305–315 (1981). Isoelectric focusing (IEF) of the apoproteins of triglyceride rich human serum lipoproteins gives rise to the separation of some 15–20 protein bands. Three of these bands have been isolated in pure form and were characterized as isoelectric species of β_2-glycoprotein-I (β_2G-I). To compare the amino acid composition of these polymorphic forms with a representative specimen of β_2 G-I from total serum it was also necessary to apply a novel isolation procedure using Rivanol, perchloric acid and Heparin-Sepharose affinity chromatography. With the possible exception of the Pro content, the three isoforms were chemically and immunochemically identical. The isoelectric points of the polymorphic forms were 5.75, 6.0 and 6.2. Their molecular weight was identical by SDS polyacryl amide gel electrophoresis (54 000 D).

THE FAT GLOBULE SIZE DISTRIBUTION IN HUMAN MILK. M. Rüegg and B. Blanc (Federal Dairy Research Institute, CH-3097 Liebefeld-Berne, Switzerland) *Biochim. Biophys. Acta 666*:7–14 (1981). The size distribution of fat globules in human colostrum and milk was measured using a conductometric method. The number-, surface- and volume-frequency functions were analyzed and various parameters related to the stability of the polydisperse fat emulsion were calculated. The shape of the distribution curves suggests the presence of sub-populations of differently sized particles. A postulated sub-population of small globules with a size frequency maximum below 1 μm comprises 70–90% of the number of globules but only a few percent of the fat volume. A sub-population of medium-sized globules with a size frequency maximum around 4 μm comprises the largest amount of the fat. A shoulder in the distribution curves around 8–12 μm indicates a third population of large globules. They contribute about 0.01% to the number of fat globules but represent 1–4% of the milk fat. The height but not the position of the maxima of the sub-distributions changed throughout lactation. This affected the size-related parameters such as the overall mean globule diameter. The volume/surface average diameter increased from about 1.8 μm in colostrum to 4.0 μm after 4–5 months of lactation. The range of globule size is similar in human and cow's milk and milk of some other species. Compared to cow's milk human milk contains more small fat globules, especially at the earlier stages of lactation.

THERMAL AND NMR STUDIES OF CHICK EMBRYO LECITHINS. J.F. Santaren, M. Rico and A. Ribera (Instituto de Quimica Fisica "Rocasolano" (CSIC) Serrano, 119, Madrid 6 and Dept. de Bioquimica, Facultad de Ciencias Universidad Complutense, Madrid, Spain) *Chem. Phys. Lipids 29*(2):147–155 (1981). Proton magnetic resonance and differential scanning calorimetry have been used to investigate model membranes composed of known molecular species of lecithins from liver, lung and brain of 19-day chick embryos. Above the chain-melting temperature the three systems studies show a similar behaviour, with the T_1 increasing with temperature and giving a similar activation energy in each case. Throughout the temperature range analyzed only a single T_1 is observed. These T_1 values can be interpreted in terms of the chemical composition of molecular species of lecithins. Calorimetric techniques show different behaviour in the three models. Thermodynamic parameters of the gel-to-liquid transition are calculated and interpreted in terms of the molecular species of lecithins.

SEPARATION OF CELLULAR PHOSPHOLIPID, NEUTRAL LIPID AND CHOLESTEROL BY HIGH-PRESSURE LIQUID CHROMATOGRAPHY. S.I. Schlager and H. Jordi (Dept. of Microbiol., Univ. of Notre Dame, Notre Dame IN 46556) *Biochim. Biophys. Acta 665*(3):355–358 (1981). High-pressure liquid chromatography was used to separate cellular cholesterol, cholesteryl esters, free fatty acids, triaglycerols and phopholipids. Application of the technique toward quantitative analysis of cellular sterol, phospholipid and neutral lipid content and metabolism is described.

DIFFERENTIAL THERMAL ANALYSIS OF DIPALMITOYLPHOSPHATIDYLCHOLINE–FATTY ACID MIXTURES. Stephen E. Schullery, Thomas A. Seder, David A. Weinstein, and Darrel A. Bryant (From the Chemistry Department, Eastern Michigan University, Ypsilanti, Michigan 48197) *Biochemistry 20*:6818–6824 (1981). Mixtures of dipalmitoylphosphatidylcholine (DPPC) with palmitic, stearic, and myristic acids and the sodium salts of these acids were analyzed by differential thermal analysis (DTA) over a wide range of lipid compositions, all in excess water. All three fatty acids raise the liquid-crystal phase transition temperature and form sharp-melting complexes, with 1:2 DPPC-fatty acid stoichiometry observed for palmitic and stearic acids and suggested for myristic acid. Phase diagrams of the peritectic type, indicating nonideal mixing, were fitted to the DPPC-palmitic acid and DPPC-stearic acid data. In contrast, DPPC forms nearly ideal mixtures with the putative DPPC-myristic acid complex. At levels of only a few mole percent, both sodium stearate and myristate remove the pretransition and main transition and produce new peaks at ~30 and ~48°C; the relative areas of the new peaks were unreproducible for the DPPC-myristate system. Sodium palmitate is the least disruptive of any of the sodium soaps or fatty acids; up to 80 mol % palmitate, the transition is lowered 3°C and approximately doubled in width. The pretransition is detectable up to 36 mol %, and the main transition persists up to 88 mol % palmitate. The apparent pK of palmitic acid (12 mol %) in DPPC bilayers was determined to be 10.2 by direct pH measurement of ternary DPPC mixtures with known palmitic acid/sodium palmitate ratios; the intrinsic pK is estimated to be $\lesssim$8.5.

PREPARATION AND PHYSIOLOGICAL PROPERTIES OF ALKYL ESTERS OF 2,3-DIHYDROXYPROPIONIC ACID. A. Seher and U. Weiss (Fed. Ctr. for Lipid Res., Pirsallee 68/76, D-4400 Munster, Fed. Rep. of Germany) *Chem. Phys. Lipids 29*(2):157–164 (1981). In order to investigate the physiological behavior of alkyl esters of 2,3-dihydroxypropionic acid two such compounds have been synthesized. One of them, the 1-dodecylester of 2,3-ditetradecyloxypropionic acid was subjected to digestion by pancreatic lipase. The substance remained unaffected. For an in vivo experiment a doubly labelled homolog, the (1′-^{14}C) decyl ester of 2,3-di-(1′-^{3}H) hexadecyloxypropionic acid was synthesized. This compound was fed by stomach tube to three groups of male albino rats. The experimental animals were killed after 2, 4 and 6 h, those of the control group after 6 h. Blood, urine, small intestines and livers were examined for radioactivity. From the recovery rates it could be derived that the molecule had been metabolized and absorbed. Obviously, the alkyl chain labelled with ^{14}C was split off first and the alkyl chains labelled with ^{3}H were split off thereafter. As the substance is metabolized in vivo it cannot be utilized as a 'non-fattening fat'.

SUPPLEMENTAL FAT AND METABOLIZABLE ENERGY-TO-NUTRIENT RATIOS FOR GROWING TURKEYS. J.L. Sell and W.J. Owings (Dept. of Animal Science, Iowa State University, Ames, Iowa 50011) *Poultry Sci. 60*(10):2293–2305 (1981). Supplementing diets with an animal-vegetable fat (increasing dietary metabolizable energy) at levels ranging from 1 to 8% improved rate of gain and feed efficiency of male turkeys from 1 to 140 days of age. Average body weight increased linearly ($P<.05$) with increments of supplemental fat in four experiments conducted. Also, the magnitude of improvements in feed efficiency were linearly ($P<.05$) related to supplemental fat level. These improvements in performance were observed when experiments were conducted

during summer and winter seasons. Furthermore, favorable responses to supplemental fats occurred with diets based on corn or milo, although the greatest responses generally were obtained with corn-based diets. Supplemental fat had similar effects on body weight and feed efficiency whether used in diets in which the concentration of nutrients was adjusted commensurate with changes in metabolizable energy (ME) concentration or whether used in diets in which nutrient concentrations remained constant (non-adjusted diets), irrespective of ME level.

LIPIDS OF GUAR SEED MEAL. S.P. Singh and B.K. Misra (Division of Biochemistry, Indian Agricultural Research Institute, New Delhi, 110012, India) *J. Agric. Food Chem. 29*(9-10):907-909 (1981). The lipids (7% by weight) of guar seed meal, a waste product of the guar gum industry, have been separated and identified by thin layer chromatographic techniques. Physical and chemical constants of the oil were determined by conventional methods, and the fatty acid composition was determined by gas-liquid chromatography with 24% saturated acid, 29% oleic acid, and 47% linolic acid. The fatty acid composition is generally similar to that of common edible oils.

STRUCTURE OF THE OLIGOSACCHARIDE CHAIN OF LIPOGLYCAN FROM *ACHOLEPLASMA GRANULARUM*. P.F. Smith (Department of Microbiology, University of South Dakota, Vermillion, SD 57069) *Biochimica et Biophysica Acta 665*:92-99 (1981). The membrane associated lipoglycan from *Acholeplasma granularum* is a linear oligosaccharide attached to a diacylglycerol. The polymer has a monomeric weight of 20000 and is composed of glucose, galactose, *N*-acetylglucosamine, *N*-acetylfucosamine, glycerol and fatty acid esters.

THE YEAST FATTY ACID SYNTHETASE: STRUCTURE-FUNCTION RELATIONSHIP AND THE ROLE OF THE ACTIVE CYSTEINE-SH AND PANTHETHEINE-SH. James K. Stoops and Salih J. Wakil (From the Marrs McLean Department of Biochemistry, Baylor College of Medicine, Houston, Texas 77030) *The Journal of Biological Chemistry 256*(16):8364-8370 (1981). The yeast fatty acid synthetase is a complex of two multifunctional proteins, α and β, and is active only in the hexamer form $\alpha_6\beta_6$. Electron microscopic studies of this complex led to a model for the synthetase as an ovate structure consisting of an equatorial plate-like structure (the α subunit) to which six arches (the β subunit) are equally distributed on either side. Studies involving the bifunctional reagent 1,3-dibromo-2-propanone have shown that this arrangement is necessary for the β-ketoacyl synthetase activity, since its active center requires the juxtaposing of an acyl group attached to an active cysteine-SH of one α subunit and a malonyl group attached to a panthetheine-SH of an adjacent α subunit. This conclusion was based in part on the following facts. 1) Iodoacetamide and dibromopropanone inhibit fatty acid synthesis by inhibiting only the β-ketoacyl synthetase activity; acetyl-CoA, but not malonyl-CoA, protected the synthetase against these inhibitors, suggesting that these reagents react with the site of acetyl binding on the enzyme. 2) Dibromopropanone cross-links the α subunits, yielding oligomers of higher molecular weights. These observations led us to postulate a mechanism of fatty acid synthesis where an active center involves two complementary halves of two α subunits and the arch β subunit. In an $\alpha_6\beta_6$ structure, therefore, there exist six sites for fatty acid synthesis, all of which function simultaneously.

INHIBITORS OF STEROL BIOSYNTHESIS: CARBON-13 NUCLEAR MAGNETIC RESONANCE STUDIES OF 9α-FLUORO-5α-CHOLEST-8(14)-EN-3β-OL-15-ONE AND RELATED COMPOUNDS. Mitsuhiro Tsuda and George J. Schroepfer, Jr. (Departments of Biochemistry and Chemistry, Rice University, Houston, TX 77001) *J. Lipid Res. 22*:1188-1197 (1981). The natural abundance ^{13}C nuclear magnetic resonance spectra of a number of 9α-hydroxy-$\Delta^{8(14)}$-15-ketosterols and their derivatives have been studied. Peak assignments for individual carbons of 9α-fluoro-5α-cholest-8(14)-en-3β-ol-15-one, 9α-hydroxy-5α-cholest-8(14)-en-3β-ol-15-one, 5α-cholest-8(14)-ene-3,15-dione, 9α-fluoro-5α-cholest-8(14)-ene-3,15-dione, 9α-hydroxy-5α-cholest-8(14)-ene-3,15-dione, 3β-benzoyloxy-5α-cholest-8(14)-en-3β-ol-15-one, 3β-benzoyloxy-9α-fluoro-5α-cholest-8(14)-en-15-one, 3β-benzoyloxy-5α-cholest-8(14)-en-9α-ol-15-one, 3β-acetoxy-9α-fluoro-5α-cholest-8(14)-en-15-one, and 3β-acetoxy-5α-cholest-8(14)-en-9α-ol-15-one have been made.

PREPARATION AND BIOLOGICAL ACTIVITY OF FATTY ACID DIMER. C.R. Balu and T.R. Ramaiah (Department of Post-graduate Studies & Research in Biochemistry, University of Mysore, Manasagangotri, Mysore 570 006) *Indian J. Biochem. Biophys. 18*(2):124-127 (1981). Ricinoleic acid from castor oil was dimerised by dehydrating the secondary alcohol group using Fuller's earth and concentrated sulphuric acid as dehydrating agents. In the presence of Fuller's earth, dehydration was intramolecular resulting in the formation of linoleic acid while in the presence of concentrated sulphuric acid it was intermolecular resulting in the formation of a dimer. Two fractions of concentrated sulphuric acid dehydrated sample from a silica gel column showed cytopathic effect on HeLa (human cervical cancer) cells. Castor oil hydrolysate did not have any effect.

ON THE MECHANISMS OF FATTY ACID TRANSFORMATION IN MEMBRANES. M. Gan-Elepano, E. Aeberhard, J. Mead (Laboratory of Nuclear Medicine and Radiation Biology, 900 Veteran Ave., Univ. of CA, Los Angeles, CA 90024) *Lipids 16* (11): 790-795 (1981). Concentrations of albumin in excess of 1% in to incubation mixture inhibited the elongation of added fatty acids and their incorporation into microsomal lipids whereas these reactions were not inhibited with endogenous microsomal membrane fatty acids. The results of these and other studies support the idea that such relations of membrane without release of free fatty acids to equilibrate with the fatty acid pool during the process.

SYNTHESIS AND THERMOLYSIS OF A-NORVINYLALLENES RELATED TO VITAMIN D. J.M. Gerdes, S. Lewicka-Piekut, P. Condran, Jr., and W.H. Okamura (Dept. of Chem., Univ. of California, Riverside, CA 92521) *J. Org. Chem. 46*(25):5197-5200 (1981). Coupling the lithium salt of allene hydrocarbon 9 with keto enol ether 10 produced a 12:1 diastereomeric mixture of A-norvinylallenones 6a (6R) and 6d (6S). The absolute configuration of A-norallenes 6a (6R) and 6d (6S) were assigned by comparison of their ^{13}C NMR and ^{1}H NMR spectra with those of the previously studied six-membered A-ring vinylallenes 4a (6R) and 4d (6S). Thermolysis of 6a (140 C, 24 h) afforded 11 (6%), 12 (5%), 13 (35%) and 14 (6%). A similar result was obtained for 6d: 11 (~5%), 12 (~1%), 13 (39%), and 14 (~3%). Reduction ($NaBH_4$-$CeCl_3$/MeOH) of 6a yielded vinylallenols 6b (1R, 6R). Similar reduction of 6d gave 6e (1R, 6S). Thermolysis of the vinylallenols led to complex, undefinable products. The thermal behavior of A-norvinylallenes 6 is discussed in terms of previous results obtained for the six-membered-ring series.

TWO NOVEL TYPES OF TREHALOSE LIPIDS. S.G. Batrakov, B. V. Rozynov, T.V. Koronelli and L.D. Bergelson (M.M. Shenyakin Inst. of Bioorganic Chem., Academy of Sciences of the U.S.S.R., M. V. Lomonosov State Univ., Moscow, U.S.S.R.) Chem. Phys. Lipids 29(3):241-266 (1981). Cells of the paraffin oxidizing bacterium *Mycobacterium paraffinicum* were found to contain at least five trehalose lipids. Three of them were characterized as previously known fatty acyl derivatives of trehalose: 6, 6'-di-O-mycoloyl-α,α-D-trehator"); 6,6'-di-O-acyl-(C_{12}-C_{16})-α,α-D-trehalose (a low-molecular weight analogue of "cord factor"). The remaining two lipids proved to be so far unknown substances. On the basis of the results of infrared (IR) and proton magnetic resonance (PMR) spectroscopy, mass spectrometry and chemical degradation experiments, they were identified as 6-O-mycoloyl-6'-O-acyl-(C_{12}-C_{16})-α,α-D-trehalose and 2-O-octanoyl-3,2'-di-O-decanoyl-6-O-succinoyl-α,α-D-trehalose.

COMETATHESIS OF METHYL OLEATE AND ETHYLENE; A DIRECT ROUTE TO METHYL DEC-9-ENOATE. R.H.A. Bosma, F. Van Den Aardweg, and J.C. Mol (University of Amsterdam, Institute for Chemical Technology, Plantage Muidergracht 30, 1018 TV Amsterdam, The Netherlands) *J. Chem. Soc. Chem. Commun. 21*: 1132-1133 (1981). Methyl dec-9-enoate is obtained by cometathesis of ethylene and methyl oleate with two different catalyst systems, *viz.* WCl_6-Me_4Sn and Re_2O_7-Al_2O_3-Me_4Sn; at 0.2 MPa ethylene pressure both catalyst systems show good activity at 343 K and the latter system also at room temperature.

PHOSPHOLIPID STUDIES OF MARINE ORGANISMS: 2. PHOSPHOLIPIDS, PHOSPHOLIPID-BOUND FATTY ACIDS AND FREE STEROLS OF THE SPONGE *APLYSINA FISTULARIS* (PALLAS) FORMA *FULVA* (PALLAS) (= *VERONGIA THIONA*). ISOLATION AND STRUCTURE ELUCIDATION OF UNPRECEDENTED BRANCHED FATTY ACIDS. Robert D. Walkup, Gene C. Jamieson, Milton R. Ratcliff and Carl Djerassi (Department of Chemistry, Stanford University, Stanford, CA 94305) *Lipids 16*(9):631-646 (1981). The free sterols and phospholipids of the demosponge *Aplysina fistularis* were isolated and analyzed. The free sterols consisted mainly of the unusual 26-methylated sterols aplysterol (53%) and 24(28)-dehydroaplysterol (7%) together with 7 commonly occurring sterols. The major phospholipids were phosphatidylcholine, phosphatidylglycerol, phosphatidylinositol, phosphatidylethanolamine, phosphatidylserine and diphosphatidylglycerol. The major fatty acyl components of the phospholipids consisted of 85% C_{14}-C_{20} acids, including the unprecedented 2,6,10-trimethyl-5-

tetradecenoic acid and 11-methyloctadecanoic acid. The remaining 15% were C_{27}-C_{30} demospongic acids, including 2 novel acids tentatively assigned the structures 5,9,23-octacosatrienoic acid and 5,9,23-nonacosatrienoic acid, and 3 novel acids proven to be 5,9,21-octacosatrienoic acid, Z,Z-20-methyl-5,9-hexacosadienoic acid and Z,Z-22-methyl-5,9-octacosadienoic acid. The biosyntheses of the novel demospongic acids are proposed to occur by chain elongation of monoenoic or branched precursors followed by desaturation. The large quantities of typically bacterial phospholipids and fatty acids found implied the presence of bacteria in the sponge, in agreement with microscopic studies. Analysis of the phospholipid-bound fatty acids in a sponge cell-enriched fraction indicated that the demospongic acids, including the 2 branched structures, were the major acids of the sponge cells. The presence in *A. fistularis* of demospongic acids containing membrane disordering groups—methyl branches or double bonds—on the $\omega 7$ carbon is proposed to be due to the need by the sponge for membranes possessing fluidity near the middle of the phospholipid bilayer. It is also proposed that the C_{26} methyl group of aplysterol causes disordering of the phospholipid bilayer in the same region, and thus also evolved in response to this need.

