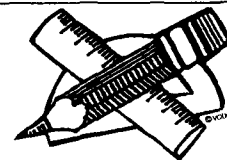


Abstracts



EDITOR: S. KORITALA • ABSTRACTORS: J.C. Harris, M.G. Kokatnur, F.A. Kummerow, G. List, B. Matijasevic, K.D. Mukherjee, D.B.S. Min, R.A. Reiners, and P.Y. Vigneron

• Drying Oils and Paints

OPTICAL BRIGHTENERS—THEIR EFFECT ON THE YELLOW APPEARANCE OF LINSEED OIL PAINT. H. Rakoff and L. E. Gast, *J. Coatings Technol.* **50**(642), 84-5 (1978). Three optical brighteners were incorporated into separate samples of commercial linseed oil paint and, after storage in the dark, panels coated with these paints were evaluated spectrophotometrically and visually. The samples containing the optical brighteners achieved a smaller yellowness index than did the paint without optical brightener; in addition, each of these samples appeared less yellow to the human eye than did a paint with the same yellowness index but not containing an optical brightener.

POLYESTERS BASED ON BORIC ACID. C.R. Desai and S.P. Potnis, *Paintindia* **28**(4), 21-9 (1978). Available information on the chemistry of polyesters based on boric acid and polyhydric alcohols like glycols, trimethylol propane, glycerol pentaerythritol has been summarized. The applications of these boric acid based polyesters in different fields have been highlighted with specific reference to the special characteristics they impart to the ultimate compositions.

EPOXY-ESTER MODIFIED BITUMINOUS COATING COMPOSITIONS. A.M. Naser and M.A. Moustafa, *Paintindia* **28**(3), 20-3 (1978). The upgrading and utilization of local bituminous materials were carried out for the purpose of producing protective and durable coating compositions. Blending mixed epoxy esters of abietic acid and linseed or dehydrated castor oil fatty acids with the base material, in amounts of 10 to 20% by weight, produces bituminous coating compositions of improved film performances.

• Fats and Oils

INDIVIDUAL LIPIDS AND PROXIMATE ANALYSIS OF VARIOUS FOODS. 4. COMMERCIAL CAKE MIXES. T.S. Rudolf, *et al.*, *J. Agr. Food Chem.* **26**, 842-7 (1978). Commercially prepared cake mixes were purchased from several supermarkets. Samples were analyzed for water, protein, total fat, ash, fatty acids, sterols, and *cis,cis*-methylene interrupted polyunsaturated triglycerides. The data indicate that in the process of making cake mixes the manufacturer used either vegetable oil alone or a mixture of animal and vegetable fat. Animal fat alone was not used in the mixes tested. The amount of total fat ranged from 8.2 to 15.3 g/100 g of product and the cholesterol from 0 to 22 mg/100 g of product.

CHANGING LIPID CLASS PATTERNS DURING MATURATION OF SWEET ORANGES. S. Nagy, H.E. Nordby, and J.M. Smoot, *J. Agric. Food Chem.* **26**, 838-42 (1978). Hamlin, Pineapple, and Valencia sweet oranges were harvested monthly from trees between July 1971 and May 1972. Vesicular lipids were extracted from each cultivar and separated into neutral lipids (NL), resin acids and glycolipids (RAGL), and phospholipids and other polar lipids (PPL) by silica gel chromatography. The NL and RAGL fractions from each cultivar showed varying trends in their percentage distributions during the ripening period. While ripening occurred fastest in Hamlin (early maturing fruit), the rate of senescence (as measured by phospholipid loss) also occurred at the fastest rate in this cultivar.

A STUDY OF LIPIDS IN DIFFERENT VARIETIES OF WHEAT (TRITICUM AESTIVUM). I.R. Singh, *et al.*, *J. Food Sci. Technol.* **15**, 16 (1978). The polar and neutral lipid contents and patterns in seven varieties of wheat (K'-227', 'S-308', 'C-273', 'K-68', 'S-413', 'Argelto' and 'Sharbati Sanora') were examined by thin layer chromatography. All the samples showed varied amounts of free fatty acids indicating the presence of lipase activity in the stored wheat grains. Among

the neutral lipids, glycerides formed the major component whereas among the phospholipids and glycolipids, phosphatidyl choline and galactosyl diglyceride formed the major component. On the basis of lipid composition, variety 'S-308' appears to have better baking qualities and likely to possess better retention power of its flour.

COMPOSITION OF GHEE-RESIDUE. I.M. Santha and K.M. Narayanan, *J. Food Sci. Technol.* **15**, 24 (1978). Ghee-residues obtained by cream, creamery-butter and *desi*-butter methods showed that the moisture, protein and ash contents were more in butter ghee-residues than in cream ghee-residues. Butter ghee-residues contained more phospholipids than cream ghee-residues. As the period of heating increased, there were decreases in all the major phospholipids and a slight increase in lysophospholipids.

COMPARATIVE TOXICITY OF METAL STEARATES. N.Y. Tarasenko, *et al.*, *Int. Arch. Occup. Environ. Health* **37**(3), 179-92 (1976). Experiments on rats were undertaken to determine the toxicity of stearates of calcium, barium, zinc, cadmium and lead. The threshold levels of acute toxicity were determined. The cumulation coefficients, determined at the threshold level, were 0.2-0.3. At intratracheal administration of 50 mg. of the studied substances, the pathologic processes were presented mainly in the lungs. Observation revealed the marked skin resorption effect of all the stearates. Recommendations for the protection of workers are given. (World Surface Coatings Abs. No. 433)

HEATS OF HYDROGENATION OF LARGE MOLECULES. II. SIX UNSATURATED AND POLYUNSATURATED FATTY ACIDS. D.W. Roger, *et al.*, *J. Chem. Soc., Far. Trans. I* **74**(1), 46-52 (1978). The heats of hydrogenation of the 16 C and 18 C unsaturated and polyunsaturated fatty acids, palmitoleic, oleic, elaidic, linoleic, linoleic and linolenic acids, have been determined. (World Surface Coatings Abs. No. 434)

CHARACTERISTICS OF QUALITY FOR THE PROCESSING OF RAPESEED. G. Röbbelen, *Fette, Seifen, Anstrichm.* **80**, 99-103 (1978). From two experiments with industry scale processing of rapeseed from new varieties low in erucic acid and glucosinolate, results were obtained in 1975 and 1976 confirming the technological equivalency of the traditional and the new rapeseed varieties. Simultaneous genetic improvement of oil and protein content is limited by a negative physiological correlation between these two important quality characteristics. But probably the maximum capacity with regard to these traits is not yet realized in the present varieties. According to the results of an experiment with more than 4,000 plants and their progenies progress in protein selection varies within different subgroups of a total of breeding stocks preselected for oil content and thousand-seed-weight, respectively.

EXPERIMENTS ON THE USE OF SEED AND MEAL OF RAPESEED LOW IN GLUCOSINOLATE CONTENT IN FEEDING RATIONS FOR MONOGASTRIC ANIMALS. B. Brak and H. Henkel, *Fette, Seifen, Anstrichm.* **80**, 104-8 (1978). Glucosinolates and their components in seed and meal of rapeseed may confine feed-uptake by animals. With broilers as experimental animals, the feed-uptake and consequently the growth rate were dependent on the amount of glucosinolates in the feed rations. Using short-term heat treated rapeseed meal with a low glucosinolate content ('Erglu') the feed-uptake was normal; with heat treated products rich in glucosinolates the feed-uptake could be increased only partly. Heating inactivates those enzymes in rapeseed which split glucosinolates to nitrils; most of the glucosinolates, however, remain intact. There exists a good correlation between content of nitrils in rapeseed products and repression of feed-uptake with broilers.

EXHAUST AIR PROBLEMS IN THE FAT INDUSTRY AND RELATED FIELDS. A. Krause, *Fette, Seifen, Anstrichm.* **80**, 77-80 (1978). After considering the legal basis for emission control

and the most important statutory instrument in this connection, the "Clean Air Manual" (TA-Luft), the paper goes on to name the air pollutants giving rise to emission problems in the relevant production processes and branches of industry, and quotes examples of analytical results which support this information. Detailed attention is paid to the processing of edible oils and fats, and also technical greases; the foods industry, with examples taken from production of ready meals and the curing of meat; and other related fields such as abattoir by-product processing and fish-meal production. The paper claims that with few exceptions the number one exhaust air problem of these industries consists in preventing the emission of exhaust air charged with malodorous substances. The problems of defining "odour nuisance" in the form of a transgression of critical values are explained, as are the difficulties involved in analytical identification of the substances responsible.