STUDIES ON THERMAL ADAPTATION IN *TETRAHYMENA* MEMBRANE LIPIDS: CHANGES IN POSITIONAL DISTRIBUTION OF FATTY ACIDS IN DIACYL-PHOSPHOLIPIDS AND ALKYL-ACYL-PHOSPHOLIPIDS DURING TEMPERATURE ACCLIMATION. Takehito Watanabe, Hirofumi Fukushima, Reiko Kasai and Yoshinori Nozawa (Department of Biochemistry, Gifu University School of Medicine, Tsukasamachi 40, Gifu, Japan) *Biochimica et Biophysica Acta 665*:66–73 (1981). The positioning of acyl chains in both 1-*O*-alkyl-2-acyl- and 1,2-diacyl-phospholipids was analyzed at various time intervals for a thermotolerant strain (NT-1) of *Tetrahymena pyriformis* cells during cold acclimation. During the 10 h period of adaptation, cells were not able to grow but maintained the ability to divide. The content of palmitate (16:0) in phosphatidylcholine and phosphatidylethanolamine was decreased after temperature-shift, with a concurrent increase of palmitoleate ($16{:}1^{\Delta 9}$) and γ-linoleate ($18{:}3^{\Delta 6,9,12}$). An increase in γ-linolenate at the 1-position and linoleate at the 2-position was observed in diacyl-phospholipids (phosphatidylethanolamine, phosphatidylcholine and 2-aminoethylphosphonolipid). The 2-position of 1-*O*-alkyl-2-acyl-phosphatidylcholine and 1-*O*-alkyl-2-acyl-(2-aminoethyl)phosphonolipid was occupied mainly by γ-linolenate together with cilienate ($18{:}2^{\Delta 6,11}$) and linoleate ($18{:}2^{\Delta 9,12}$). Cilienate and γ-linolenate at the 2-position of 1-*O*-alkyl-2-acyl phosphatidylcholine were increased after temperature shift, with a small decrease of linoleate. There are little significant changes in alkyl ether lipid content of phosphatidylcholine and 2-aminoethylphosphonolipid after temperature shift. The results indicate that phosphatidylethanolamine, which is most abundant and present only in the diacyl form, would play a crucial role in thermal adaptation of membrane lipids, by replacing palmitate with γ-linolenate at its 1-position, and also that hexadecyl/γ-linolenoyl phosphatidylcholine would be an important molecular species in the acclimation.

FATTY ACYL COENZYME A-SENSITIVE ADENINE NUCLEOTIDE TRANSPORT IN A RECONSTITUTED LIPOSOME SYSTEM. Gebretateos Woldegiorgis, Earl Shrago, Jerry Gipp, and Milton Yatvin (From the Departments of Nutritional Sciences, Medicine, and Human Oncology, University of Wisconsin, Madison, Wisconsin 53706) *The Journal of Biological Chemistry 256*(23):12297–12300 (1981). The adenine nucleotide translocase was purified from bovine heart mitochondria and incorporated into membranes of phospholipid liposomes. The rate of transport of the adenine nucleotides was competitively inhibited by oleoyl coenzyme A with an approximate K_i of 1.0 μM. Significant inhibition was limited to those fatty acyl coenzyme A esters which are carnitine dependent for their oxidation in isolated mitochondria. Octanoyl coenzyme A was almost completely inactive as was palmitic acid and palmitoyl carnitine. The results demonstrate that the interaction of long chain fatty acyl-CoA esters with the ADP/ATP carrier in a purified reconstituted system mimics their effects with isolated mitochondria and inverted submitochondrial particles. In general, these findings are consistent with the role of acyl-CoA esters acting as natural ligands and biological effectors of the translocator.

STUDY ON THE ESTERS OF GLYCEROL, TARTARIC, ACETIC AND FATTY ACIDS: II. ANALYSIS AND COMPARED PROPERTIES OF ESTER COMBINATIONS. G. Schuster and W. Adams (Rev. Franc. Corps Gras, vol. 28, n° 10, 1981, p. 405–412. french. RFCG 81-30.) This second part is devoted to detailed chemical analysis of mixed trade esters corresponding with E 472 e and E 472 f series. These analyses are concerned with as well the classical characteristics as the compositions. The results obtained on the active matter and their separated fractions points out that the E 472 e and E 472 f combinations contain the same reaction products, but in different proportions. Since the hydrolytic behaviour of these combinations in the aqueous systems is the same, the hydrolysis rate is similar for both products. For this reason, it seems logical to group the E 472 e and E 472 f emulsifiers under only the reference E.

DETERMINATION OF RESIDUAL HEXANE IN SOLVENT EXTRACTED MEALS. A. Prevot and J.L. Coustille (Rev. Franc. Corps Gras, vol. 28, n° 10, 1981, p. 413–420, french. RFCG 81-31.) Four methods for desorbing residual hexane in extracted meals for its determination by gas-liquid chromatography have been compared: grinding in a Dangoumau mill with a solvent; either isopropanol, or trichloroethylene; head space at 110°C; carrying away by nitrogen. For every method, the eventual influence of water addition to the meal on the desorption has been studied. The head space method with addition of water 50% gives always higher results, whatever the analysed meal may be: sunflower, rapeseed or soybean. A procedure is propounded for this method.

PRODUCTION OF HYDROCARBONS BY CATALYTIC CRACKING OF PALM OIL BY-PRODUCTS: I. DEVELOPMENT AND PRELIMINARY TESTS. J. Graille, P. Lozano, P. Geneste, A. Guida, and O. Morin (Rev. Franc. Corps Gras, vol. 28, n° 10, 1981, p. 421–426, french. RFCG 81-32.) The available biomass from oil mill processes is reviewed and its energy balance sheet is given. After a bibliography general survey, the case of Malaysia is studied; a way for valorizing the concrete fraction of the palm oil would consist in a cracking giving hydrocarbons. A cracking reactor has been developed. It is able to completely control the reaction and thus to test a lot of catalysts. Some preliminary examples are given. The NMR, UV and GLC/MS suggest that these hydrocarbons compare favorably with those from fossil hydrocarbons. According to the catalyst, it is possible to obtain a fuel for an internal combustion of diesel engine, aromatic high hydrocarbons for organic synthesis and, at last a solvent for the recovery of the residual oil from the press fibers. The energy of this process is obtained by the waste combustion.

GENETIC STUDY OF THE REPRODUCTION OF AN *ELAEIS GUINEENSIS* OIL PALM CROSS. J.-C. Jacquemard, J. Meunier and F. Bonnot (*Oléagineux*, 1981, 36, N° 7, p. 343–352.) With the oil palm, the most effective way of improving the value of the seeds supplied to the planters is to reproduce the best crosses discovered each year in the comparative hybrid trials. It is known that in theory the reproduction of a given hybrid A × B is possible by crossing samples of trees A′ and B′ descended from A and B by selfing. Several trials planted in the Ivory Coast and Cameroon have confirmed this hypothesis, and show that a sample of 12 to 20 crosses is sufficient for the faithful reproduction of a given hybrid. Moreover, the seeds obtained in this way are an improvement on the original hybrid thanks to supplementary phenotypic selection on the most heritable characters such as pulp content, oil quality and above all vertical growth. The application of this principle to the best crosses in the reproduction also leads, through the exploitation of intra-cross variability, to an increase of 10–20 p. 100 in yield, as well as a reduction in the heterogeneity of the plantations. This method of improvement in parallel with recurrent reciprocal selection is of particular interest for a perennial plant such as oil palm, as it allows a considerable short-term gain of one generation on the normal improvement cycle.

THE TALL COCONUTS AT PORT BOUET (IVORY COAST): 2. RENNELL TALL, SOLOMON TALL, THAILAND TALL, NEW HEBRIDES TALL. M. de Nucé de Lamothe and W. Wuidart (*Oléagineux*, 1981, 36, N° 7, p. 353–365.) Like its predecessors, this third article on the coconut collection at the Marc Delorme Research Station at Port Bouet (Ivory Coast) aims at providing plant breeders with information to guide their choice. The authors describe 4 varieties of Tall: origins, vegetative characters, mode of reproduction, precocity, fruit components. The Rennell is precocious; it produces an average number of large fruit of very good composition. The Solomon has rapid vertical growth and gives a large number of relatively small nuts. The New Hebrides is remarkable for its precocity, its numerous nuts and the variability of its characters; its fruit are small (190 g copra/nut) but their copra yield is excellent; the tree is perfectly resistant to the disease of unknown origin which, in Vanuatu, afflicts the other varieties. The Thailand yields a small number of large fruit; its productivity is comparatively low, but it has the advantages of being one of the types most tolerant to the lethal yellowing disease which is rife in the Caribbean. The eight varieties of Tall described to date could be classed in 4 groups, each with well-defined characteristics: African, Gulf of Siam, Melanesian and Polynesian.

LIPOGENESIS IN THE OLIVE: II. FORMATION OF POLAR

LIPIDS. B. Marzouk and A. Cherif (*Oléagineux*, 1981, 36, N° 7, p. 387–391.) Polar lipids in olive oil account for 2.5 p. 100 of total lipids; 58 p. 100 of them are phospholipids and 42 p. 100 are galactolipids. Their synthesis is speeded up from the start to the middle of ripening, and is reflected in contents rising from 0,5 mg per newly-formed fruit to 4,5 mg in a completely ripe one. The fatty acids characteristic of polar lipids are oleic acid for the phospholipids and linolenic acid for the galactolipids. The evolution of the latter reflects the appearance and then progressive loss of the photosynthetic capacities of the tissue. The accumulation of polar lipids follows a sigmoidal curve as for neutral lipids.

RESULTS OF FOUR YEARS OF RESEARCH ON RESISTANCE OF GROUNDNUT VARIETIES TO *ASPERGILLUS FLAVUS*. C. Zambettakis, F. Waliyar, A. Bockelée-Morvan and O. de Pins (*Oléagineux*, 1981, 36, N° 7, p. 377–385.) During the four campaigns 1976–77 to 1979–80, seven trials each comparing about forty varieties of groundnut were carried out in Senegal on the Bambey and Darou Stations to study their performance relative to *Aspergillus flavus* contamination. The natural contamination rate in the field is very different depending on the varieties and is correlated to the rate of contamination of the kernels by artificial inoculation carried out in the Paris Museum Laboratory, which proves the value of this test used to select resistant varieties. A Senegalese variety of proven agronomic value, 55-437, has resistance similar to that of the resistance control PI 337-409. Two other varieties, 73-30 and 73-33 also show favourable performance over a period of several years, and may be considered tolerant.

OXYGEN ATOM TRANSFER FROM IODYLBENZENE TO DIPHENYL DISELENIDE–A CONVENIENT METHOD FOR DEHYDROGENATION OF STEROIDAL 3-KETONES. D.H.R. Barton, J.W. Morzycki, and W.B. Mtherwell (Institut de Chimie des Substances Naturelles, C.N.R.S., 91190 Gif-sur-Yuette, France) *J. Oil Chem. Soc. Chem. Comm. 20*:1044-1045 (1981). Steroidal 3-ketones are smoothly dehydrogenated in high yield using benzeneseleninic anhydride generated *in situ* by oxygen atom transfer from iodylbenzene, $PhIO_2$, to catalytic amounts of diphenyl diselenide; use of *meta*-iodylbenzoic acid in the above cycle has led to the development of an economical and experimentally convenient method avoiding chromatographic separations and with recovers of the *m*-iodobenzoic acid and the diphenyl diselenide.

CHOLESTEROL SOLUBILIZATION BY SHORT-CHAIN LECITHINS: CHARACTERIZATION OF MIXED MICELLES AND CHOLESTEROL OXIDASE ACTIVITY. R.A. Burns, Jr. and M.F. Roberts (Dept. of Chemistry, Massachusetts Insitute of Technology, Cambridge, MA 02139) *Biochemistry 20*(25):7102-7108 (1981). The synthetic short-chain lecithins diheptanoylphosphatidylcholine and dioctanoylphosphatidyl-choline solubilize cholesterol up to 10 and 18 mol %, respectively. The half-time for diheptanoylphosphatidylcholine solubilization of solid cholesterol is 80 (±30) min. This is much faster than Triton X-100 micelle or egg lecithin vesicle solubilization of solid cholesterol. Both the broadening of lecithin and (4-^{13}C) cholesterol carbon resonances by Mn^{2+} and the observation of surface dilution kinetics for phospholipase A_2 (*Naja naja naja*) and phospholipase C (*Bacillus cereus*) hydrolysis of the lecithins indicate that the cholesterol 3β-hydroxyl group resides at the particle surface exposed to solvent. Analysis of lecithin ^{13}C chemical shifts suggests that cholesterol causes the short-chain lecithin acyl chains to become slightly more trans, although to a lesser extent than it affects egg lecithin chains in liposomes. Lecithin motion as characterized by ^{13}C $\underline{T}_1$s and line widths is unaffected by the incorporation of cholesterol. (3,4-$^{13}C_2$)Cholesterol line widths are 5-10-fold narrower in these mixed micelles than in egg lecithin sonicated vesicles, while $\underline{T}_1$s in the two systems are comparable. These mixed micelles serve as substrates for cholesterol oxidase with a 40-fold rate increase over comparable cholesterol concentrations in egg lecithin vesicles. Part of this rate enhancement can be understood as an increase in interfacial area available to cholesterol oxidase in the micellar systems. These studies suggest that cholesterol oxidase has a weaker affinity for interfaces than other surface active enzymes.

A GENERAL ROUTE TO OPTICALLY PURE PROSTAGLANDINS FROM A D-GLUCOSE DERIVATIVE. R.J. Ferrier and P. Prasit (Department of Chemistry, Victoria University of Wellington, Private Bag, Wellington, New Zealand) *J. Oil Chem. Soc. Chem. Comm. 19*:983-985 (1981). The epoxy-lactone which is a key intermediate in one synthetic route to prostaglandins, has been prepared from a readily available D-glucose derivative.

HYDROCARBON CHAIN DYNAMICS IN LIPID BILAYERS. O. Edholm (Dept. of Theoretical Physics, Royal Inst. of Tech., S-100 44 Stockholm 70, Sweden) *Chem. Phys. Lipids 29* (3):213-224 (1981). A model is proposed for hydorcarbon chain dynamics in lipid bilayers. In the upper and middle parts of the chain all motion occurs by concerted rotations around at least two carbon-carbon bonds at a time, preserving a structure with kinks (that is *gauche* ± *trans gauche* ∓ conformations) as the only deviations from the all-*trans* chain. At the end, independent rotations around carbon-carbon bonds play a larger and larger part. This gives a reasonable interpretation of dueterium NMR data.

PHASE BEHAVIOR OF TRIOLEIN AND TRIPALMITIN DETECTED BY DIFFERENTIAL SCANNING CALORIMETRY. J. E. Hale and F. Schroeder (Department of Pharmacology, University of Missouri, School of Medicine, Columbia, MO 65212) *Lipids 16* (11):805-809 (1981). The thermotropic behavior of triolein, tripalmitin and their mixtures was determined by differential scanning calorimetry. Polymorphic behavior was noted for the triglycerides but the triglycerides were converted to a single form after 4 to 5 successive heating scans. Melting points for each triglyceride were determined for the pure samples and mixtures, and plotted as a phase diagram. The phase diagrams indicate that a phase separation of triglycerides occurred at all concentrations of triolein and tripalmitin. However, the melting peak onset temperature of tripalmitin was shifted by triolein from 56 C at 100 mol % tripalmitin to 37 C at 15 mol % tripalmitin. Similarly, the peak onset temperature of triolein was shifted by tripalmitin from -2.5 C at 100% triolein to -4 C at 95% triolein. Enthalpies were also determined for pure samples and mixtures. These data indicated than when either triolein or tripalmitin were present as the minor component of the mixture, the enthalpy of the minor component was reduced whereas that of the major component was not greatly altered.

PERMEABILITY PROPERTIES OF UNILAMELLAR VESICLES CONTAINING CHOLINE PLASMALOGENS AND COMPARISON WITH OTHER GLYCEROPHOSPHOLIPID SPECIES. A. Hermetter and A. Paltauf (Institut fur Biochemie und Lebensmittelchemie, Technische Universitat Graz, A-8-8010 Graz, Austria) *Chem. Phys. Lipids 29* (3):225-233 (1981). The rates of non-electrolyte and ion diffusion across bilayer membranes consisting of choline plasmalogens or of their alkyl and acyl analogs were studied. The influx of [^{14}C] glucose, $^{86}Rb^{+}$ $^{36}Cl^{-}$ into small unilamellar vesicles made from a semisynthetic choline plasmalogen and from synthetic diacyl, alkylacyl and dialkyl analogs with comparable side chain compositions were measured. Rates of glucose and Rb^{+} diffusion are about equal in alkenylacyl- and diacyl-glycerophosphocholine (GPC) bilayers, but are reduced in dialkyl-GPC membranes; the permeability coefficients correlate with the packing densities of the respective choline glycerophospholipids in monolayers at the air water interface. Rates of chloride diffusion are consistently higher in membranes formed from phospholipids containing alkenyl or alkyl ether bonds as compared to the diacyl analogs. The phospholipid side chain composition, glucose, and Rb^{+} diffusion are markedly affected. Incorporation of cholesterol (30mol%) into choline plasmalogen membranes reduces their solute permeability by approximately 70%. Thus, the choline phospholipid–cholesterol interaction, as far as it is reflected in reduced bilayer permeability, is not influenced by the presence of the alkenylether bond of plasmalogens.

NEW TOTAL SYNTHESIS AND HIGH RESOLUTION ^{1}H NMR SPECTRUM OF PLATELET-ACTIVATING FACTOR, ITS ENANTIOMER AND RACEMIC MIXTURES. F. Heymans, E. Michel, M. Borrel, B. Wichrowski, J. Godfroid, O. Convert, E. Coeffier, M. Tence, and J. Benveniste (Laboratoire de Pharmacochimie Moleculaire, Universite de Paris VII, 2, Place Jussieu, 75251 Paris Cedex 05, France) *Biochim. et Biophys. Acta 666(2)*;230-237 (1981). A new method of synthesis of octadecyl platelet activating factor (PAF; 1-O-octadecyl 2-O-acetyl *sn*-glycero-3-phosphorylcholine is described. Its advantage is to proceed by way of the "lyso-PAF" which may be substituted by various groups, while avoiding the inconveniences of the total synthesis already described. Moreover, the intermediates in synthesis are easier to purify, with better yields. The platelet aggregating activity of synthetic PAF, its enantiomer (3-O-octadecyl) and racemic mixtures were $2.7 \cdot 10^{-10}$, $1.7 \cdot 10^{-7}$ and $2.2 \cdot 10^{-10}$M, respectively. These results indicate the stereospecificity of platelet activation induced by PAF.