PRECONDITIONS FOR THE PRODUCTION OF HIGH QUALITY IN RAPESEED FROM NATIVE HARVEST. D. Brauer, *Fette, Seifen, Anstrichm.* 80, 53-66 (1978). A historical draft on the production of rapeseed in Germany in the previous 100 years includes the change-over of the rapeseed production to genetically zero erucic acid rapeseed varieties in 1974. For the characterization of this new type of quality the federation mark SINOLA, registered at the German federal patent office, will be awarded upon application by the CMA for seed for sowing, for seed for crushing, and for seed oil from rapeseed. A controlled low content of erucic acid in the seeds of a commercial production and in the seed oil from rapeseed produced from it, can be reached only by the use of certified seed with SINOLA quality with an erucic acid content of less than 2%. From this point of view the accurate accomplishment of the maintenance breeding and the seed multiplication is of decisive importance.

BREEDING OF ZERO-ERUCIC RAPE IN HUNGARY. E. Kurnik *et al.*, *Fette, Seifen, Anstrichm.* 80, 67-71 (1978). The latest results of rape breeding in Hungary are discussed with reference to the characteristics of winter rape (*Brassica napus*) currently grown in Hungary. For the breeding of new varieties of rape, zero-erucic varieties of Canadian and Polish origin were used in addition to those of Hungarian origin. Cross breeding of the aforesaid varieties yielded a zero-erucic line (IR-0) and a low-erucic line (IR-1). The characteristics of these new varieties are reported. The new varieties are currently being tested in Government laboratories. The results obtained so far show many favorable properties of the new varieties.

MIGRATION OF COMPONENTS OF PACKAGING MATERIALS INTO FAT-RELEASING FOODSTUFFS. C.G. vom Bruck *et al.*, *Fette, Seifen, Anstrichm.* 80, 72-6 (1978). A practicable legislation dealing with foodstuffs in contact with packaging material should be constructed in that way that responsibility for the observance of laws can be divided among the user of packaging material, the manufacturer of packaging material and the producer of polymers. In order to be able to formulate the corresponding legal texts, profound knowledge as to the interaction between packaging material and the foodstuff, particularly the fat-releasing foodstuff is required. The possibilities for a characterization of fatty foodstuffs as being fat-releasing are discussed as well as the influence of the foodstuff on the mechanical properties of the packaging and the migration of components of the packaging material into or onto fat-releasing foodstuffs. According to the diffusion rate of the components in the packaging material and the interaction between foodstuff and packaging material, three types of this system are discussed.

SOME CONTEMPORARY APPLICATIONS OF OPEN-TUBULAR GAS-LIQUID CHROMATOGRAPHY IN ANALYSES OF METHYL ESTERS OF LONGER-CHAIN FATTY ACIDS. R.G. Ackman and C.A. Eaton, *Fette, Seifen, Anstrichm.* 80, 21-38 (1978). The application of wall-coated open-tubular (capillary) gas-liquid chromatographic columns to some current analytical problems in fat research is described. The liquid phase SILAR-5CP in commercially available stainless steel columns has been found to be particularly suitable for rapid screening of fats and oils for total docosenoic acid without interference from other components. Differentiation of two important 22:1 isomers (erucic acid from vegetable oils and cetoleic acid from marine oils) is possible and the erucic acid content of an oil or fat can be estimated in approximately 20 minutes. The effects of

partial hydrogenation of fats on the gas-liquid chromatography of these fatty acid structural details are reviewed. The use of other liquid phases such as butanediolsuccinate polyester, and the advantages of SILAR-7CP for study of geometrical isomers in wall-coated open-tubular columns are discussed briefly, and also the potential of support-coated open-tubular columns for similar analyses of longer-chain fatty acids.

SEPARATION OF SOLIDS FROM FATS AND OILS BY ELECTROPHORESIS. M. Schmidt, *Fette, Seifen, Anstrichm.* 80, 38-43 (1978). The development of PETRECO[®] ELECTRO-FILTER[™] SEPARATOR provides the food industry with plants that enable the separation of solid particles, including those in the submicron region (< 0.5 μ m), from fats and oils with the aid of high-voltage electrical field. The most important commercial application is the removal of bleaching earth and nickel catalyst; a final polishing filtration becomes unnecessary. Results of pilot plant operation show, for example in the removal of nickel catalyst from hydrogenated soybean oil, a continuous reduction of nickel from 500 ppm to < 0.15 ppm. These plants are completely closed systems under slight pressure with a definite precalculated capacity for solids; the latter can be removed by a simple regeneration process involving rinsing with the product to be treated. This regenerating liquid is a pumpable suspension containing ca. 5% solids; it is subjected to further treatment. Plants of various sizes with respect to maximum flow rate and capacity are available. The layout is always done for the specific application.

EVALUATION OF PACKAGING MATERIALS FROM THE VIEWPOINT OF HEALTH. R. Franck, *Fette, Seifen, Anstrichm.* 80, 9-14 (1978). In the past three decades, the conventional materials used for food packaging, such as wood, straw, metallic sheet, stoneware, porcelain and glass, have been more and more replaced by the new packaging material, plastic. The macromolecular synthetic resins are, as such, hygienically unobjectionable and especially suitable as packaging materials, since they are insoluble due to their high molecular weight. For the production of plastics, however, low molecular additives are used, which might migrate from the plastics and contaminate the packed foodstuffs. Modification of analytical methods has enabled us to recognize that residual traces of starting materials, such as acryl nitrile, vinyl chloride etc., which are objectionable from the viewpoint of health, may be present in plastic packaging materials. This aspect is critically evaluated and the criteria discussed, on the basis of which the Federal Center for Health may accept additives for plastics used in consumer articles according to the law governing food and consumer articles.

SURFACE LIPIDS AND LIPID POLYMERS OF PLANTS. C.H. Brieskorn, *Fette, Seifen, Anstrichm.* 80, 15-20 (1978). The protective skin of higher plants, or cuticle, consists of a lipid coating and the characteristic polymer lipids cutin and suberin. The lipid coating contains hydrocarbons, wax, triterpenes, sterols and sometimes aldehydes and ketones. Cutin, an estolid, insoluble in water and organic solvents, is built up by hydroxylated fatty acids with 16 and 18 C-Atoms. Suberin is in its constitution very similar to cutin. Its characteristic compounds are hydroxylated dicarboxylic acids. To the degradation of cutin and suberin by men and animals some references have been given.

• Biochemistry and Nutrition

CHANGES IN THE STRUCTURAL AND METABOLIC HETEROGENEITY OF PHOSPHATIDYLCHOLINES IN THE DEVELOPING RAT LUNG. G. Okano and T. Akino, *Biochim. Biophys. Acta* 528, 373-84 (1978). In the present study the developmental profiles of the structural and metabolic heterogeneity of rat lung phosphatidylcholine are presented. The individual molecular species of phosphatidylcholine at different stages of the developing rat lung were analyzed as diacylglycerol derivatives. The metabolic heterogeneity of rat lung phosphatidylcholine was also studied by incubation using lung slices with radioactive precursors. These results suggest that the lysophosphatidylcholine pathway which is mainly attributed to transacylation mechanism between 2 molecules of lysophosphatidylcholine may contribute to the marked production of dipalmitoylphosphatidylcholine in the lung in the last stage of gestation.

COMPARISON OF MOLECULAR STRUCTURE OF GLYCEROLIPIDS IN RAT LUNG. G. Okano, T. Kawamoto and T. Akino, *Biochim. Biophys. Acta* 528, 385-93 (1978). The major individual molecular species of glycerolipids such as phosphatidylethanolamine, phosphatidylcholine, phosphatidylethanolamine, phosphatidylglycerol, phosphatidylinositol and diacylglycerol of rat lung were determined quantitatively as diacylglycerol acetates. In three glycerolipids such as phosphatidylethanolamine, phosphatidylglycerol, and diacylglycerol, the main molecular species was dipalmitoyl. The species was not detectable in phosphatidylethanolamine and was not of quantitative importance in phosphatidylinositol. The pentaenoic and hexaenoic species of all glycerolipids examined consisted mainly of palmitoyl types.

EFFECTS OF DIETARY VITAMIN B-2 AND VITAMIN E ON THE Δ^6 -DESATURASE AND CATALASE ACTIVITIES IN THE RAT LIVER MICROSOMES. T. Okayasu *et al.*, *Biochim. Biophys. Acta* 489, 397-402 (1977). The effects of dietary vitamin B-2 and vitamin E on Δ^6 -desaturation of stearoyl-CoA, catalase, glutathione peroxidase, superoxide dismutase and electron transport components in rat liver microsomes have been investigated. Δ^6 -desaturase activities were decreased on diets deficient of vitamin B-2, E and supplemented with E. Among the peroxide-scavenging enzymes, only the catalase activity in microsomes correlates significantly with Δ^6 -desaturase activity. In vitro addition of bovine catalase had no effect on microsomal Δ^6 -desaturation in microsomes on vitamin B-2 deficient diet which contained low catalase and high superoxide dismutase activities, compared to those in microsomes of control diet. It is suggested that the hydrogen peroxide-generating and -decomposing systems may play an important role on the Δ^6 -desaturase activity in microsomes.