PROPERTIES, APPLICATION AND NUCLEAR MAGNETIC RESONANCE SPECTROSCOPIC STUDY OF SOME NEW NONIONIC SURFACE ACTIVE AGENTS USEFUL IN FORMULATION OF WATER-IN-OIL EMULSIONS. K. Honda, A. Tsugita, T. Yoneya, and Y. Nishijima (Cosmetics Laboratory Kanebo, Ltd., 5-3-28 Kotobukicho, Odowara 250, Japan) *J. Soc. Cosmet. Chem. 32* (5):255-273 (1981). Two novel types of surface active agents useful in preparation of water-in-oil (w/o) emulsions are described: N-(3-alkyloxy-2-hydroxypropyl)-alkanolamines and N-(3-alkyloyloxy-2-hydroxypropyl)-alkanolamines. The dynamic behavior of these materials and their model compounds in reversed micellar state was

characterized by ^{13}C-Nuclear Magnetic Resonance (^{13}C-NMR) spectroscopy in order to seek some explanation for their distinctive nature. Measurements of ^{13}C spin-lattice relaxation times indicated that the segmental motion around the double-bonded carbons in the lipophilic group was restricted and that the mobility of carbons at the hydrophilic position was also reduced. The results suggested that the mobility of surfactant molecules may correlate with the stability of w/o emulsions. A brief investigation of the physiological safety of these compounds revealed that they are not toxic and do not cause skin irritation or ellicit allergic response.

THE ACTIVE SITE AND THE PHOSPHOLIPID ACTIVATION OF RAT LIVER LYSOSOMAL LIPASE ARE NOT STEREOSPECIFIC. A. Joutti, P. Vainio, J.R. Brotherus, F. Paltauf and P.K.J. Kinnunen (Dept. of Medical Chemistry, University of Helsinki, Siltavuorenpenger 10 A, SF-001 70 Helsinki 17, Finland) *Chem. Phys. Lipids 29* (3):235-239 (1981). The stereochemical specificity of lysosomal lipase of rat liver was investigated using enantiomeric triacylglycerol analogs, *sn*-1-alkyl-2,3-diacylglycerol and *sn*-3-alkyl-1,2-diacylglycerol as substrates. Lysosomal lipase utilized both substrates with equal rates. The dependence of the activity of lysosomal lipase on the stereoconfiguration of activating acidic phospholipid was also studied. Our results showed that both *sn*-1-phospholipids (bis(monoacylglycero)phosphate (BMP)) were efficient activators of this enzyme and thus the stereochemical configuration of the activating phospholipid is not important. Accordingly, the rat liver lysosomal lipase lacks stereospecificity with respect to both the tricylglycerol substrate and the acidic phospholipid activator.

PARTIAL SYNTHESIS OF (20R,22R)-20,22-DIHYDROXYCHOLESTEROL. K.S. Kyler and D.S. Watt (Dept. of Chem., Univ. of Wyoming, Laramie, WY 82071) *J. Org. Chem. 46* (25):5182-5188 (1981). A new procedure for assembling the cholestane side chain from 20-oxopregnanes involved the sequential construction of the C-20,22 and C-24,25 bonds via the sequential α,γ-dialkylation of 1-(phenylthio)-1-(trimethylsilyl)-2-propene. A stereoselective, partial synthesis of (20R,22R)-20,22-dihydroxycholesterol served to test the validity of this approach.

COMPONENTS OF ROYAL JELLY: I. IDENTIFICATION OF THE ORGANIC ACIDS. G. Lercker, P. Capella, L.S. Conte, and F. Ruini (Istituto di Industrie Agrarie, Universita di Bologna, Via S. Giacomo, 7, 40126 Bologna, Italy) *Lipids 16*(12):912-919 (1981). This present work characterizes the fatty acid constituents of the lipid fraction of royal jelly. Among the organic acids found after fractionation by thin layer chromatography of the corresponding methyl esters, the following compounds were identified by combined GC-MS: saturated and unsaturated linear fatty acids, saturated and unsaturated linear and branched dicarboxylic acids, mono- and dihydroxy acids. The most common characteristic of the organic acids was that most contained 8 or 10 carbon atoms, whether saturated or unsaturated, linear or branched.

CONVERSION OF LINOLEIC AND LATEX FURANOID ACID TO FISH C_{18} dimethyl furanoid isomers. M.S.F. Lie Ken Jie and F. Ahmad (Chemistry Department, University of Hong Kong, Pokfulam Road, Hong Kong) *J. Chem. Soc. Chem. Commun. 21*:1110-1111 (1981). Methyl 9(19), 12(13)-dioxo-octade-canoate (derived from methyl linoleate) and 10,13-dioxo-11-methyloctadecanoate (derived from the latex of the rubber plant) were methylated at the methlene carbons located between the two oxo-groups (using MeI, KOH in DMSO) and cyclodehydration furnished a mixture of methyl 9(10),12(13)-epoxy-10(11),11(12)-dimethyloctadeca-9(10),-11(12)-dienoates and methyl 10,13-epoxy-11,12-dimethyloctadeca-10,12-dienoate respectively.

DISTRIBUTION OF LONG CHAIN POLYENOIC ACIDS AMONG PHOSPHOLIPIDS OF MOUSE TESTIS. W. McLean Grogan (Department of Biochemistry, Box 614, Medical College of Virginia, Virginia Commonwealth University, Richmond, VA 23298) *Lipids 16*(12):940-942 (1981). Fatty acid composition of phospholipid (PL) classes was measured in mouse testis. Among the long-chain polyenoic acids (LCPA), 22:6 was found in highest concentration in phosphatidylethanolamine (PE), whereas percentages of 20:4 and 22:5 were not different in PE than in phosphatidylcholine. Each PL class had a unique fatty acid composition which was also different from that of triglycerides and cholesteryl esters. Differential metabolisms of 22:5 and 22:6 suggest different roles for these fatty acids in mouse testis. Tissue-specific functions of LCPA in mouse spermatogenesis may be divided between 22:5 and 22:6.

INTRINSIC PROTEINS AND THEIR EFFECT UPON LIPID HYDROCARBON CHAIN ORDER. D.A. Pink, A. Georgallas, and D. Chapman (Theoretical Physics Institute, St. Francis Xavier University, Antigonish, Nova Scotia, Canada B2G 1C0) *Biochemistry 20* (25):7152-7157 (1981). We present evidence that at temperatures greater than their main transition temperature, phospholipid molecules that are trapped within clusters of intrinsic molecules such as polypeptides or proteins have the ends of their hydrocarbon chains more statically disordered than those of lipid molecules far from such intrinsic molecules. We have constructed a model in which the lipids are divided into three populations: (i) those that are not adjacent to any protein ("free" lipids), (ii) those that are adjacent to only one protein ("adjacent" lipids), and (iii) those that are "trapped" between two or three proteins. We applied this model to study deuterium nuclear magnetic resonance of dimyristoyl-3-*sn*-phosphatidylcholine (DMPC) bilayers containing gramicidin A′ or cytochrome oxidase and found that while the methyl groups of adjacent lipids are slightly more statically ordered than those of free lipids, the methyl groups of trapped lipids are more statically disordered than those of free lipids. We propose a physical explanation for this and show that phosphorus-31 nuclear magnetic resonance data for DMPC-cytochrome oxidase bilayers can be understood as a consequence of changes in the polar region of only trapped lipids.

RAPID FRACTIONATION OF HUMAN HIGH DENSITY APOLIPOPROTEINS BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY. D. Polacek, C. Edelstein, and A.M. Scanu (Departments of Medicine and Biochemistry, The University of Chicago and Pritzker School of Medicine, Chicago, IL 60637) *Lipids 16*(12):927-929 (1981). A simple and rapid fractionation procedure (30 min) has been developed for the isolation of the major apoproteins from human serum high density lipoproteins by molecular sieving in a high performance liquid chromatographic column. Apo A-I, ApoA-II and the C peptides are quantitatively resolved up to a protein load of 3 mg. The technique has also been successfully applied to the final purification of A apoproteins which had been isolated by conventional chromatographic procedures and as a sensitive analytical tool for assessing apoprotein purity.

EFFECT OF TEMPERATURE ON THE NMR SPECTRA OF SONICATED DISPERSIONS OF ISOMERS OF DIPALMITOYLPHOSPHATIDYCHOLINE. N.B. Smith (Dept. of Biophysics, Health Sci. Ctr., Univ. of Western Ontario, London, Ontario N6A 5C1, Canada) *Chem. Phys. Lipids 29*(3):277-281 (1981). Sonicated dispersions of 1,2-dipalmitoyl-*sn*-glycero-3-phosphorylcholine and of 1,3-dipalmitoylglycero-2-phosphorylcholine were examined by proton nuclear magnetic resonance (NMR) as a function of temperature. The $-(CH_2)_n-$ peak in the spectrum of the *sn*-3-isomer of dipalmitoylphosphatidylcholine showed the characteristic dramatic changes in the peak intensity and width associated with the phase transition between the liquid crystalline and gel states of the phospholipid. This occurred over a 2-3 C temperature range with the midpoint of the transition at 38.5 C. With the 2-isomer the change in phase took place over a similar temperature range but the midpoint was at 33.8 C. This lower phase transition temperature is presumably the result of increased acyl chain mobility caused by the increased separation of the two acyl chains by the center carbon of the glycerol backbone. The effect of sonication on the broadening of the range and lowering of the midpoint temperature of the phase transition from that of the corresponding unsonicated dispersions was similar with each isomer. This suggests that the over-all geometry of the sonicated vesicles of the isomers is similar.

STUDIES OF BIOSYNTHESIS OF WAXES BY DEVELOPING JOJOBA SEED: 111. BIOSYNTHESIS OF WAX ESTERS FROM ACYL-COA AND LONG CHAIN ALCOHOLS. S. Wu, R. Moreau, and P. Stumpf (Dept. of Biochem. and Biophysics, Univ. of Cal, Davis, CA 95616) *Lipids 16*(12):897-902 (1981). Acyl-CoA:alcohol trans-acylase activity was demonstrated in cell-free homogenates of developing jojoba seeds. The optimal pH was 8.0-8.1. Under optimal conditions, wax formation had a nearly linear relationship with extract concentration; the time course of wax formation was also linear up to 30 min. cis-11-Eicosenol was the most effective alcohol substrate whereas tetradecanol, octadecanol, dodecanol, cis-9-octadecanol, and cis-13-eicosenol gave progressively lower activities. Either saturated or unsaturated acyl-CoA with 18 or 20 C-atoms had similar activity, a 12,000 X g fat pad was the most active in wax formation; to maximize the activity, a 12,000 X g supernatant appeared to be necessary. This factor in the supernatant was thermolabile and nondialyzable.

EFFECT OF WATER MOBILITY ON LATERAL DIFFUSION OF PHOSPHOLIPIDS IN LIPOSOMES. W. Wu and C. Huang (Dept. of Biochem., Univ. of Virginia Schl. of Med., Charlottesville, VA 22908) *Lipids 16*(11):820-822 (1981). Recently, several studies have shown that the rate of lateral diffusion of liquid-crystalline phospholipids in various phospholipid/water lamellar systems depends markedly on the hydration over the water content of 15-40 w/w%. In this paper, we calculated the change in lipid lateral diffusion as a function of water content according to the theory of

Brownian motion in thin sheets developed by Saffman and Delbruck. These calculations, based on experimental data of lipid dimensions and bulk water diffusion coefficients obtained for the egg phosphatidylcholine/water system at various water contents, clearly indicate that the dependence of lipid lateral diffusion on the hydration can be attributed primarily to the change in bulk water mobility in the multilamellar phospholipid/water system.

LUNG PHOSPHATIDYLCHOLINE AND FASTING IN MALE AND FEMALE RATS. M. Abe, M. Endo, and H. Nagai (Department of Biochemistry, Sapporo Medical College, Sapporo, 060, Japan) *Lipids 17*(1):42-45 (1981). Lung from male and female rats fasted for 4 days were used. Phospholipid, phosphatidylcholine and its molecular species were analyzed in lungs from these rats and effects of fasting upon the biosynthesis of phosphatidylcholine in lungs from both sexes were determined using radioactive choline. The molecular species of phosphatidylcholine in both male and female rats did not differ with fasting except the monoenoic species. Incorporation of choline into phosphatidylcholine in both male and female rats significantly increased after fasting, but distribution of radioactivity in phosphatidylcholine yielded similar values in each group. These results suggest that the decrease of saturated phosphatidylcholine content after fasting may be not due to specific change in saturated phosphatidylcholine.

PHOTOSENSITIZED OXIDATION OF METHYL LINOLEATE: SECONDARY AND VOLATILE THERMAL DECOMPOSITION PRODUCTS. E.N. Frankel, W.E. Neff, E. Selke, and D. Weisleder (Northern Regional Research Center, Agricultural Research, U.S. Department of Agriculture, Peoria, IL 61604) *Lipids 17*(1):11-18 (1982). Studies of photosensitized oxidation of methyl linoleate show that the greater relative concentration of 9- and 13-hydroperoxides than 10- and 12-hydroperoxides is characteristic of singlet oxygenation and not due to either simultaneous autoxidation or type 1 photosensitized oxidation. Cyclization of the internal 10- and 12-hydroperoxides accounts for their lower relative concentrations. Secondary products separated by silicic acid and high pressure liquid chromatography were characterized spectrally (IR, UV, ^{1}H-NMR, GC-MS). Major secondary products included diastereomeric pairs of 13-hydroperoxy-10,12-epidioxy-*trans*-8-octadecenoate (I and III) and 9-hydroperoxy-10,12-epidioxy-*trans*-13-octadecenoate (II and IV); minor secondary products included hydroperoxy oxygenated and epoxy esters. Thermal decomposition of the hydroperoxy cyclic peroxides produced hexanal and methyl 10-oxo-8-decenoate as major volatiles from I and III and methyl 9-oxo-nonanoate and 2-heptenal from II and IV. Hydroperoxy cyclic peroxides may be important sources of volatile decomposition products of photooxidized fats.

FLUORESCENCE STUDIES ON THE LIPOPROTEIN COMPLEX OF THE FATTY ACID SYNTHETASE FROM THE INSECT *CERATITIS CAPITATA*. J.G. Gavilanes, M.A. Lizarbe, A.M. Municio, and M. Onaderra (Department of Biochemistry, Faculty of Sciences, Complutensis University, Madrid 3, Spain) *Biochemistry 20* (20):5689-5694 (1981). The fatty acid synthetase complex from the insect *Ceratitis capitata* forms a stable lipoprotein complex. The intrinsic fluorescence of the complex was studied by observing the emission spectra with different excitation wavelengths, both in the native complex and after treatment with sodium cholate and sodium dodecyl sulfate. The excitation spectrum of the native form also was recorded. The fluorescence behavior of the native enzyme showed two families of tryptophan residues. Cholate influenced the fluorescence, suggesting that phospholipids are the conformational support at this level. The two families of fluorescing tryptophan residues were similarly accessible to quenching by acrylamide. Thermal changes in the fluorescence characteristics were observed; warming caused a decrease in the quantum yield as well as a red shift in the emission maximum. The high fluorescence remaining after the thermal transition suggested that the lipid-protein interaction was affected but maintained shielding of the fluorophore by the lipids. Fluorescent probe molecules 1,6-diphenylhexa-1,3,5-triene (DPH) and dansylphosphatidylethanolamine (DPE) were also used. DPH uptake was temperature dependent, with a middle point consistent with the thermal conformation transition, indicating that internal lipids are nonrandomly distributed within the complex. DPE uptake did not reach the saturation of the complex, suggesting that its solubilization sites would be located on the lipoprotein surface.

RELATIONSHIP BETWEEN TBA NUMBERS AND INEXPERIENCED PANELISTS' ASSESSMENTS OF OXIDIZED FLAVOR IN COOKED BEEF. B.E. Greene and T.H. Cumuze (College of Home Economics, Univ. of Georgia, Athens, GA 30602) *J. Food Science 47*(1):52-54 (1981). Fifty-two inexperienced sensory panelists rated a series of ground beef samples four or six times for intensity of oxidized flavor. Correlation coefficients for sensory scores versus TBA numbers were significant but low. Variability in panelist scoring appeared to account partly for the lower values. Of the 52 panelists tested, 28 were determined statistically to be consistent in their scoring of the treatment variables. Correlation coefficients were higher for this group of panelists. The initial range of oxidized flavor detection for this panel group was within a range of TBA numbers that closely resembled the previously determined threshold level for trained panelists.

RECONSITUTION OF BACTERIORHODOPSIN VESICLES WITH *HALOBACTERIUM HALOBIUM* LIPIDS. B. Höjeberg, C. Lind, and H.B. Khorana (Depts. of Biology and Chemistry, Massachusetts Cambridge, Massachusetts) *J. Bio. Chem. 257(4)*:1690-1694 (1982). Reconstitution of bacteriorhodopsin into vesicles has been studied using individual and defined mixtures of fractionated *Halobacterium halobium* polar lipids. The lipids varied greatly in their ability to form vesicles that translocated protons and showed stimulation by valinomycin. Thus, phosphatidylglycerol phosphate gave mainly lipid-protein aggregates, while glycolipid sulfate gave mainly functional vesicles. Addition of glycolipid sulfate to phosphatidylglycerol phosphate promoted vesicle formation. Reconstituitons performed with different combinations of the purified lipids showed; 1) that vesicles with maximal proton pumping are obtained with a mixture of phosphatidylglycerol phosphate and glycolipid sulfate at a ratio close to that found in the purple membrane; 2) increasing the concentration of glycolipid sulfate in vesicles increase the stimulation of proton translocation by valinomycin; 3) phosphatidylglycerol sulfate cannot replace glycolipid sulfate or phosphatidylglycerol phosphate; and 4) vesicles containing sulfated polar lipids only are inferior to those in which lipid combinations containing phosphatidylglycerol phosphate are used.

SIMULTANEOUS DETERMINATION OF *SONCHUS ARVENSIS* L. TRITERPENES BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY. S.N. Hooper, R.F. Chandler, E. Lewis, and W.D. Jamieson (College of Pharmacy, Dalhousie University, Halifax, Nova Scotia, Canada) *Lipids 17*(1):60-63 (1982). *Sonchus arvensis* L. or sow thistle has proved an excellent source of pentacylic triterpenes; triterpenes account for about 6% of the crude lipid extract of 0.2% of the dried plant. Composition of the triterpenoid fraction, as indicated by gas chromatography of the corresponding acetates, was α-amyrin (9%), β-amyrin (21%), lupeol (13%), taraxasterol (24%) and pseudotaraxasterol (12%). A single, long-chain alcohol (16%) was also present. The nature of the triterpenoids were defined using gas chromatography and gas chromatography-mass spectrometry (GC/MS) and confirmed by direct comparison with authentic samples. The use of combined GC/MS proved extremely valuable in the simultaneous analysis of a mixture of triterpene acetates and greatly reduced the time needed to phytochemically evaluate these compounds.

ISOLATION AND IDENTIFICATION OF OBJECTIONABLE VOLATILE FLAVOR COMPOUNDS IN DEFATTED SOYBEAN FLOUR. O.A.-L. Hsieh, A.-S. Huang and S.S. Chang (Dept. of Food Science, Cook College, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ 08903) *J. Food Science 47*(1):16-18 (1981). The volatile flavor constituents of defatted soy flour were isolated by a specially designed apparatus. The isolated volatiles were fractionated by gas chromatography. The fractions with characteristic beany, grassy, and green odors were identified by infrared and mass spectroscopy. A total of 25 compounds was identified, including nine alcohols, six aldehydes, nine ketones, and 2-pentyl furan. Among the identified compounds, 2-pentyl furan and ethyl vinyl ketone are probably the key compounds for the beany and grassy odors of the soy flour. All the compounds identified in this study can be postulated as autoxidative decomposition products of soy lipids. Therefore, the presence of these compounds in soy flour might be due to the incomplete removal of lipids in soy flour.

CHARACTERIZATION OF THE NONVOLATILE MINOR CONSTITUENTS RESPONSIBLE FOR THE OBJECTIONABLE TASTE OF DEFATTED SOYBEAN FLOUR. A.-S. Huang, O.A.-L. Hsieh and S.S. Chang (Dept. of Food Science, Cook College, Rutgers, The State Univ. of New Jersey, New Brunswick, NY 08903) *J. Food Science 47*(1):19-23 (1981). A scheme was developed for the separation of the nonvolatile minor constituents from soy flour which are responsible for the astringent and bitter tastes. The scheme involved solvent extraction, freeze-drying, and fractional crystallization. Two fractions, collected by semipreparative HPLC, had the characteristic bitter and astringent tastes. Further fractionation by reverse phase HPLC produced three pure compounds which were identified by UV, NMR spectrometry and elemental analysis, as daidzein, glycitein 7-β-D glucoside, and genestin. Preliminary sensory evaluation showed that these isoflavones might contribute additively to the undesirable bitter and astringent tastes of soy protein products.

SYNTHESIS AND DETERMINATION OF THE CONFIGURA-

TION OF 23,25-DIHYDROXYVITAMIN D_3; A NEW METABOLITE OF VITAMIN D_3; X-RAY CRYSTAL STRUCTURE OF A 3,23,25-TRIOL PRECURSOR. N. Ikekawa, T. Eguchi, Y. Hirano, Y. Tanaka, H.F. DeLuca, A. Itai, and Y. Iitaka (Laboratory of Chemistry for Natural Products, Tokyo Institute of Technology, Nagatsuta, Midori-ku, Yokohama 227, Japan) *J. C. S. Chem. Comm.* 22:1157-1159(1981). The configuration at the C-23 position of 23, 25-dihydroxyvitamin D_3, a new metabolite of vitamin D_3, was determined as *S* by comparison with the synthetically prepared C-23 *S*- and *R*-isomers and an *X*-ray crystallographic determination of the structure of the 3,23,35-triol.

ELECTRON SPIN ECHO STUDIES OF CHOLESTANE NITROXIDE MOTION IN LECITHIN MULTIBILAYER DISPERSIONS AND VESICLES: DETECTION OF NITROXIDE PROBE MOTION AND VESICLE ROTATION. K. Madden, L. Kevan, P.D. Morse II, and R.N. Schwartz (Departments of Chemistry and Biological Sciences, Wayne State University, Detroit, Michigan 48202) *J. Am. Chem. Soc.* 104(1):10-13 (1982). Electron spin echo spectroscopy has been used to *directly* measure the electron spin transverse relaxation time T_2 vs. temperature of the 3-doxyl-5α-cholestane nitroxide spin probe in egg yolk lecithin vesicles. In a preliminary study of cholestane nitroxide in isotropic liquids and in egg yolk lecithin multibilayer dispersions, the electron spin echo decay function was a single exponential attributed to motion of the spin probe. In contrast, the echo decay in vesicles exhibits fast and slow exponential decay components associated with spin probes with their long axes perpendicular and parallel to the magnetic field. In addition a new fast component appears at high temperatures which is attributed to vesicle rotation which moves a population of slowly relaxing spin probes into an orientation having faster relaxation. This appears to be the first *direct* observation of vesicle rotation by electron magnetic resonance.

IDENTIFICATION OF 25,26-DIHYDROXYVITAMIN D_3 AS A RAT RENAL 25-HYDROXYVITAMIN D_3 METABOLITE. J.L. Napoli, R.T. Okita, B.S. Masters, and R.O. Horst (Department of Biochemistry, The University of Texas Health Science Center, Dallas, TX 75235) *Biochemistry 20*(20):5865-5871 (1981). 25,26-Dihydroxyvitamin D_3 [25,26-$(OH)_2D_3$] was unequivocally identified as a major renal microsomal metabolite of 25-hydroxyvitamin D_3 in rats fed a vitamin D sufficient diet. The structural assignment was based on a comparison of the high-performance liquid chromatograms of synthetic and in vitro generated 25,26-$(OH)_2D_3$ through four different systems, the ultraviolet absorbance and mass spectral characteristics of the sodium metaperiodate cleavage product of the metabolite. The enzymic synthesis of 25,26-$(OH)_2D_3$ was inhibited 60-80% by a semipurified goat anti-rat NADPH-cytochrome P-450 reductase. This implicates cytochrome P-450 as the probably terminal oxidase of the 25-hydroxyvitamin D_3-26-hydroxylase system. The methodology used to assay rat renal 25-OH-D_3-hydroxylases is also discussed.

TOTAL SYNTHESIS OF (+)-PROSTAGLANDIN I_2 METHYL ESTER AND (±)-15-EPI-PROSTAGLANDIN I_2 METHYL ESTER. R.F. Newton, S.M. Roberts, B.J. Wakefield, and G.T. Woolley (Chemical Research Department, Glaxo Group Research, Ware, Herts. SG12 ODJ) *J. C. S. Chem. Comm.* 17:873-932 (1981). Prostacyclin (prostaglandin I_2) methyl ester has been prepared; the key step was an aldol reaction between a cyclopentanone enolate and the cyclopentenylacetaldehyde derivative.

NEW APPROACHES TO THE SYNTHESIS OF VITAMIN D METABOLITES. 1. STEREOCONTROL IN THE INTRAMOLECULAR DIELS–ALDER REACTION. K.A. Parker and T. Iqbal (Department of Chemistry, Brown University, Providence, RI 02912) *J. Org. Chem.* 47(2):337-342 (1982). A short sequence which couples the Ireland-Claisen rearrangement with the intramolecular Diels-Alder reaction gives a 1:1 mixture of hydrindenes 3 and 13. Hydrindenes 3 are known intermediates in the total synthesis of vitamin D derivatives.

FATTY ACID COMPOSITION OF SEED OILS FROM SIX *ADANSONIA* SPECIES WITH PARTICULAR REFERENCE TO CYCLOPROPANE AND CYCLOPROPENE ACIDS. A. Ralaimanarivo, E.M. Gaydou, and J-P. Bianchini (Ecole Superieure de Chimie de Marseille, Universite de Droit, D'Economie et des Sciences, Centre Scientifique de Saint-Jerome, rue Henri Poincare, 13 397 Marseille Cedex 4, France) *Lipids* 17(1):1-10 (1982). The oil content of six Adansonia species (Bombacaceae family) of Madagascar (*Adansonia grandidieri, A. za, A. digitata, A. fony, A. fony, A. madagascariensis* and *A. suarenzensis*) and Africa ranges from 8 to 46%. All the oils give a positive response to the Halphen test. Malvalic, sterculic and dihydrosterculic acids were detected using gas liquid chromatography-mass spectrometry (GLC-MS). Epoxy or hydroxy fatty acids were not found in these oils. Fatty acid composition was determined by GLC using glass capillary columns coated with BDS and Carbowax 20 M. Results obtained for cyclopropenic fatty acids were compared to those given by glass capillary GLC after derivation with silver nitrate in methanol, by hydrogen bromide titration and by proton magnetic resonance. Good agreement was observed for the results given by the various methods. Malvalic acid content ranges from 3 to 28%, sterculic acid from 1 to 8% and dihydrosterculic acid from 1.5 to 5.1%. Odd-numbered fatty acids were also observed in minute amounts. Among the normal fatty acids, we observed mainly palmitic, oleic and linoleic. The relationship between fatty acid composition and *Adansonia* species is discussed.

REACTIVITY OF KEY METABOLIC STEROLS IN STANDARD COLORIMETRIC ASSAYS FOR CHOLESTEROL. C.P. Sarkar and R.J. Cenedella (Department of Biochemistry, Kirksville College of Osteopathic Medicine, Kirksville, MO 63501) *Lipids* 17(1):46-49 (1982). The reaction of lanosterol, desmosterol and 7-dehydrocholesterol, key intermediates in cholesterol biosynthesis, were compared with cholesterol in 3 standard colorimetric assays for cholesterol based on formation of chromogens with acetic anhydride, ferric chloride and ferrous sulfate. Marked differences in the reaction of the sterols in the different assays were due both to formation of chomogens with qualitatively similar spectral patterns but with greatly different extinctions and to formation of chromogens with clearly different absorption maxima. For example, in all assays, cholesterol and desmosterol formed chromogens with very similar absorption spectra but with varying extinctions, whereas the lanosterol chromogen in all assays was different from cholesterol's in both absorption maxima and in extinctions. The finding show that attempts to measure tissue sterol levels by colorimetric methods can result in great errors when cholesterol is not the sole sterol. Also the unique spectral properties of the lanosterol chromogen formed in the Liebermann-Burchard reaction (a sharp absorption peak at 450 nm) suggests the possible use of their method as a qualitative test for lanosterol.

VOLATILE HYDROCARBONS FROM PHOTOSYNTHETIC MEMBRANES CONTAINING DIFFERENT FATTY ACIDS. G. Sandmann and P. Böger (Lehrstuhl für Physiologie und Biochemie der Pflanzen, Universität Konstanz, D-7750 Konstanz, Germany) *Lipids* 17(1):35-41 (1982). A cell-free plant system was developed generating short-chain volatile hydrocarbons as markers of light-induced copper-mediated peroxidation of fatty acids present either as endogenous constituents of photosynthetic membranes or added exogenously. Different polyunsaturated fatty acids are present in the blue green algae *Anacystis vnidulans, Anabaena variabilis* and *Spirulina platensis*. The first species has no polyunsaturated acids. Thylakoids isolated from these algae produce different short-chain volatile hydrocarbons. The location of the double bond of dienoic or higher polyunsaturated fatty acids most distant from the carboxyl group determines the chain length of hydrocarbons evolved. Their number of C-atoms is the same as found beyond this double bond of the fatty-acid molecule (ω-1). This pattern of volatile hydrocarbons produced is in contrast to thermolytic cleavage. Malondialdehyde is formed only when at least 3 double bonds are present in the fatty acid. Peroxidation of endogenous thylakoidal and added fatty acids is completed within 24 hr; a maximum of 1% of the carbon skeleton can be recovered as volatile hydrocarbons.

FATTY ACID COMPOSITION AND TRIGLYCERIDE STRUCTURE OF CORN OIL, HYDROGENATED CORN OIL, AND CORN OIL MARGARINE. A. Strocchi (Agricultural Industries Institute, Via S. Giacomo 7, 40126 Bologna, Italy) *J. Food Science 47* (1):36-39 (1981). Corn oil, hydrogenated corn oil and corn oil margarine were compared on the basis of fatty acid composition and triglyceride structure, including configurational isomerism of unsaturated fatty acids. Hydrogenated corn oil contained trans unsaturation and positional isomers not naturally found in corn oil. The β-position of triglycerides of hydrogenated corn oil was 85% occupied by trans octadecenoic acids (trans-18:1); that of corn oil was 70% occupied by linoleic acid. The proportion of cis octadecenoic acids (cis-18:1) in the β-position of the triglycerides was distinctly less in the hydrogenated corn oil than in corn oil, indicating a hydrogenation and/or a geometrical isomerization of cis-18:1 to trans-18:1 preferentially in the β-position, as compared with the α-positions. Chemical composition of corn oil margarine was intermediate between that of corn oil and that of hydrogenated corn oil.

THE COCONUT AS A RENEWABLE ENERGY SOURCE. J.A. Banzon, *Oleagineux 36*(10):487-495 (1981). The coconut in the Philippines, is shown to be a renewable energy source of large magnitude. The energy contained in the 1978 harvest of over 12 billion nuts is calculated of equal 31×10^{12} kilocalories considering only the energy in the husk and shell: this is equivalent to 3.8

billion liters of gasoline. Each of the existing 377 million trees, whether bearing or not, sheds one leaf per month; the petiole of each leaf weighs 2.17 kg dry. Energy from these petioles is calculated to be 39×10^{12} kilocalories, a value even larger than that from husk and shell because of so many non-bearing trees. Considering a "standard" coconut plantation of 150 trees/hectare and bearing 10,000 nuts/year, the calculated energy from the shell, husk and petiole amounts to 54.5 million kilocalories. For other sizes of nut harvests, E = 2.6 N + 15.6 where N is in thousand nuts and E is in million kilocalories. If only husk and shell are considered, E = 2.6 N. Shell, husk and petiole may be converted to charcoal, but with an energy loss of about 50 percent; the latter is partly recoverable by using as fuel the noncondensible gases evolved during charcoaling.

GROUNDNUT CULTIVARS WITH SEED RESISTANT TO INVASION BY *ASPERGILLUS FLAVUS*. V.K. Mehan, D. McDonald, S.N. Nigam and B. Lalitha, *Oleagineux 36*(10):501-507 (1981). One Indian commercial cultivar J 11 and two groundnut lines PI 337409 and PI 337394 were found resistant to invasion and colonization by *A. flavus* of intact, dried seeds when these were rehydrated and inoculated with Indian strains of the fungus. Storage of seeds for periods of 55, 70 and 90 days before testing did not significantly affect the results. Inoculation of seeds of seven cultivars with three different toxigenic strains of *A. flavus* showed marked differences in invasive potential between cultivars. The strain NRRL 3000 was less virulent than the other two on all cultivars. The cultivar J 11, which also shows resistance to pod rots, could be useful in areas where aflatoxin contamination is a serious problem.

PRODUCTION OF SELECTED *ELAEIS GUINEENSIS* OIL PALM SEEDS. J.P. Gascon, J.C. Jacquemard, M. Houssou, D. Boutin, H. Chaillard, F. Kanga Fondjo, *Oléagineux 36*(10):475-486 (1981). Distributed by the I.R.H.O. and its partners, these oil palm seeds belong to hybrids whose performances are known. The best D X T or P hybrids are reproduced from *dura* of the parent D X D crosses or parental D selfs, and *pisifera* of the parent T X T or T X P crosses as well as parental T selfs. A choice of *dura* and *pisifera* parents in function of heritability of characters leads to improvement compared to the hybrids reproduced. The techniques used guarantee legitimacy and good germination to the D X P seeds produced, which are identified according to the hybrid reproduced.

TRENDS IN OILSEEDS PRODUCTION IN INDIA. A.C. Chhattrapati, *Oléagineux 36*(10):509-514 (1981). Oilseeds output shows an increase of only 60 percent over the First Five-Year Plan average. The prime source of this growth has been increase in area. Yield levels of oilseeds have been stagnant for nearly five decades. This article aims to review the trend in our oilseeds production in the overall context of supply and demand for edible oils.

ANTIOXIDANT PROPERTIES OF TOCOPHEROLS AND ASCORBYL PALMITATE IN OILS AND FATS. C. Bourgeois, *Rev. Fr. Corps Gras 28*(9):353-356 (1981), (french RFCG 81-27). In the last 40 years, many investigations have been carried out on the antioxidant potencies of the tocopherols and of ascorbyl palmitate. The present article is a brief survey of these investigations.

STUDY ON THE ESTERS OF GLYCEROL, TARTARIC, ACETIC AND FATTY ACIDS. I. PROPERTIES, SPECIFICATIONS, MANUFACTURING. G. Schuster and W. Adams, *Rev. Fr. Corps Gras 28*(9):357-365 (1981), (french RFCG 81-28). The compound esters of glycerol, tartaric acid, acetic acid and fatty acids are classified E 472 e and E 472 f. In CEE and member states regulations as in EFEMA (monographs for food emulsifiers) the diacetyl-tartaric acid and monodiglycerides mono- and diesters are called esters of E472 e series; the glycerol and tartaric and acetic acids mixed fatty esters are called esters of E 472 f series. According to the authors, the two series are not significantly different; in respect of composition properties, it seems logical to classify them in the same E series. The first part reviews the regulation, specifications, manufacturing of two series; the analysis and properties of products are studied in a second part.

STUDY ON THE UNSAPONIFIABLE OF *THEVETIA NERRIFOLIA* JUSS OIL. J. Miralles, *Rev. Fr. Corps Gras 28*(9):367-369 (1981), (french RFCG 81-29). The qualitative and quantitative composition of sterols, 4-methyl sterols, triterpenic alcohols and tocopherols has been determined in the unsaponifiable of *Thevetia neriifolia* Juss oil, by thin layer chromatography and gas liquid chromatography.

ENERGY BALANCE OF OIL PALM GROWING. AN APPROACH. G. Martin, *Oléagineux 36*(6):273-290 (1981). Because the average calorific value of palm and palm kernel oils is close to that of diesel oil, the industrial plantations can produce a significant energy equivalent of about 4.7 TPE/ha. In relation to this potential an attempt has been made by an appraisal of its biomass and of the energy spent to produce it to estimate the degree of efficiency of this crop and to determine the influence of the main parameters on its energy management. *A priori*, with a degree of efficiency of 3.7, the balance is satisfactory. Many elements, not well known at present, remain to be studied if the oil palm's energy potential is to be better known and used.

MICRONUTRIENTS IN COCONUT NUTRITION. J.M. Eschbach and R. Manciot, *Oléagineux 36*(6):291-304 (1981). A geographical inventory of micronutrient levels, determined by the I.R.H.O. was carried out for the following elements: Al, B, Cu, Fe, Mn, Mo, Zn, F. On young seedlings, studies in pot culture or in the nursery, have shown that boron is indispensable to good growth, and that when lacking, there is a risk of malformations on young crops or adult trees. Fe and Mn can become deficient when soil is too alkaline but spectacular correction of these deficiencies were achieved on the Polynesian atolls. At present, it is hard to propose a precise critical level for these elements but in this article the authors try to indicate those above which no deficiencies are to be feared. In any event, preventive B, Fe or Mn applications can avoid the appearance of corresponding deficiencies. As yet, no observable deficiencies in Al, Cu, Mo and Mn have been discovered on coconut.

HIGH QUALITY EDIBLE OIL FROM *JESSENIA* AND *OENOCARPUS* SPECIES: A PALM COMPLEX NATIVE TO THE AMAZON VALLEY. M.J. Balick, *Oléagineux 36*(6):319-326 (1981). Amazonian palms of the *Oenocarpus-Jessenia* complex produce edible oil closely resembling olive oil both chemically and in taste. *Jessenia bataua* is the most widespread species, growing throughout the Amazon Valley on either dry or swampy land. Indians have always known about the uses of this palm; in preconquest times, some tribes based part of their trading economies on its exploitation. The palms in this complex represent potential crops for tropical nations that yield high quality oil with strong consumer demand. Natural hybridization between *Jessenia* and *Oenocarpus* species has been observed among wild populations. The fruit can be made into a beverage or oil, and pulp obtained as a byproduct used as an animal feed. Further efforts towards the goal of domesticating this species are being made.

A STUDY OF THE GROWTH OF TWO GROUNDNUT CULTIVARS WITH AND WITHOUT THE USE OF FUNGICIDES IN MALAWI. P.C. Mercer, *Oleagineux 36*(6):311-316 (1981). Growth rates and yields of two groundnut cultivars, one an alternately branched runner and the other a sequentially branched bunch were examined over two seasons with and without the spraying of fungicides to control *Cercospora* leafspots. There were marked increases with spraying in top growth and numbers of pods. Spraying deferred overall maturity and affected the *in vitro* digestibility of the haulms, oil content of the kernels and the incidence of pod rots. It did not appear to have an effect on the crude protein content of the haulms. Generally, there were greater differences between results for the two seasons than there were between results for sprayed and unsprayed crops.

OBTAINING POLYMETHACRYLATES OF ALCOHOLS OF JOJOBA OIL. V. Gonzalez. *Rev. Plasticos 40*, 721-3 (1980). The polymers are obtained by saponification of jojoba wax, transesterification of the alcohols with methyl methacrylate, and free-radical bulk polymerisation. (World Surface Coatings Abs. No. 468).

IR SPECTROSCOPY FOR DETERMINATION OF TOTAL UNSATURATION. J.L. Bernard and L.G. Sims. *Ind. Research Dev. 1980*, Aug. 81-3. A technique using a correlation factor is used for determining the unsaturation (iodine value) of vegetable oils. (World Surface Coatings Abs. No. 470).