REGULATION OF TRIACYLGLYCEROL AND PHOSPHOLIPID SYNTHESIS IN TETRAHYMENA. H. Okuyama *et al.*, *J. Biol. Chem.* 253, 3588-94 (1978). The enzyme systems responsible for the synthesis of triacylglycerol and phospholipids in *Tetrahymena pyriformis* were characterized. Formation of diacylglycerophosphate from glycerophosphate by microsomes occurred mainly via 1-acylglycerophosphate. 1-Acylglycerophosphate phosphatase activity was 3 to 11 times higher than the diacylglycerophosphate phosphatase activity. The former was localized in microsomes while the latter resided mainly in the soluble fraction. These results show that fluctuations in the activities of the enzymes catalyzing triacylglycerol and phospholipid formation can be brought about by changes in *Tetrahymena* growth conditions.

ACTIVATION OF MITOCHONDRIAL FATTY ACID OXIDATION BY CALCIUM. CONVERSION TO THE ENERGIZED STATE. D.V. Otto and J.A. Ontko, *J. Biol. Chem.* 253, 789-99 (1978). The oxidation of (1-¹⁴C)palmitate by isolated rat liver mitochondria was increased by calcium chloride, and was quantitatively accounted for by an increased production of ketone bodies (acetoacetate plus β -hydroxybutyrate). ¹⁴CO₂ production was depressed by Ca²⁺. These changes were associated with an elevated β -hydroxybutyrate:acetoacetate ratio, reflecting an increased mitochondrial NADH:NAD⁺ ratio. The results indicate that the effect of Ca²⁺ on fatty acid oxidation was responsible for the elevation of the mitochondrial NADH:NAD⁺ ratio. The effects of Ca²⁺ on palmitate oxidation and the pyridine nucleotide oxidation-reduction state showed an absolute requirement for carnitine, CoA, ATP, and Mg²⁺.

DISTRIBUTION OF PROSTAGLANDIN BIOSYNTHETIC PATHWAYS IN ORGANS AND TISSUES OF THE FETAL LAMB. C.R. Pace-Asciak and G. Rangaraj, *Biochim. Biophys. Acta* 528, 512-4 (1978). Five prostaglandins, i.e. prostaglandins E₂, F_{2a} and D₂, 6-keto-prostaglandin F_{1a} and thromboxane B₂, were measured by mass spectrometry. Homogenates of fetal lamb brain, lung, liver, spleen and kidney and the ductus arteriosus, aorta and pulmonary artery formed different amounts of each product. Although the main prostaglandin in the fetal organs was prostaglandin E₂, arterial tissue formed mostly 6-keto-prostaglandin F_{1a}. These results demonstrate significant differences between organs and tissues in the relative direction of the 'prostaglandin synthetase' enzyme complex.

PLASMA MEMBRANE PHOSPHOLIPID, CHOLESTEROL AND FATTY ACYL COMPOSITION OF DIFFERENTIATED AND UNDIFFERENTIATED L₆ MYOBLASTS. R.G. Perkins and R.E. Scott, *Lipids* 13, 334-7 (1978). The lipid composition of plasma membranes isolated from differentiated and undifferentiated L₆ myoblasts has been compared. In general, the plasma membranes of

differentiated L₆ myoblasts have a higher cholesterol to phospholipid molar ratio than plasma membranes of undifferentiated cells. Differentiated L₆ myoblasts have increased relative amounts of phosphatidylethanolamine and phosphatidylcholine in their plasma membrane and a decreased relative amount of sphingomyelin when compared with the plasma membranes of undifferentiated myoblasts. In addition, preliminary results show that differentiated L₆ myoblasts plasma membrane phospholipid shows differences in the fatty acyl composition, specifically there appears to be relatively more 17:0 and 24:1 and less 16:1 and 18:1 than in plasma membrane phospholipids of undifferentiated L₆ myoblasts. These observations indicate that significant changes in plasma membrane lipid composition occur during myoblast differentiation. The role that changes in lipid composition play in control of cellular differentiation, however, remains to be elucidated.