ORIENTATION AND COMPATIBILITY IN MONOLAYERS. I. MACROMOLECULAR COMPOUNDS AND FATTY ACIDS. G. Gabrielli, P. Baglioni and A. Maddii. *J. Colloid Interface Sci. 79*, 268-71 (1981). Compatibility studies have been made on the systems polyvinyl stearate/oleic acid and polyvinyl acetate/oleic acid. (World Surface Coatings Abs. No. 469).

RADIOTRACER STUDY ON OXIDATION OF OLEIC ACID MONOLAYER ON AQUEOUS PERMANGANATE SOLUTION. M. Iwahashi, K. Toyoki, T. Watanabe and M. Muramatsu. *J. Colloid Interface Sci. 79*, 21-32 (1981). Studies have been made of the mechanisms of the oxidative processes of C-14 oleic acid in its insoluble monolayer spread on aqueous permanganate solution by measuring simultaneously the time dependences of surface radioactivity, apparent molecular area, and surface pressure. Infrared spectroscopic examination of the film material obtained by skimming the monolayer on permanganate solution indicates that the rate-determining intermediate involved in the interfacial processes is predomi-

nantly cis-epoxyoctadecanoic (cis-epoxy) acid and none of the other oxyacids such as dihydroxy (diol), ketohydroxy (ketol), and diketo acids, which have been assumed as intermediate compounds, by other investigators. (World Surface Coatings Abs. No. 468).

MANAGEMENT OF MINERAL NUTRITION ON INDUSTRIAL OIL PALM PLANTATIONS. FERTILIZER SAVINGS. M. Lagnier and R. Ochs, *Oléagineux 36:* (8-9), 409-421, (1981). The crisis in energy and raw materials of mineral origin has drawn attention back to the problem of fertilizer savings, while giving it a new dimension. Present circumstances no longer lend themselves to an over-generous approach which was so often practiced in the recent past, and which sometimes continues to be today. It is therefore necessary to advance all research options enabling fertilizer consumption to be reduced in the future; it is already possible to make very substantial savings, thanks to careful management of plantation mineral nutrition. The corresponding methods are operational, based on the association between the experimental rigor of field experiments, and the flexibility of leaf analysis enquiries. Mineral nutrition must not be managed in function of general norms which have turned out to be eminently variable depending on the age of the cultures, the nature of the soil, and the climate and resulting potential. It is thus indispensable to turn to reference experiments set up in the heart of the industrial plantations. This is the only way of proving that a fertilizer is efficient, and of defining the critical levels to be used to draw up the specific fertilizer schedules for the region concerned. Critical nitrogen level drops with the age of the plantations. Phosphorus levels vary according to the level of nitrogen nutrition. The critical levels for potassium and magnesium depend on the nature of the soils, the climate and the production potential. Schedules modulating the fertilizer rate are used in function of the leaf levels observed in each plantation plot. The schedules are drawn up on the basis of experimental reference results and are readjusted yearly if necessary. Other schedules are being studied, enabling the year's rate to be calculated in function of the previous year's rate, and taking into account the effect of this rate on the evolution of levels.

CHEMICAL COMPOSITION OF THE RASPBERRY SEED OIL (*RUBUS IDAEUS L. ROSACOES*). H. Pourrat and A.P. Carnat. *Rev. Fr. Corps Gras. 28:* (11-12), 477-479, (1981). (french. RFCG 81-36). The raspberry seeds (*Rubus idaeus L. Rosacees*) provide 16 to 18% of a semi-drying oil by chloroform extraction. The chemical composition of this oil, which has real antioxidant properties, has been studied little in the past. The predominant fatty acids are linoleic and linolenic acids; the unsaponifiable mainly consists of sterols, fatty alcohols and saturated hydrocarbons.

RESEARCH AND PRODUCTION IN THE FIELD OF RAPESEEDS AND FATS AND OILS IN JAPAN. E. Chone. *Rev. Fr. Corps Gras. 28:* (11-12), 481-484, (1981) (french RFCG 81-37). This mission report reviews rapeseed production in Japan, genetic research carried out and utilization of rapeseed oil and meals. Different information concerning oilseed and vegetable oil imports, and also the crushing data are given.

POLLINIC COMPETITION AND LEGITIMACY OF THE SEEDS PRODUCED IN THE COCONUT SEED GARDENS. A. Sangare, *Oléagineux 36:* (8-9), 423-427, (1981). Competition between yellow Dwarf, red Dwarf and West African Tall pollens has been demonstrated by studies made in 1979 and 1980 on the Mare Delorme Station (Ivory Coast). The female flowers of yellow Dwarf tend to be fertilized preferentially by pollen of the same variety or of other Dwarfs in general. This affinity of their flowers for Dwarf pollen underlines the importance of the quality of the emasculation work in a Dwarf coconut seed garden. Even a very small emission of pollen resulting from imperfect emasculation in a seed garden can lead to a fairly high percentage of illegitimates (pure Dwarfs) in spite of regular contributions of Tall pollen by assisted or directed natural pollination.

STUDY OF THE GROWTH OF A FEW YEAST STRAINS ON BY-PRODUCTS OF GROUNDNUT OIL REFINING. VALORIZATION TRIALS OF SOAPSTOCKS. A. B, R. Ratomahenina, J. Graille and P. Galzy, *Oléagineux, 36:* (8-9), 439-445, (1981). Alkaline refining of groundnut oils produces an important by-product, the soapstocks. The higher the initial acidity of the crude oil, the more abundant the soapstocks; their mass in relation to the crude oil can be estimated at an average 5/100, but can be more. It would be worthwhile for developing countries to valorize this by-product by converting it into proteins of unicellular organisms (PUO). The authors, who think that in this respect they have a contribution to make to the development of new sources of protein-rich foods, have studied the growth of a few yeast strains on this substrate, a source of carbon. In particular, they have worked out growth rates and the growth yield in dry matter and proteins. In addition, they have examined the influence of pH and temperature on the different biological systems. The amino-acid composition of the various yeasts cultured has been determined, and a specific study of the fatty acids in the residues has been conducted to discover a possible selectivity related to the length of the chain and the unsaturation.

SOME DESIGN AND PERFORMANCE CHARACTERISTICS OF A SMALL PEANUT SHELLER. J.I. Davidson, Jr., R.F. Hudgins and C.T. Bennett, *Oléagineux 36:* (8-9), 433-437 (1981). The National Peanut Research Laboratory and the Paul Hattaway Company have developed a small, improved peanut sheller that has many potential applications in research, farming and industry. This sheller provides a high shelling rate, out-turns and efficiencies that correlate well with those of large, commercial-type peanut shellers. The sheller provides automatic hull separation, as many as six sizing operations and automatic clean-out. It is essentially maintenance-free and can be used to shell samples and small lots with a minimum of labor. It is being used extensively as a research tool. Other potential applications include peanut shelling for farmers and small processors; quality control during drying, cleaning and storing of peanuts; and optimizing the set-up, operation and performance of commercial peanut shelling plants.

ON THE REFINABILITY OF OILS. IV. STUDY OF REFINED RAPESEED OILS. E. Sambuc, G. Devinat and M. Naudet. *Rev. Franc. Corps Gras. 28:* (11-12) 459-466 (1981) (french. RFCG 81-33). Thirty-five new rapeseed oils refined in pilot workshop under standard conditions have been analyzed and tested in the fresh state. A re-orientation according to the immediate flavor score after removal of rough centroid parameters makes it possible to select the most characteristic analytical tests. First order multilinear regression experiments give simple relations providing precisely the immediate flavor score from iron content, absorption at 420 nm and/or phosphorus content or absorption at 270 nm. The comparison of analytical results and flavor scores suggests the characteristics required for the new rapeseed oils in order to be compatible with the immediate sensorial acceptability threshold. Experiments have also been carried out to relate the flavor score after a more or less short storage to some characteristics of freshly refined oils. Equations have been elaborated, but require confirmation.

ON THE REFINABILITY OF OILS. V. COMPLEMENT TO THE STATISTICAL INTERPRETATION OF RESULTS. E. Sambuc and M. Naudet. *Rev. Fr. Corps Gras. 28:* (11-12), 467-471, (1981) (french. RFCG 81-34). The factorial analysis to successfully foresee the immediate flavor score of soybean and new rapeseed refined oils is at fault for studying the relations between inorganic content of refined oils and analytical tests of raw oils. A new method for selecting the analytical tests, called method of "combination selection" has been elaborated. It is based on the a priori calculation of type deviation or the postulated relation, without establishing that. This method applies to the all kinds of polynomial relations, whatever the degree may be. Its validity is controlled by applying it to already resolved prevision of immediate flavor score for soybean and new rapeseed oils.

TRIGLYCERIDE STRUCTURE OF THE SESAME OIL. M. Ouedraogo and J. Bezard. *Rev. Fr. Corps Gras. 28:* (11-12) 473-476. (1981) (french. RFCG 81-35). This work gives detailed analytical data on the triglyceride structure of an oil extracted from sesame seeds harvested in Upper Volta (Africa). This oil contains high levels of linoleic (43.3%) and oleic (40%) acids, both preferentially esterified in the 2-position of glycerol. The oil triglycerides were fractionated according to unsaturation into nine classes which were submitted to pancreatic lipase hydrolysis. Analysis of the monoglycerides formed during lipolysis and in some cases, of one class of diglycerides showed the presence of 40 isomers. Sixteen of them accounted for more than 1%, together representing 94% of the oil. Three isomers were present in high amount (more than 10%), together accounting for 37% of the oil triglycerides. Relatively high amounts of trilinolein (10.3%) and triolein (8.7%) were found. The 20 last isomers (0.1 to 0.3% each) together only represented 3% of the sesame oil studied.

Biochemistry and nutrition

PATHOGENESIS OF FATTY LIVER IN RATS FED A HIGH PROTEIN DIET WITHOUT PYRIDOXINE. M. Abe and Y. Kishino (Department of Nutrition, School of Medicine, Tokushima University, Tokushima 770, Japan) *J. Nutr. 112*(1):205-210 (1982). Fatty liver induced in rats by a high protein diet without pyridoxine was studied morphologically. The microscopic change was characterized by accumulation of fat in hepatocytes of the centrolobular and midzonal areas. Electron microscopic examination at an early stage showed marked accumulation of small osmiophilic particles in the

granular endoplasmic reticulum and vesicles throughout the cytoplasm with similar particles in the spaces of Disse. After 4 weeks, numerous lipid droplets of various sizes were seen in pericanalicular lysosomes in hepatocytes with concomitant increase in the triglyceride level. The droplets gradually formed larger droplets in the cytoplasm. After 8 weeks, myelin figures together with fat droplets were seen in continuity with the endoplasmic reticulum and occasionally crystal clefts were observed within lysosomes of hepatocytes. These findings suggest that development of fatty liver results from impaired lysosomal degradation of lipid.

EFFECT OF ESTROGEN IMPLANTS ON HEPATIC LIPID DEPOSITION IN CHICKS FED DIFFERENT ISONITROGENOUS AND ISOCALORIC DIETS. Y. Akiba, L.S. Jensen, and M.S. Lilburn (Department of Poultry Science, University of Georgia, Athens, GA 30602) *J. Nutr. 112*(1):189-196 (1982). Two experiments were conducted to determine if differences in response of livers to estradiol administration in male broiler chicks would be observed if fed isonitrogenous and isocaloric diets of different composition. A polymethylsiloxane tube filled with estradiol dipropionate was implanted in two- or three-week-old chicks fed a basal corn-soybean meal (CS) diet or a diet containing fish meal, alfalfa meal, and torula yeast (FAY) or distiller's dried grains with solubles (DDGS). Body weight gains were significantly reduced by the highest level of estradiol in chicks fed the CS diet but not in chicks fed FAY or DDGS. Liver weight, deposition of lipid in liver and plasma lipid were markedly increased in proportion to the size of estradiol tube in chicks fed all diets. Increase of liver weight and lipid deposition by the highest level of estradiol in chicks fed the CS diet was significantly greater than that in chicks fed the FAY diet. Liver weight and the liver lipid response to estradiol in chicks fed the CS diet were significantly greater than that in chicks fed the FAY diet when dose response equations were compared among diets. These data show that the response on deposition of lipid in liver to estrogen administration was modified by the type of ingredients included in diets with similar energy and nutrient profiles.

DIURNAL VARIATION IN BILIARY LIPIDS AND SERUM VLDL BEFORE AND DURING TREATMENT WITH CLOFIBRATE. E. Andersen and K. Hellstrom (Department of Medicine, St. Erik's Hospital, S-11282 Stockholm, Sweden) *Atherosclerosis 41*(1):87-97 (1982). Biliary lipid composition and serum VLDL triglyceride (VLDL-TG) level were determined intermittently over 24 hr in 5 previously cholecystectomized hypertriglyceridaemic patients. The study was repeated when the patients had been treated with clofibrate for 2 months. Before and during treatment the molar cholesterol concentration in duodenal bile showed marked diurnal variations. It dropped after the first meal in the morning, remained depressed until the end of the evening, increased early at night and dropped back slightly between 2 and 8 a.m. A diurnal variation was also recorded for bile acid composition, as the contribution of cholic acid (C) increased in 4 of the subjects at night. During treatment with clofibrate, the molar concentration of cholesterol remained unchanged during the day but was significantly elevated in samples obtained at night. The contribution of C increased during both the day and the night. As a general tendency, changes in the curve representing the molar level of cholesterol in bile were mirrored by reversed changes in the VLDL level in plasma. The possibility of a causal relationship between these two parameters is discussed.

THE EFFECTS OF ORAL IODIZED OIL ON INTELLIGENCE, THYROID STATUS, AND SOMATIC GROWTH IN SCHOOL-AGE CHILDREN FROM AN AREA OF ENDEMIC GOITER. A. Bautista, P.A. Barker, J.T. Dunn, M. Sanchez, and D.L. Kaiser (Section of Nutrition and GI, Baylor Medical College, Houston, TX 77030) *Am. J. Clin. Nutr. 35*(1):127-134 (1982). One hundred goitrous school children received 475 mg of iodized oil by mouth while 100 controls received mineral oil, on a double-blind basis. On follow-up 22 months later the urinary iodine had increased and goiter size had decreased in both groups, more strikingly in the iodine-treated children. There were no consistent differences between the two treatment groups in rate of somatic growth or performance on the Stanford-Binet and Bender tests. Because of the complexities introduced by increases in urinary iodine in the controls, we compared goiter reduction with improvement in IQ score in all children, regardless of group, and found a significant relationship ($p = 0.014$), particularly in girls ($p = 0.029$). We conclude that oral iodized oil is an attractive alternative to its injection but we recommend an approximate doubling of the dose used here for more effective control. Also, while our data are not conclusive, they support the possibility that correction of iodine deficiency may improve mental performance in school age children, particularly girls.

STUDIES IN LIPID COMPOSITION AND PHYSICAL STATE OF LIVER AND HEART MITOCHONDRIA AND MICROSOMES IN PIGS FED ON DIETS CONTAINING DRIED BIOMASS OF CANDIDA LIPOLYTICA (TOPRINA). A.R. Borgatti, G. Lenaz, A.M. Sechi, G. Trigari, A. Pagliarani, and V. Ventrella (Institute of Biochemistry, Faculty of Veterinary Medicine, Via Belmeloro, 8/2° 40126 Bologna Univ., Italy) *J. Food Science 47*(1):59-64 (1981). The lipid composition and certain structural and functional features of liver and heart mitochondria and microsomes have been investigated in pigs fed diets containing 0%, 15%, 30% "Toprina" (dried biomass of *Candida lipolytica* grown on n-alkanes). The presence of "Toprina" in the diets and its odd-chain higher fatty acids (HFA) (especially 17:1 and 17:2) in total lipids, phospholipids, and neutral lipids of pig liver and heart mitochondria and microsomes does not result in any variations of membrane fluidity (evaluated by the unsaturation index, the unsaturation index/% of total saturated HFA, and by fluorescence polarization of perylene), nor does it result in changes in mitochondrial ATPase activity, sensitive to membrane lipid composition.

DIETARY TRILINOELAIDATE: EFFECTS OF METABOLIC PARAMETERS RELATED TO EFA METABOLISM IN RATS. G. Bruckner, J. Shimp, S. Goswami, J. Mai, and J.E. Kinsella (Department of Food Science, Cornell University, Ithaca, NY 14853) *J. Nutr. 112*(1):126-135 (1982). To study the effects of dietary trilinoelaidate (tt18:2) on metabolic parameters, as they relate to essential fatty acid metabolism, a diet containing "adequate" linoleic acid with incremental isocaloric tt18:2 supplementation was formulated. This diet was fed to rats for 11 weeks and oxygen (O_2) consumption, insensible water loss (IWL), growth parameters and liver fatty acid composition evaluated at specific time intervals. The results showed that while an essential fatty acid deficient diet (hydrogenated tallow) increased IWL and decreased body weight gains, O_2 consumption remained unaltered. Dietary tt18:2, while accumulating in liver lipids, and apparently inhibiting Δ6 desaturase, as evidenced by 18:2/20:4 ratios, did not alter O_2 consumption or IWL. At the highest level to tt18:2 fed (2.5 weight percent of dietary fat) there was a noticeable decrease in body weight gains by the 11th week; organ weights, however, were not affected. While the increased consumption of dietary trans fatty acids has raised questions regarding their potential biologically detrimental effects, the present study indicated that gross alterations related to classical essential fatty acid deficiency symptoms are not precipitated in the rat by tt18:2 levels comparable to those consumed in a normal human diet.

INTERRELATIONSHIP BETWEEN DIETARY *TRANS* FATTY ACIDS AND THE 6- AND 9-DESATURASES IN THE RAT. R. De Schrijver and O.S. Privett (The Hormel Institute, University of Minnesota, Austin, MN 55912) *Lipids 17*(1):27-34 (1982). Studies are reported on the effects of dietary *trans* fatty acids on the 6- and 9-acyl desaturase activities in the liver microsomes of rats fed essential fatty acid (EFA)-deficient and non-EFA-deficient diets. In experiment I, weanling male rats were fed a semisynthetic diet with either 10% safflower oil (SAF) or 10% hydrogenated coconut oil (HCO). At the age of one year, half of the dietary fat was replaced by a supplement containing elaidate, linolelaidate and *cis,trans-trans,cis*-18:2 (TRANS) for 12 weeks. In experiment II, male rats which were kept from weanling on a 10% SAF diet for one year received one of the following fat supplements for a 12-week period: 10% HCO, 9% HCO + 1% TRANS, or 5% HCO + 5% TRANS. Feeding TRANS depressed the 6-desaturase activity in the liver microsomes, especially in the EFA-deficient rats (HCO + TRANS group of experiment I). Unlike the 6-desaturase activity, the 9-desaturase activity was not inhibited by the dietary *trans* fatty acids and was significantly stimulated in the non-EFA-deficient rats (SAF + TRANS group of experiment I and HCO + TRANS groups of experiment II). This was evidenced by incubation reactions and by comparisons of fatty acid consumptions and microsomal fatty acid levels, showing extra biosynthesis of 16:1 and 18:1 when TRANS was fed. The biosynthesis of essential (n-6) fatty acids was depressed by the TRANS supplement in EFA-deficient as well as in non-EFA-deficient animals.

CONFORMATIONAL TRANSITIONS IN SERUM HIGH DENSITY APOPROTEINS OF HYPERCHOLESTEROLEMIC MONKEYS. S. Dhawan, S. Nityanand, N.K. Kapoor and S. Singh (Central Drug Research Institute, Lucknow, India) *Atherosclerosis 41*(1):81-86 (1982). Conformational transitions in serum high density apolipoproteins of normal and hypercholesterolemic monkeys have been studied by circular dichroism. This study has revealed that under hypercholesterolemic conditions the secondary structure of apolipoproteins suffers permanent changes which could be observed even after a lengthy procedure of isolation, purification and delipidation of high density lipoprotein.

EXPLORATORY STUDIES OF LIPID-PECTIN INTERACTIONS.

J.D. Falk and J.J. Nagyvary (Department of Biochemistry and Biophysics, Texas A&M University, College Station, TX 77843) *J. Nutr. 112*(1):182-188 (1982). This study was undertaken to elucidate the mechanism responsible for the hypolipidemic action of pectin. The experiments reported here were designed to test of direct molecular interactions exist between pectin and lipids. Equilibrium dialysis of pectin and taurocholate showed binding only at high physiological ionic strength. When lipid microemulsions and micelles of low charge density were used, unambiguous proof of binding of pectin were obtained by NMR spectroscopy and gel exclusion chromatography. The results suggest that the interaction is mainly by hydrogen bonds involving the pectin carboxylic moieties. The quantitation of lipid binding by pectin could be established only in the presence of polyvalent cations using a membrane filtration technique. Under optimum conditions, pectin can bind four times its weight in lipids. Although the techniques presented here are physical-chemical, the conclusions are highly relevant to bioavailability. These results represent the first successful demonstration of direct lipid-polysaccharide interactions in biochemistry, and they have an obvious bearing on the physiological absorption process. The intestinal binding of dietary and biliary lipids by pectin may be a major mechanism of action of this hypolipidemic polysaccharide. This paper also calls attention to techniques which could be beneficial for the in vitro evaluation of plant fibers.

INFLUENCE OF MILK SOURCE ON SERUM LIPIDS AND LIPOPROTEINS DURING THE FIRST YEAR OF LIFE, BOGALUSA HEART STUDY. R.P. Farris, G.C. Frank, L.S. Webber, S.R. Srinivasan, and G.S. Berenson (Louisiana State University Medical Center, Specialized Center of Research—Arteriosclerosis, 1542 Tulane Avenue, New Orleans, LA 70112) *Am. J. Clin. Nutr. 35*(1): 42-49 (1982). An epidemiological study of coronary heart disease risk factor variable in a cohort of 440 infants from birth to age 4 was conducted in Bogalusa, LA. This report evaluates differences in serum lipids and lipoproteins and dietary intakes of infants fed various milk or formula types during the 1st year of life. There were significant positive correlations between serum total cholesterol and β-lipoprotein cholesterol levels and consumption of cow's milk at 6 months of age. The cow's milk-fed infants at 6 months had significantly greater intakes of animal protein and saturated fat as compared to the formula-fed groups. At 1 year these differences were not found, possibly because of the heterogeneity of the eating patterns of infants by this age. Serum lipid and lipoprotein levels appear to be responsive to concurrent dietary intake of fat and cholesterol in 6-month-old infants.

ENDOTHELIAL MORPHOLOGY AND PLASMA TOTAL AND HIGH DENSITY LIPOPROTEIN CHOLESTEROL CHANGES IN HYPOTHALAMICALLY STIMULATED SQUIRREL MONKEYS FED A MODIFIED ATHEROGENIC DIET. W.H. Gutstein, P. Anversa, L. Korcek, J.E. Harrison, G.K. Turi, and G. Kiu (Department of Pathology, New York Medical College, Valhalla, NY 10595) *Atherosclerosis 41*(1):41-51 (1982). Experimental animals fed atherogenic diets show endothelial damage, impairment of endothelial regeneration and plasma lipid changes characterized by elevation of LDL and decrease of HDL cholesterol concentrations. Previous studies in this laboratory disclosed that chronic electrical stimulation of the lateral hypothalamus was associated with electron-microscopic evidence of endothelial injury in rats and squirrel monkeys maintained on basal (low fat/cholesterol-free) diets. In the present investigation squirrel monkeys fed similar diets supplemented with "modest" amounts of caloric fat and cholesterol was subjected to chronic lateral hypothalamic stimulation for periods as long as 20 months with the expectation that endothelial injury would be greater than in the absence of the supplements. These expectations were not substantiated. Endothelium was found to be surprisingly intact by electron microscopy and similar to that of implanted nonstimulated controls. A further observation of interest was the cholesterolemic response, notably in the HDL fraction, observed in both groups, but more striking in experimental animals. The data suggest that an interaction between a modified lipid/cholesterol concentration and preservation of endothelial integrity. Further investigation is required to determine whether these two events are causally related.

LONG-TERM EFFECTS OF SEMIPURIFIED DIETS CONTAINING CASEIN OR SOY PROTEIN ISOLATE ON ATHEROSCLEROSIS AND PLASMA LIPOPROTEINS IN RABBITS. M.W. Huff, D.C.K. Roberts and K.K. Carroll (Depts. of Biochemistry, Univ. of Western Ontario, London, Ontario N6A 5C1, Canada) *Atherosclerosis 41*:327-336 (1982). Long-term feeding trials of male New Zealand White rabbits were carried out with low-fat cholesterol-free semipurified diets containing casein or soy protein isolate as the source of protein. Young rabbits fed the casein diet from 6 to 8 weeks of age for 10 months rapidly became hypercholesterolemic and maintained high cholesterol levels throughout the experiment. At autopsy, all rabbits showed extensive aortic lesions. In young rabbits fed the soy protein diet, low plasma cholesterol levels were maintained for the 10-month period, and aortic lesions were minimal. Mature rabbits fed the casein diet from 6 months of age did not become significantly hypercholesterolemic until they had been on the diet for 6 months and the final cholesterol level achieved after 9 months on diet was less than that seen in the young rabbits. Those fed the soy protein isolate diet maintained low plasma cholesterol levels throughout the 9-month period.

SURFACTANT PHOSPHATIDYLCHOLINE SOURCE, FLUXES, AND TURNOVER TIMES IN 3-DAY-OLD, 10-DAY-OLD, AND ADULT RABBITS. H. Jacobs, A. Jobe, M. Ikegami, and S. Jones (Fetal-Maternal Research Laboratories, Harbor-UCLA Medical Center, Torrance, California) *J. Biol. Chem. 247*(4):1805-1810 (1982). We have measured turnover times for alveolar surfactant phosphatidylcholine in rabbits at 3 and 10 days of age and in adult rabbits. To generate accurate estimates of the turnover time of surfactant phosphatidylcholine from lamellar bodies into the alveolar space, large numbers of rabbits at each age were injected with radiolabeled choline, palmitic acid, and phosphate. Phosphatidylcholine was isolated from lamellar body and surfactant fractions from each rabbit. Curves of specific activity versus time were analyzed using the Zilversmit equations for a two compartment precursor product model. The curves for each labeled precursor at each age were consistent with the lamellar bodies being the solve precursors of surfactant phosphatidylcholine. The same equations were used to calibrate turnover times for surfactant phosphatidylcholine; these were 8-10 hr in 3- and 10-day-old rabbits but only 3 hr in adult rabbits. From estimates of surfactant phosphatidylcholine pool sizes and turnover times, the flux of surfactant phosphatidylcholine was estimated to be 3.4 μmol/hr in adult and 0.48 μmol/hr in 3-day-old rabbits; however, the flux expressed/kg of body weight is 2.4 times larger in 3-day-old than in adult rabbits. Finally, the conservation of the radiolabeled precursors in phosphatidylcholine implies reutilization of phosphatidylcholine after synthesis and secretion.

EFFECTS OF ORAL AND INTRAVENOUS FAT ADMINISTRATION ON THE LEVELS OF APOPROTEINS A-I, A-II, AND C-III IN HUMAN SUBJECTS. S. Koga, Y. Yamanaga, S. Fujii, K. Yamamoto, and H. Ibayashi (Third Department of Internal Medicine, Faculty of Medicine, Kyushu University, Fukuoka City 812, Japan) *Atherosclerosis 41*(1):115-124 (1982). Changes of plasma levels of apoproteins A-I, A-II and C-III were determined after oral and intravenous fat administration. The A-I levels increased in three out of four subjects after fat ingestion but no changes or even a slight decrease in the levels of A-I were observed after intravenous fat infusion. The A-II levels also increased after fat ingestion in two subjects but the levels either did not change or decreased slightly after fat infusion. The levels of C-III increased concomitantly with the increase of triglyceride levels after fat ingestion as well as fat infusion. After intravenous fat infusion, part of the C-III in the $d>1.006$ fraction shifted to the lighter fraction ($d<1.006$). These observations suggest that the increase in the levels of A-I and A-II after fat ingestion are a consequence of an increase in apoprotein synthesis in the intestine during fat absorption. The increase in the levels of C-III after fat ingestion as well as fat infusion seemed to be related to the capture of C-III in the triglyceride rich particles, i.e., C-III accumulated in the circulation with triglyceride-rich particles. However, it appeared also to be possible that the rate of C-III synthesis increases during hyperlipidemia induced by fat infusion.

THE FATTY ACIDS OF ERYTHROCYTES OF MYOCARDIAL INFARCTION PATIENTS. E.J.A. Lea, S.P. Jones and D.V. Hamilton (Membrane Laboratory, School of Biological Science, Univ. of East Anglia, Norwich, NR4 7TJ, and Addenbrooke's Hospital, Cambridge, Great Britain) *Atherosclerosis 41*:363-369 (1982). Arachidonic acid and eicosapentaenoic acid are precursors of two different series of prostaglandins important in homeostasis of the cardiovascular system. The levels of these and other fatty acids have been measured in a group of 20 patients who had suffered myocardial infarction and a group of 17 healthy age-matched controls using the erythrocyte as a lipid probe. There was no significant difference between the level of arachidonic acid in patients and controls. There was however a highly significant difference in the level of the peak containing eicosapentaenoic acid, i.e., 6.60% ± 0.29 (mean and SE of mean) for controls; 3.91 ± 0.36 (mean and SE of mean) for patients with myocardial infarction. In each of the two groups the relationship between the levels of the two fatty acids, arachidonic acid, eicosapentaenoic acid and their essential fatty acid precursors has been investigated. No significant functional relationship was found except between C18:3ω3 and C20:5ω3 (eicosapentaenoic acid) in the control group. These results are discussed in relation to homeostasis and recent evidence that levels of these fatty acids can be altered by dietary manipulation.

HYPOCHOLESTEROLEMIC EFFECT OF ALFALFA MEAL IN MONKEYS IS NOT DUE TO THYROID STIMULATION. M.R. Malinow (Oregon Regional Primate Research Center, Beaverton, Oregon 97006) *Proc. Soc. Exper. Biol. Med. 169*:110-112 (1982). Monkeys ingesting Purina Monkey Chow or semipurified foods containing alfalfa have plasma thyroxine levels similar to those in animals ingesting semipurified foods. The low plasma cholesterol levels in monkeys fed alfalfa are not due to induced hyperthyroidism.

THE EFFECT OF ENVIRONMENTAL TEMPERATURE OF SEBUM COMPOSITION IN TROPICAL AND TEMPERATE BREEDS OF CATTLE. J.C. O'Kelly and H.P. Reich (Division of Animal Production, Tropical Cattle Research Centre, PO Box 545, North Rockhampton, Qld. 4701, Australia) *Lipids 17*(1):19-26 (1982). This study compared the effect of environmental temperature on sebum composition in 2 breeds of cattle, British (SH) and Brahman (GB), which differ in their abilities to tolerate heat. By long-term exposure of both breeds to environmental temperatures of 24 C and 32 C and the more heat-tolerant GB breed to 38 C, it was possible to make breed comparisons at (a) different body temperatures, i.e., when all animals were exposed to the same environmental temperature, and (b) at the same body temperature, i.e., when the 2 breeds were exposed to different ambient temperatures. The composition of sebum excreted to saturation level on the skin surface was determined. At the same body temperatures, the amounts of fatty acids in each lipid class were higher in GB than in SH animals except during hyperthermia when the amounts of triglyceride fatty acids were similar in both breeds. The total amounts of individual fatty acids except 14:1, 16:1, 20:0 and 14:OH were higher in both breeds at 32 C than at 24 C. The GB cattle excreted more essential fatty acids (EFA) than the SH cattle at 24 C and at 32 C. There was a significant genotype by environment interaction in the amounts of EFA partitioned between triglycerides and wax esters; in GB cattle, the amount of EFA excreted in triglycerides decreased whereas the amount excreted in wax esters increased with rising body temperature.

THE INFLUENCE OF THYROID FUNCTION ON SERUM LIPID PROFILE. A. Raziel, B. Rosenzweig, V. Botvinic, I. Beigel, B. Landau and I. Blum (Depts. of Internal Medicine B, Endocrinology and The Lipids Laboratory of the Institute of Cardiac Rehabilitation, Beilinson Medical Center, Petah Tiqva; and the Sackler School of Medicine, Tel Aviv Univ., Ramat Aviv (Israel)) *Atherosclerosis 41*:321-326 (1982). Serum triglycerides, cholesterol, HDL-C and LDL-C levels as well as the LDL/HDL cholesterol ration were determined in 11 patients suffering from hyperthyroidism and 7 patients suffering from hypothyroidism, and compared with those of 19 sex- and age-matched controls. In hypothyroidism a net increase of all lipid values was observed. In hyperthyroidism cholesterol and LDL-C values were reduced while those of the triglycerides and HDL-C were unchanged as compared with controls. The LDL/HDL cholesterol ratio in either group of patients was lower than in controls, the lowest being observed in thyrotoxicosis.

"LOW DOSE" COLESTIPOL IN CHILDREN, ADOLESCENTS AND YOUNG ADULTS WITH FAMILIAL HYPERCHOLESTEROLEMIA. G. Schlierf, K. Mrozik, C.C. Heuck, G. Middelhoff, P. Oster, W. Riesen, and B. Schelienberg (Medizinische Universitatsklinik, Bergheimer Strasse 58, D-6900 Heidelberg, Germany) *Atherosclerosis 41*(1):133-138 (1982). The effect of colestipol on plasma lipids and lipoproteins was studied in children, adolescents and young adults with familial hypercholesterolemia. 0.215 g or 0.25 g/kg body weight were given in randomized sequence for periods of 4 weeks. Total cholesterol was lowered by 13 and 18% with the smaller and larger dose, respectively, and LDL cholesterol lowered by 15% with the smaller and 12% with the larger dose. HDL cholesterol rose by 18 and 32%. LDL composition before and during the study was abnormal due to a markedly reduced triglyceride content. "Low-dose" colestipol is less effective in lowering total plasma and LDL cholesterol than conventional doses but may, due to very few side effects, be advantageously used in cases of familial hypercholesterolemia when plasma cholesterol levels after dietary management are only 15-20% above normal.

PROPERTIES OF ACID AND NEUTRAL CHOLESTEROL ESTER HYDROLASES IN RAT AND PIGEON AORTAS. D.L. Severson and T. Fletcher (Division of Pharmacology and Therapeutics, Faculty of Medicine, The University of Calgary, Calgary, T2N 1N4, Canada) *Atherosclerosis 41*(1):1-14 (1982). The activity of cholesterol ester hydrolase was measured in subcellular fractions from rat and pigeon aortas using a glycerol-dispersed cholesterol oleate substrate preparation. The specific activity of acid cholesterol ester hydrolase (assayed at pH 5) in adventitia tissue fractions was 40-50 fold greater than in media–intima fractions from rat aorta. Soluble and particulate subcellular fractions from rat aorta (media–intima) were observed to have cholesterol ester hydrolase activity with both an acid (pH 4.5-5) and a neutral (pH 7.5) pH optimum. A comparison of the subcellular distribution of acid cholesterol ester hydrolase with the lysosomal marker enzyme, N-acetylglucosaminidase, suggests that the acid hydrolase activity originated in aortic lysosomes; the neutral cholesterol ester hydrolase was predominantly soluble. Acid and neutral cholesterol ester hydrolases could also be distinguished on the basis of the effects of $MgCl_2$ and NaCl on hydrolase activity and on rates of thermal denaturation. Both acid and neutral hydrolases from rat aorta (media–intima) were inhibited by chloroquine (half-maximal at 2-4 mM), and both hydrolases were characterized as having the same apparent affinity for the glycerol-dispersed cholesterol oleate substrate. Acid and neutral cholesterol ester hydrolases were also observed in preparations from pigeon aortas. The specific activity of both acid and neutral hydrolases was higher in atherosclerosis-susceptible White Carneau pigeon aortas in comparison to Show Racer pigeon aortas.

POSTPRANDIAL EFFECTS OF DIETARY PHOSPHATIDYLCHOLINE ON PLASMA LIPOPROTEINS IN MAN. P. Simonsson, M.D., A. Nilsson, M.D., and B. Akesson, M.D. (Dept. of Clin. Chem. and the Dept. of Med., Univ. Hospital, S-221 85 Lund, Sweden) *Am. J. Clin. Nutr. 35*(1):36-41 (1982). To evaluate the effects of dietary phospholipids on plasma lipoproteins in the postprandial phase six normolipidemic men were fed alternatively a test meal rich in phosphatidylcholine and a control meal low in phosphatidylcholine. Plasma very low-density lipoproteins, low-density lipoproteins, and high-density lipoproteins were isolated at 2, 4 and 6 hr after the meals. The changes in lipoprotein cholesterol, triacylglycerol, and phospholipid after feeding the phospholipid-rich meal were indistinguishable from those after the low-phospholipid meal. The phospholipid composition in high-density lipoproteins was also unchanged. The amount of phosphatidylcholine used in this trial was approximately 10-fold higher than that found in the normal Swedish diet. It is therefore concluded that the normal dietary intake of phosphatidylcholine has little influence on the plasma lipoprotein parameters measured in the present study.

INCREASED LIVER OLEIC ACID SYNTHESIS IN CHOLESTEROL-FED RABBITS. M.R. Sivaramakrishnan and T.I. Pynadath (Chemistry Department, Kent State University, Kent, OH 44242) *Atherosclerosis 41*(1):21-25 (1982). Several investigators have observed increased levels of esterified oleic acid in tissue cholesterol esters and phospholipids of atherosclerotic humans and cholesterol-fed animals. However, the cause of this is still unknown. Increased synthesis, increased esterification, or both of oleic acid can account for this. In the present investigation, hepatic synthesis of oleic acid is studied in cholesterol-fed rabbits. A nearly 3-fold increase in oleic acid synthesis was observed after 3 weeks of cholesterol feeding. This increase continued for at least 6 weeks. Since acyl acceptors like glycerol-3-phosphate are known to increase liver oleic acid synthesis, it is possible that the observed increase in oleic acid formation was partially due to an increased availability of acyl acceptors in the system.

THE FREE COENZYME A REQUIREMENT OF ANIMAL FATTY ACID SYNTHETASE. PARTICIPATION IN THE CONTINUOUS EXCHANGE OF ACETYL AND MALONYL MOIETIES BETWEEN COENZYME A THIOESTER AND ENZYME. A. Stern, B. Sedgwick, and S. Smith (Bruce Lyon Memorial Res. Lab., Children's Hospital Med. Center of Northern CA, Oakland, CA 94609) *J. Biol. Chem. 257*(2):799-803 (1982). A hypothesis that the existance of common binding sites for acetyl and malonyl moieties on the animal fatty acid synthesis necessitates that free CoA be available continuously to facilitate unloading of inappropriately bound acetyl or malonyl moieties, allowing initial access of an acyl moiety and subsequent access by malonyl moieties to the site of chain elongation, was formulated and tested. The unloading of acetyl or malonyl moieties from the enzyme was blocked by a CoA-scavenging system and the enzyme was unable to reload with the other substrate; the inhibition was relived by the addition of CoA or pantetheine. The freely reversible nature of the loading/unloading reaction was established as follows. CoA or pantetheine, but not *S*-acetyl-*N*-acetylcysteamine, could act as donor or acceptor for acetyl moieties in the loading or unloading reactions; incubation of fatty acid synthetase, acetyl-CoA, and [G-^{3}H] CoA resulted in the formation of acetyl-[G-^{3}H] CoA in an amount consistent with the predicted equilibrium; and addition of high concentration of CoA shifted the equilibrium; toward unloading, leaving most of the substrate-binding sites vacant. These results support our hypothesis and provide a plausible explanation both for the requirement of free CoA by the fatty acid synthetase and for the observed inhibition of fatty acid synthesis by high concentrations of CoA.

RAPID AND SUBSTANTIAL LOWERING OF HUMAN SERUM

CHOLESTEROL BY MEVINOLIN (MK-803), AN INHIBITOR OF HYDROXYMETHYLGLUTARYL-COENZYME A REDUCTASE. J.A. Tobert, G. Hitzenberger, W.R. Kukovetz, I.B. Holmes, and K.H. Jones (Dept. of Clinical Pharmacology, Merck Sharp and Dohme Research Laboratories, Rahway, NJ) *Atherosclerosis 41*(1):61-65 (1982). Mevinolin (MK-803) is a potent inhibitor of HMG-CoA reductase. After a placebo run-in period, mevinolin 5, 15 or 50 mg, or placebo was given twice daily for 7-11 days under double-blind conditions to 4 groups of 6 normocholesterolemic male volunteers. After 7 days, mean serum cholesterol fell 14%, 25% and 24% on 5, 15 and 50 mg, respectively, which was significantly greater than the fall on placebo (4%) in the case of the two higher doses ($p<0.01$). Serum triglycerides did not change significantly, Mevinolin was generally well-tolerated and there were no serious adverse effects.

SERUM HIGH DENSITY LIPOPROTEIN CHOLESTEROL LEVELS IN AFRICAN SCHOOLCHILDREN LIVING NEAR OR VERY FAR FROM SCHOOL. A.R.P. Walker, B.F. Walker, and Q.N. Mngomezulu (Medical Research Council Human Biochemistry Research Unit, South African Institute for Medical Research, Johannesburg, South Africa) *Atherosclerosis 41*(1):35-40 (1982). In African populations, coronary heart disease (CHD) is rare. Serum high density lioprotein (HDL) cholesterol levels, negatively associated with CHD, understandably are significantly higher in African children and adults, compared with their White counterparts. On inquiring into the role of physical activity, observations at 3 rural African schools showed that children of 10-12 years, who regularly walked long distances attending school (average about 10 km daily) had only slightly (although significantly) elevated mean HDL cholesterol levels, compared with groups who lived near by. It is considered that the diet of pupils (*inter alis*, having low fat and high fiber contents), associated with the high level of activity which prevails *generally*, share responsibility for their high HDL cholesterol levels.

INFLUENCE OF GENETIC HYPERLIPEMIA IN THE ZUCKER RAT UPON THE LIPEMIC RESPONSE TO GRADED ESTRADIOL EXPOSURE. J.N. Wilson, S.P. Wilson, and R.P. Eaton (University of New Mexico, School of Medicine, Dept. of Medicine, Albuquerque, NM 87131) *Atherosclerosis 41*(1):99-114 (1982). The present investigation was designed to examine the influence of genetic Type IV hyperlipoproteinemia on the metabolism of lipids in response to estrogen exposure. The influence of 17-β-estradiol was examined in a dose-response study over a range of hormone concentration from 10 to 100 pg/ml in genetic hyperlipidemic Zucker rats, In oophorectomized female rats, replacement levels of plasma estradiol of 40 pg/ml resulted in maximal hypertriglyceridemia of approximately 500 mg/dl representing a 5-fold exaggeration of that observed in control genetically normo-lipemic animals. This hypertriglyceridemia was associated with an increased production of triglyceride (TG) in excess of clearance, with a resulting production: clearance ratio of approximately 1.5. Exposure to maximum blood levels of estradiol, approximately 100 pg/ml, resulted in sub-normal levels of plasma TG (~145 mg/dl) in association with a reduced production: clearance ratio of approximately 0.36. In contrast to the marked hypocholesterolemic response to maximum estrogen exposure seen in normolipemic animals, the genetic Type IV hyperlipemic animal failed to demonstrate reduced plasma cholesterol concentration. This phenomenon was related to a rise in plasma LDL concentration in conjunction with parallel reduction in plasma HDL_2 levels. Thus, an abnormal ratio of excessive LDL:HDL emerged in response to estrogen exposure in this model of human Type IV lipemia. This observation suggests that the genetic predisposition of the host may be critical to both the quantitative as well as the qualitative response to estrogen.

COMPARATIVE ACTION OF LYSOPHOSPHOLIPASES ON ACYL-OXYESTER AND ACYL-THIOESTER SUBSTRATES IN MICELLAR AND MEMBRANE-BOUND FORM. A.J. Aarsman and H. Van Den Bosch (Biochem. Lab., Univ. of Utrecht, Padualaan 8, 3584 CH Utrecht, The Netherlands) *Chem. Phys. Lipids 29*(3):267-275 (1981). Phospholipid analogs in which the acyl-oxyester bond is replaced by an acyl-thioester bond represent convenient substrates for sensitive assays of lipolytic enzymes. It has previously been found that such thioester substrates are hydrolyzed at higher rates than their oxyester counterparts. For bovine liver lysophospholipase II the preferential hydrolysis of thioesters appeared to be due to the thioester linkage per se rather than to the formation of preferred interfaces. The preferential hydrolysis of thioesters persisted when thioester and oxyester substrates were presented to the enzyme either as mixed micelles or incorporated in the bilayer of phospholipid vesicles. The transbilayer distribution of thioester substrates in sonicated phospholipid vesicles is identical with no apparent indications for transbilayer movement of both substrates.

MECHANISM OF LONG CHAIN FATTY ACID PERMEATION IN THE ISOLATED ADIPOCYTE. N.A. Abumrad, R.C. Perkins, J.H. Park and C.R. Park (Dept. of Physiology, Vanderbilt University School of Medicine, Nashville, TN 37232) *J. Biol. Chem. 256*(17): 9183-9191 (1981). The mechanism of permeation of [^{14}C] oleate into isolated rat adipocytes has been examined. The initial rates of uptake of the fatty acid were determined at 23 C as a function of the concentration of unbound fatty acid in the medium. Under the conditions employed, the following observations were made. 1) The rates were maximal and linear for at least 15 s and were the same in the presence or absence of glucose. 2) In the absence of glucose, all fatty acid taken up was recovered in the cell as unesterified in the presence of the sugar. Thus uptake appeared to be independent of fatty acid metabolism. 3) Influx of fatty acid was strongly inhibited by phloretin, particularly at low concentrations of unbound fatty acid. Efflux was also blocked. (Phloretin in an albumin-free medium at 0 C was a very effective stop solution for abruptly terminating fatty acid fluxes and for washing cells without loss of unesterified fatty acid.) 4) The fatty acid taken up was not bound to the cell surface but probably was largely bound within the cell. 5) Uptake was not limited by dissocation of fatty acid from albumin in the medium nor by an interaction between albumin and the cell surface. From these considerations, we concluded that the uptake measurements were valid estimates of the influx of fatty acid. Partial saturation was observed as a function of external concentration of unbound fatty acid with a $k_{0.5}$ of 6×10^{-8} M. It appears that permeation by long chain fatty acids is facilitated by a saturable, phlortetin-inhibitable mechanism that is presumably protein in nature.

AGE-RELATED CHANGES IN BIOLOGICAL PARAMETERS IN ZUCKER RATS. A. Bach, H. Schirardin, M. Bauer, A. Schaeffer, and A. Weryha (Laboratoire de Pathologie Generale, Service de Medecine Interne A, Clinique Medicale A. Hospital Civil, 67091 Strasbourg, Cedex, France) *Lipids 16*(11):841-848 (1981). Changes in a number of morphological and biochemical parameters were observed in genetically obese Zucker rats and in lean controls between 3 and 58 weeks of age. By 3 weeks, the genetically obese rats had higher proportional (wt/100 g body wt) and absolute amounts of adipose tissue, hyperlipemia affecting all the lipid fractions, and hyperproteinemia compared to lean controls. Obesity, hepatomegaly, high concentrations of hepatic lipids and hyperinsulinemia did not appear until the fifth week. In obese animals, liver lipid concentration reached a maximum at 17 weeks of age and then declined. During this time, the triacylglycerol concentrations in the serum remained stable, whereas the cholesterol and phospholipid concentrations continued to increase. The glycogen concentration in obese animals increased, both absolutely and compared to lean controls, between the 12th and 43rd week of age. From weaning, the Zucker rats, compared to lean controls, exhibited characteristics of obesity (accumulation of adipose tissue, hyperlipemia and hyperproteinemia), which persisted to the age of 58 weeks.

ENDOGENOUS LIPOLYTIC ACTIVITIES DURING AUTOLYSIS OF HIGHLY ENRICHED HEPATIC LYSOSOMES. J. Beckman, K. Owens, W. Weglicki (Dept. of Biophysics, Med. Coll. of VA Commonwealth Univ. Richmond, VA 23298) *Lipids 16*(11):796-799 (1981). Highly enriched (50- to 70-fold) fractions of "native" lysosomes were isolated using continuous flow electrophoresis from livers of rats which had not been pretreated with Triton WR-1339. Incubation of lysosomes for 30 min. at pH 5.0 in the presence of 5 mM EDTA resulted in a dramatic loss in the content of fatty acids bound to triacylglycerols (137 down to 10 μmol/mg protein) and to phospholipids and an elevation in the level of unesterified fatty acid. Phosphatidylcholine, phosphatidylethanolamine and sphingomyelin concentrations decreased whereas those of lysophosphatidylethanolamine (0.9 up to 8.5% of total lipid-P) and lysophosphatidylcholine (1.9 up to 16.7%) rose in a manner parallel to their respective, fully acetylated lipids. Other phospholipids, including phosphatidylinositol, did not change in concentration during incubation. These results indicate that lysosomal phospholipase A, sphingomyelin and triacylglycerol lipase are activated by incubation at acid pH, enabling them to hydrolyze endogenous lysosomal lipids. However, lysosomal phosphatidylinositol-directed phospholipase C is apparently unable to interact with phosphatidylinositol of the lysosomal membrane.

MONOCLONAL ANTIBODIES TO THE LOW DENSITY LIPOPROTEIN RECEPTOR AS PROBES FOR STUDY OF RECEPTOR-MEDIATED ENDOCYTOSIS AND THE GENETICS OF FAMILIAL HYPERCHOLESTEROLEMIA. U. Beisiegel, W.J. Schneider, J.L. Goldstein, R.G.W. Anderson and M.S. Brown (Depts. of Molecular Genetics, Internal Medicine, and Cell Biology, University of Texas Health Science Center at Dallas, Dallas, TX 75235) *J. Biol. Chem. 256*(22):11923-11931 (1981). Monocloncal antibodies directed against low density lipoprotein (LDL) receptor have been prepared by immunization of mice with a partially purified receptor

from bovine adrenal cortex. Spleen cells from the mice were fused with the Sp2/0-Ag14 line of mouse myeloma cells. The most extensively studied monoclonal antibody, designated immunoglobulin-C7, reacts with the human and bovine LDL receptor, but not with receptors from the mouse, rat, Chinese hamster, rabbit, or dog. In normal fibroblasts, the receptor-bound monoclonal antibody was taken up and degraded at 37 C at a rapid rate similar to that for LDL. Fibroblasts from a patient with the internalization defective form of familial hypercholesterolemia bound the monoclonal antibody, but did not internalize or degrade it. The current data demonstrate the usefulness of monoclonal antibodies as probes for the study of the cellular and genetic factors involved in receptor-mediated endocytosis.

INHIBITION OF LCAT IN PLASMA FROM MAN AND EXPERIMENTAL ANIMALS BY CHLORPROMAZINE. F.P. Bell and E.V. Hubert (Diabetes and Atherosclerosis Res., The Upjohn Co., Kalamazoo, MI 49001) *Lipids 16*(11):815-819 (1981). Chlorpromazine (CPZ), a major tranquilizer, was found to be a potent inhibitor of lecithin cholesterol acyltransferase (LCAT, EC 2.3.1.43) in the plasma of normal man, rat, rabbit and dog in vitro. The inhibitory effect of CPZ reached 35-50% at 0.5 mM depending on species; dog plasma LCAT appeared to be somewhat more sensitive than that of the other species. In rats fed CPZ or lidocaine for 14 days (0.05% in the diet), there was not statistically significant change in total plasma cholesterol levels or the size of the plasma-free (unesterified) cholesterol pool. However, 5 hr after an intracardial injection of [^{14}C] cholesterol, the percentage of plasma [^{14}C] cholesterol that was esterified was significantly lower (ca. 6%, $p<0.05$) in the CPZ-treated group, suggesting that CPZ may also inhibit LCAT to some extent in vivo. The percentage of plasma [^{14}C] cholesterol esterified in the lidocaine-treated group was similar to control values and did not reflect its ability to inhibit LCAT in vitro.

METABOLISM OF LEUKOTRIENE D BY PORCINE KIDNEY. K. Bernström and S. Hammarstrom (Dept. of Chemistry, Karolinska Institutet, S-10401 Stockholm, Sweden) *J. Biol. Chem. 256*(18): 9579-9582 (1981). An enzyme from porcine kidney converted leukotriene D_4 into a less polar metabolite. The structure of this compound was 5-hydroxy-6-S-cysteinyl-7,9-*trans*-11,14-*cis*-eicosatetraenoic acid (leukotriene E_4). Analogous products, *viz.* 5-hydroxy-6-S-cysteinyl-7,9,11-eicosatrienoic acid (leukotriene E_3), 5-hydroxy-6-S-cysteinyl-7,9,11-*trans*-14-*cis*-eicosatetraenoic acid (11-*trans*-leukotriene E_4), and 5-hydroxy-6-S-cysteinyl-7,9,11,14,17-eicosapentaenoic acid (leukotriene E_5) were formed from leukotrienes D_3, 11-*trans*-D_4, and D_5, respectively. Leukotriene E_4 induced slow reacting substance-like contractions of guinea pig ileum but less potent (8-12 times) than leukotriene C_4. The biological potency of 11-*trans*-leukotriene E_4 was similar to that of leukotriene E_4.

EFFECTS OF INSULIN ON LIPOLYSIS AND LIPOGENESIS IN HAMSTER WHITE ADIPOCYTES WITH HIGH SENSITIVITY TO HORMONES. P. Bjorgell, N.O. Nilsson, and P. Belfrage (Dept. of Physio. Chem., Univ. of Lund, P.O. Box 750, 22207 Lund, Sweden) *Biochim. Biophys. Acta 666*(2):246-251 (1981). A modified procedure for preparation of hamster adipocytes by collagenase digestion under carefully controlled conditions has been developed. The adipocytes were 4- to 8-fold more sensitive to catecholamine stimulation of lipolysis than cells prepared by a commonly used method (Hittelman, K.J., Wu, C.F., and Butcher, R.W. (1979) *Biochim. Biophys. Acta 304*, 188-196) and also more sensitive to the antilipolytic action of insulin. The effects of insulin on lipogenesis, measured as [^{3}H] glucose conversion to cell lipids, and on catecholamine-stimulated lipolysis were compared under identical conditions with the same cell batch. Isoprenaline-stimulated lipolysis was found to be half-maximally inhibited by an insulin concentration 8-fold lower than that stimulating lipogenesis to a corresponding extent (half maximal effects at insulin concentrations of 40 vs. 300 pM). A similar difference was found when cells had been stimulated with adrenaline instead of isoprenaline.

ROLE OF LIPOPROTEIN LIPASE IN THE UPTAKE OF CHOLESTERYL ESTER BY RAT LACTATING MAMMARY GLAND IN VIVO. T. Chajek-Shaul, G. Friedman, G. Halperin, O. Stein and Y. Stein (Lipid Research Laboratory, Dept. of Medicine B, Hadassah Univ. Hospital, Jerusalem, Israel) *Biochim. Biophys. Acta 666*(2): 216-222 (1981). Rat mesenteric duct chylomicrons and plasma very low density lipoproteins were labeled by biotransfer with [^{3}H] cholesterol linoleyl ether and [^{14}C] cholesteryl linoleate. Following intravenous injection into rats, 50% of labeled chylomicrons were cleared from the circulation in 5 min and the ratio of both labels in the plasma and liver was similar to the injected material. The chylomicrons labeled with radioactive cholesteryl linoleyl ether were injected into rats on the 4th day postpartum and about 3% of the injected label were recovered in the lactating mammary gland. When the labeled chylomicrons were injected into postpartum rats that had been separated from their litters for 24 hr the uptake of labeled cholesteryl linoleyl ether by the mammary glands was very low and did not exceed 0.2% of injected dose and was not different from the uptake by virgin mammary glands. Small mesenteric duct chylomicrons and plasma VLDL served as cholesteryl linoleyl ether donors, in analogy to large chylomicrons. The uptake of cholesteryl linoleyl ether by lactating mammary glands was related to the activity of lipoprotein lipase of the mammary tissue, which was high in suckled and low in unsuckled rats. However, this correlation became apparent only above a certain threshold of lipoprotein lipase activity which in the present experiments was about 200 nmol fatty acid released/mg acetone per hr. The present findings indicate that high local activity of lipoprotein lipase promotes cellular uptake of lipoprotein cholesteryl ester, as studied presently with the help of cholesteryl linoleyl ether, a nondegradable analog of cholesteryl linoleate.

THE EFFECTS OF CERULENIN ON LIPID METABOLISM IN VITRO IN CELLULAR PREPARATIONS FROM THE RAT. W.W. Christie, M.L. Hunter, and R.A. Clegg (The Hannah Res. Inst., Ayr KA6, 5HL, U.K.) *Biochim. Biophys. Acta 666*(2):284-290 (1981). The effects of the fatty acid-like antibiotic, cerulenin, on fatty acid biosynthesis in preparations of rat adipocytes and mammary cells in vitro have been investigated. Synthesis of palmitic acid was most strongly inhibited, although the magnitude of the effect was dependent on the nature of the tissue, and was especially diminished in the larger adipocytes from older rats. Cerulenin had no effect on the chain elongation of preformed fatty acids in any of the tissues studied. Some inhibition of the esterification of preformed palmitic acid was also observed, but this appeared to be due to disruption of the cells rather than direct inhibition of the acyltransferases. It is concluded that cerulenin is a valuable experimental tool in studies of lipogenesis in preparations of intact mammalian cells in vitro.

THE INFLUENCE OF *TRANS*-ACIDS ON DESATURATION AND ELONGATION OF FATTY ACIDS IN DEVELOPING BRAIN. H.W. Cook (Department of Pediatrics and Atlantic Research Centre for Mental Retardation, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4H7) *Lipids 16*(12):920-926 (1981). *trans*-Monounsaturated acids account for up to 3% of the total octadecenoic acyl chains of human brain lipids. To investigate the influence of *trans*-acids on desaturation and chain elongation of fatty acids, in vitro and in vivo experiments with rat brain were performed. In the in vitro assays of Δ9 desaturation, Δ6 desaturation and chain elongation, *trans,trans*-dienoic acid was inhibitory, particularly to chain elongation. Slight differences between the inhibitory effects of *trans*-monoenoic acids and their *cis*-isomers were observed. In an in vivo model, unlabeled fatty acid (stearate, oleate, elaidate, linoleate, linoelaidate, arachidonate, or *trans*-monoene from margarine) was injected simultaneously with [1-^{14}C] linoleic acid into the brains of suckling rats. Linoelaidate and oleate inhibited desaturation and elongation of linoleate, whereas elaidate, stearate and *trans*-monoene from margarine were stimulatory. While the demonstration of differences between *cis* and *trans* monoenic isomers required relatively high levels of the test acids, it appears that *trans*-acids can influence desaturation and elongation enzymes that lead to acyl chain modification in the central nervous system.

INFLUENCE OF LIPID PEROXIDATION ON LIPOPROTEIN SECRETION BY ISOLATED HEPATOCYTES. M.U. Dianzani, G. Poli, E. Gravela, E. Chiarpotto and E. Albano (Istituto di Patologia Generale dell Universita, Corso Raffaello 30, 10125 Torino, Italy) *Lipids 16*(11):823-829 (1981). Isolated rat liver cells have been exposed to 3 different lipid peroxidation-inducing agents, CCl_4, $FeCl_3$, and cumene hydroperoxide, and the rates of malonaldehyde production and of lipoprotein secretion have been compared. Results indicate that it is possible to induce a high degree of lipid peroxidation without inducing strong changes in lipoprotein secretion. Only in CCl_4-poisoned hepatocytes is lipoprotein secretion strongly impaired. In this experimental condition, the effect of free radical scavengers, or inhibitors of lipid peroxidation, has been studied; the degree of covalent binding of CCl_4 metabolites to hepatocyte proteins, as well as the behavior of both lipid peroxidation and lipoprotein secretion, have been evaluated. Promethazine and propyl gallate prevented malonaldehyde production, but neither agent reduced covalent binding nor improved secretion. Menadione, on the contrary, besides inhibiting malonaldehyde production, decreased covalent binding and protected against the impairment of secretion. These data lead to the conclusion that covalent binding of CCl_4 metabolites, rather than lipid peroxidation products, accounts for the derangement of lipoprotein secretion in CCl_4-poisoned liver cells.

BIOSYNTHESIS OF (Z,Z)-6,9-HEPTACOSADIENE IN THE

AMERICAN COCKROACH. L. Dwyer, M. Renobales, G. Blomquist (Dept. of Biochem., Univ. of Nevada, Reno, NV 89557) *Lipids 16* (11):810-814 (1981). The biosynthesis of (Z,Z)-6,9-heptacosadiene, the major cuticular hydrocarbon component of the American cockroach, was examined by radiotracer and ^{13}C-nuclear magnetic resonance (NMR) techniques. Sodium [1-^{14}C] acetate was incorporated about equally into the saturated and diunsaturated hydrocarbons, whereas [1-^{14}C] linoleate preferentially labeled the C_{27} *alkadiene and [9,10-^{3}H] oleate labeled the* C_{27} *alkadiene* almost exclusively. ^{13}C-NMR demonstrated that [2-^{13}C] acetate labeled carbons 25 and 27 but not carbon 3 of the C_{27} alkadiene. In addition, ozonolysis of the diene labeled from [1-^{14}C] acetate followed by radio-gas liquid chromatography showed that carbons 1-6 were not labeled, whereas the fragment containing carbons 10-27 was labeled. The data presented in this paper indicate that linoleate from the diet or synthesized de novo is elongated by the addition of acetate units and is then decarboxylated.

IDENTIFICATION AND QUANTIFICATION OF PROSTAGLANDIN E_3 IN RENAL MEDULLARY TISSUE OF THREE STRAINS OF RATS FED FISH OIL. A. Ferretti, N. Wchoene, V. Flanagan (Agricultural Research Service, Beltsville Human Nutrition Research Center, Lipid Nutrition Laboratory, Beltsville, MD 20705) *Lipids 16*(11):800-804 (1981). Three strains of rats were fed a fish oil diet to verify their ability to incorporate and convert dietary eicosapentaenoic acid (20:5ω3) into trienoic prostaglandins. Our results show that such E_3 (PGE_3) was established by gas chromatographic-mass spectrometric (GC-MS) analysis. The compound was conclusively identified by comparison of fragment ions and their relative intensities with those obtained from authentic PGE_3. Further evidence was provided by studying the recovery of exogenously added PGE_3. The crude ethyl acetate extracts of the medullary homogenates were methylated and cleaned up by liquid-gel chromatography with Lipidex-5000 prior to conversion to $^{2}H_4$ PGE_2 as internal standard. The levels of PGE_3 were similar, about 3 ng/mg of wet tissue, in the 3 strains of rats. Identical in vivo conversion of the 20:5ω3 fatty acid to PGE_3 could not be positively established by analysis of pooled urine specimens.

THE EFFECT OF HYDROCORTISONE ON CHOLESTEROL METABOLISM OF CULTURED HUMAN SKIN FIBROBLASTS. K. Henze, B.J. Kudchodkar, A. Chait, J.J. Albers and E.L. Bierman (Division of Metabolism and Endocrinology, and the Northwest Lipid Research Clinic, Department of Medicine, University of Washington School of Medicine, Seattle, WA 98195) *Biochim. Biophys. Acta 666*(2):199-204 (1981). Hydrocortisone in physiologic concentrations resulted in a reduction in sterol synthesis by cultured normal human skin fibroblasts. These changes were observed when [^{14}C]acetate, [^{14}C] octanoic acid and $^{3}H_2O$ were used as precursors. However, the incorporation of [^{3}H] mevalonic acid lactone into digitonin-precipitable sterols was not affected by hydrocortisone, suggesting that hydrocortisone inhibits sterol synthesis at a site prior to the formation of mevalonic acid. In contrast, the activity of hydroxymethylglutaryl-CoA reductase was stimulated several-fold by the hormone. Thus, the inhibitory effect of hydrocortisone on the cholesterol synthetic pathway may be on hydroxymethylglutaryl-CoA synthase.

COMPARISON OF PHOSPHOLIPID PROFILES OF PRIMARY ADENOCARCINOMA IN THE LUNG AND OTHER ORGANS. K. Itoh and M. Nakamura (Third Dept. of Internal Med., Dept. of Biochem., Sapporo Med. Coll., Sapporo 060, Japan) *Lipids 16*(12): 876-880 (1981). Phospholipid profiles, particularly molecular structure of phosphatidylcholine, of human primary lung adenocarcinoma were compared with those of the histologically same type of carcinoma from other organs in order to search for a possibility that differentiates between primary and metastatic tumor in the lung. The saturated class, mainly containing palmitic acid at both positions, accounted for 20.8% of phosphatidylcholine in lung adenocarcinoma, whereas it accounted for only 6-10.7% in the adenocarcinoma of other organs. Adenocarcinoma of organs other than the lung had specific characteristics of unsaturated molecular classes of phosphatidylcholine for each organ. Stomach tumor had high contents of dienes and tetraenes with particularly high proportion of arachidonic acid at the 2-position. Breast tumor had a high content of monoenes, containing palmitoleic acid at the 2-position. Adenocarcinomas of rectum, colon and thyroid contained more dienes compared to lung adenocarcinoma.

GLYCEROLIPID BIOSYNTHESIS IN RAT ADIPOSE TISSUE: VII. EFFECT OF OBESITY AND CELL SIZE ON [^{14}C] ACETATE INCORPORATION INTO LIPIDS. S.C. Jamdar and L.J. Osborne (Med. Res. Inst., Florida Inst. of Tech., 3325 W. New Haven Ave., Melbourne, FL 32901) *Lipids 16*(11):830-834 (1981). [^{14}C] Acetate incorporation into different lipid fractions was measured as a function of adipocyte size by using the larger and smaller adipocytes derived from Sprague-Dawley rats. In both the larger and smaller adipocytes, [^{14}C] acetate was incorporated into phospholipid, diacylglycerol, free fatty acid and triacylglycerol fractions. Although the rates of lipid formation were significantly higher in the larger adipocytes compared to the smaller ones, the proportions of the various lipids formed from [^{14}C] acetate did not change significantly as a function of cell size. In some experiments, isolated adipocytes derived from obese Zucker rats were fractionated further to isolate an adipocyte preparation which was similar in size to those obtained from lean animals. The matching adipocytes derived from lean and obese animals did not differ significantly with respect to lipid formation from [^{14}C] acetate. These studies suggest that the larger adipocytes are more active in lipogenesis from [^{14}C] acetate than the smaller ones and that the increased capacity of lipogenesis in obese adipose tissue noted previously (Biochem. J., 170, 153-160, 1978) is not an intrinsic property of all the obese adipocytes, but is limited mainly to the larger adipocytes.

SERUM 26-HYDROXYCHOLESTEROL. N.B. Javitt, E. Kok, S. Burstein, B. Cohen, and J. Kutscher (Div. of Hepatic Diseases, The New York Hosp.-Cornell Med. Ctr., New York, NY 10021) *J. Biol. Chem. 256*(24):12644-12654 (1981). Using isotope dilution mass spectrometry, 26-hydroxycholesterol was identified in the serum of normal adults. Total values ranged from 9.2 to 25.6 μg/100 ml of which 31-35% was free sterol. Density gradient ultracentrifugation indicates that the steroid is distributed among the low and high density lipoproteins.

IN VIVO EFFECT OF CHOLESTEROL FEEDING ON THE SHORT TERM REGULATION OF HEPATIC HYDROXYMETHYLGLUTARYL COENZYME A REDUCTASE DURING THE DIURNAL CYCLE. H-S. Jenke, M. Löwel, and J. Berndt (Gesellschaft für Strahlen- und Umweltforschung, München, Institut für Toxikologie and Biochemie, Abteilung Zellchemie, 8042 Neuherberg, West Germany) *J. Biol. Chem. 256*(18):9622-9625 (1981). Light-dark-cycled rats were fed a 3% cholesterol-supplemented diet at the beginning of the dark phase. Cholesterol-fed and control animals were taken at intervals throughout the following 12 hr and the microsomal and solubilized hepatic 3-hydroxy-3-methylglutaryl coenzyme A reductase was isolated. Immunotitrations of this microsomal and solubilized enzyme were performed with a monospecific antibody to 3-hydroxy-3-methylglutaryl coenzyme A reductase. In contrast to the specific activity of the enzyme, which differs extremely during the diurnal cycle, the immunotitrations obtained from cholesterol-fed and control animals, yielded in identical antisera equivalence points. On the other hand, when the enzyme was phosphorylated *in vitro*, the antisera equivalence points corresponded to the alterations of the specific activity. Our data prove that even the *in vivo* short term changes in enzyme activity are due to changes in the quantity of enzyme rather than to a modulation of the catalytic activity.

THE LIPIDS OF GROSSLY NORMAL HUMAN AORTIC INTIMA FROM BIRTH TO OLD AGE. S.S. Katz (McGill University Clinic, Royal Victoria Hospital, Montreal, Quebec H3A 1A1, Canada) *J. Biol. Chem. 256*(23):12275-12280 (1981). Lipid content, composition, and lipid physical states of 86 grossly normal human aortic intimas were studied to determine changes occurring from birth to the eighth decade. Newborn intimas were 71.5% phospholipid, 23.8% cholesterol, 2.4% cholesterol ester, and 2.4% triglyceride. Lipid compositions of the first four decades fell on a straight line in the phase diagram joining the compositions of newborn intimas and low density lipoproteins (LDL). This suggested a continued accumulation of LDL-derived lipids to age 40. LDL-derived lipids could account for 16.8% of total intimal lipids in the first decade, and 35.3%, 53.9%, and 72.0% of total lipids in the second, third, and fourth decades, respectively. Cholesterol ester fatty acid composition of intimas also approached the fatty acid composition of LDL in the second and third decades and was almost the same as LDL after age 30. After the fourth decade, cholesterol saturation increased markedly but intimal compositions never entered the three phase region of the phase diagram, and cholesterol monohydrate crystals were never seen in lesion-free intima. Lipid content relative to DNA (milligrams per mg) increased from 2.13 at birth to 22.35 by the eighth decade. Thus, lipid accumulation in normal intima up to age 40 is characterized by increasing LDL lipids, either as LDL particles, cholesterol ester-rich droplets, or even connective tissue-bound lipids. After age 40, another process supervenes resulting in an increasing saturation of intimal lipids with free cholesterol.

LETHAL EFFECT OF *CIS*- BUT NOT *TRANS*-22-DEHYDROCHOLESTEROL ON MOUSE FIBROBLAST CELLS. H.W. Kircher, F.U. Rosenstein, and A.A. Kandutsch (Department of Nutrition and Food Science, College of Agriculture, The University of Arizona, Tucson, AZ 85721) *Lipids 16*(12):943-945 (1981). *cis*- and *trans*-

22-dehydrocholesterol were incorporated into the culture medium for mouse fibroblast cells. Although neither isomer had an effect on sterol biosynthesis, the *cis* isomer inhibited cell growth and viability and increased Rb^+ efflux from the cells. The *trans* isomer had no effect on growth and could replace exogenous cholesterol for growth of cells for which sterol biosynthesis was blocked by 25-hydroxycholesterol.

CONTRACTION OF THE CANINE BASILAR ARTERY FOLLOWING LINOLEIC, ARACHIDONIC, 13-HYDROPEROXYLINOLEIC, OR 15-HYDROPEROXYARACHIDONIC ACID. T. Koide, Y. Noda, S. Hata, K. Sugioka, S. Kobayashi, and M. Nakano (Res. Labs, Chugai Pharm. Co., Ltd., Takada, Toshima-ku, Tokyo, and College of Med. Care and Tech., Gunma Univ., Maebashi, Gunma, Japan) *Proc. Soc. Exp. Biol. and Med. 168*(3):399-402 (1981). The contractile activity of linoleic acid (LA), arachidonic acid (AA), 13L-hydroperoxy-*cis*-11-*trans*-13-eicosatetraenoic acid (15HPAA) was tested on canine basilar artery segments in a small chamber, using serotonin as the reference vasoconstrictor. The cumulative dose-response contraction was approximately 400 times that of serotonin. On the other hand, either 15HPAA or 13HPLA at 10^{-6} M induced a contraction almost equal to the maximum attained with serotonin (1×10^{-6} M) contraction. The maximal artery response to each of the hydroperoxy fatty acids was almost 1.4 times stronger than that obtained with serotonin, LA, or AA.

NEUTRON SMALL ANGLE SCATTERING ON SELECTIVELY DEUTERATED HUMAN PLASMA LOW DENSITY LIPOPROTEINS. THE LOCATION OF POLAR PHOSPHOLIPID HEADGROUPS. P. Laggner, G.M. Kostner, U. Rakusch and D. Worcester (Institut fuer Roentgenfeinstrukturforschung der Oesterreichischen Akademie der Wissenschaften und des Forschungzentrums Graz, Steyrergasse 17, A-8010 Graz, Austria) *J. Biol. Chem. 256*(22): 11832-11839 (1981). Human plasma low density lipoproteins (LDL) were deuterated in the phospholipid headgroup region by exchange with phosphatidylcholine-$N(CD_3)_3$-apolipoprotein A complexes. The exchange was associated with a net transfer of phosphatidylcholine to LDL leading to an increase in total phospholipid content by 27%. Practically all of the endogenous phosphatidylcholine including lysophosphatidylcholine, and about one-third of the sphingomyelin pool was found to be exchangeable. Both native and deuterated LDL were investigated by neutron small angle scattering at several representative contrasts in H_2O/D_2O buffers. Subtraction of the scattering amplitudes of native from deuterated LDL resulted in a radius of gyration of 103 ± 5 Å for the $N(CD_3)_3$ groups, and in a structure factor resembling that of a thin, spherical shell. Evaluation of the contrast variation experiments in combination with previous data from x-ray small angle scattering indicates that the phospholipids form a spherical monolayer shell in the radial range between 75 Å and 103 Å around the core of cholesteryl esters and triglycerides. For the protein moiety, a radius of gyration of 110 Å was calculated, indicating that it is located, on average, 5 to 10 Å from the polar phospholipid headgroups toward the aqueous environment.

IDENTIFICATION OF ARACHIDONIC ACID IN GULF OF MEXICO SHRIMP AND DEGREE OF BIOSYNTHESIS IN *PENAEUS SETIFERUS* M. Lilly and N. Bottino (Dept. of Biochem. and Biophysics, TX A&M Univ., College Station, TX 77843) *Lipids 16*(12): 871-875 (1981). An icosatetraenoic fatty acid, thought to be all cis-5,8,11,14-icosatetraenoic acid (arachidonic acid) was isolated from shrimp total lipid. The acid was subjected to partial reduction with hydrazine hydrate, with subsequent isolation of monoenoic reaction products which were shown to be cis and dicarboxylic acids were converted to methyl esters. Identification of the resulting mono- and dicarboxylic acids indicated that the original icosatetraenoic acid had the all cis-5,8,11,15 pattern of double bonds, and it was thus identified as arachidonic acid. Experiments were also performed to study the synthesis of arachidonic acid 20:4(5,8,11,14) from linoleic acid, 18:2(9,12)–18:3(6,9,12)–20:4(5,8,11,14) was assayed separately, and the level of activity of each enzyme was expressed as percentage conversion of substrate to product. It was found that, in each step of the sequence, the enzyme activity in the shrimp tissue was very low compared to the activity found in rats. These and previous observation seem to indicate that the arachidonic acid in shrimp tissue originates mostly in the diet.

ASYMMETRIC METABOLISM OF PHOSPHATIDYLETHANOLAMINE IN THE HUMAN RED CELL MEMBRANE. G.V. Marinetti and K. Cattieu (Dept. of Bio. Chem., Univ. of Rochester Med. Ctr., Rochester, NY 14642) *J. Biol. Chem. 257*(1):245-248 (1982). The incorporation of labeled fatty acids into phosphatidylethanolamine (PE) on the two sides of the human red cell membrane was studied by use of the vectorial probe trinitrobenzene sulfonate (TNBS). A small population of PE molecules on the outer surface of the membrane has a 4-fold higher turnover rate than the remaining PE molecules. This effect is greatest with palmitic acid, less with linoleic and linolenic acids, and not seen with stearic acid. By use of the hydrophobic penetrating probe fluorodinitrobenzene (FDNB), we find a second larger population of PE and phosphatidylserine (PS) molecules which reacts with FDNB and has a higher specific activity than the PE and PS molecules which do not react. With human polymorphonuclear cells, the labeled PE molecules inside the cell have a higher specific activity than the PE molecules located on the outer cell surface. These results suggest that there are heterogeneous populations of PE and PS on both halves of the red cell membrane which show different metabolic turnover rates of their fatty acids.

STRUCTURE OF THE CHICKEN APO VERY LOW DENSITY LIPOPROTEIN II GENE. Frits C.P.W. Meijlink, A.D. van het Schip, A.C. Arnberg, B. Wieringa, Geert AB, and M. Gruber (Dept. of Bio. Chem., Univ. of Groningen, Nijenborgh 16, 9747 AG Groningen, The Netherlands) *J. Biol. Chem. 256*(18):9668-9671 (1981). We describe two cloned genomic DNA fragments, both bearing the entire apo very low density lipoprotein II gene. Electron microscopy and restriction enzyme mapping showed that this gene is split into at least four coding sequences by three or more intervening sequences. A very short exon at the 5'-end of the gene is separated by a 1.5-kilobase intron from the second exon, which codes for the AUG initiation codon of the mRNA.