STEROID-PROTEIN INTERACTIONS: 40. THE EFFECT OF FATTY ACIDS ON PROGESTERONE BINDING TO HUMAN SERUM ALBUMIN. B.L. Ramsey and U. Westphal, *Biochim. Biophys. Acta* 529, 115-22 (1978). Human serum albumin was delipidated by solvent extraction or by treatment with charcoal. Progesterone complexes formed with these albumin preparations had higher association constants than those formed with the untreated samples. The charcoal method of delipidation resulted in somewhat higher affinity constants than extraction with chloroform/methanol. Addition of 5 mol lauric acid per mol albumin reduced the association constant of the progesterone complex by approx. 50%. Studies with lauric, myristic, and palmitic acid showed that the decrease of binding affinity for progesterone was proportional to the amount of fatty acid added to albumin, and to its chain length. These results confirm and extend our previous findings of inhibition of progesterone binding to human albumin by long-chain fatty acids.

REDUCTION IN MEDIUM CHAIN ACIDS AND MONOENOIC ACIDS IN LIVERS AND PLASMA OF RATS FED EICOSA-5,8,11,14-TETRAYNOIC ACID. G.A. Rao, K. Siler, and E.C. Larkin, *Lipids* 13, 356-9 (1978). Male Sprague-Dawley rats were fed for 8 weeks a corn oil (CO) diet or a hydrogenated coconut oil (HCNO) diet. These diets were fed in the absence or presence of eicosa-5,8,11,14-tetraynoic acid (TYA). The inclusion of TYA in the HCNO diet reduced the levels of 12:0 and 14:0 in the total fatty acids of livers and plasma. With either diet, the presence of TYA caused an alteration in the fatty acid composition of these tissues so as to reduce the values of the ratios: 16:1/16:0, 18:1/18:0, and 20:4/18:2. These results suggest that dietary TYA can influence the hepatic metabolism of medium chain fatty acids and that it may inhibit the desaturase enzyme involved in the synthesis of not only 20:4 but also of monoenoic fatty acids.

A QUANTITATIVE STUDY OF THE DEVELOPMENT OF SUDANOPHILIC LESIONS IN THE AORTA OF RABBITS FED A LOW-CHOLESTEROL DIET FOR UP TO SIX MONTHS. M.R. Roach, J.F. Cornhill and J. Fletcher, *Atherosclerosis* 29, 259-64 (1978). Eighteen New Zealand white rabbits were placed on a diet containing 0.25% cholesterol and 6% corn oil for periods of up to 6 months. The animals were divided into 4 groups and sacrificed after 2, 3, 4, and 6 months. The aortae were removed, stained with Sudan III, and analyzed with the polar coordinate technique. While the periorificial lesions developed more slowly on this diet than on the diet with 2% cholesterol and 6% corn oil we had used previously, there was no difference in either the location or the shape of the lesions. In the descending thoracic aorta, lesions developed initially distal to orifices; however, significant lateral and proximal components were observed as atherogenesis progressed. The coronary lesions completely surrounded the ostia in all stages of development. The total area of the lesions was more related to time ($r = 0.74$, $P < 0.01$), than to serum cholesterol ($r = 0.51$, $P < 0.05$) or to cholesterol-time product ($r = 0.69$, $P < 0.01$).

OXIDIZED CHOLESTEROL BILAYERS. DEPENDENCE OF ELECTRICAL PROPERTIES ON DEGREE OF OXIDATION AND AGING. R.L. Robinson and A. Strickholm, *Biochim. Biophys. Acta* 509, 9-20 (1978). Black lipid membranes made from oxidized cholesterol were examined for their specific resistance, capacitance, and physical stability, as a function of cholesterol oxidation time and of age. Membranes formed from cholesterol oxidized in n-octane were not physically stable even after 7 h of oxidation unless they were aged for at least a month. Membranes formed

from cholesterol oxidized in decane and tetradecane (1:1) were stable immediately after 2-6 h of oxidation. Membrane resistance ordinarily decreases with storage time. The rate of these changes with age is dependent on the extent of initial cholesterol oxidation and subsequent oxidation, with long term stability best in the least oxidized membranes.

EQUAL ATHEROSCLEROSIS IN RABBITS FED CHOLESTEROL-FREE, LOW-FAT DIET OR CHOLESTEROL-SUPPLEMENTED DIET. A.C. Ross, C.R. Minick and D.B. Zilversmit, *Atherosclerosis* 29, 301-15 (1978). This study compares the atherogenicity of a cholesterol-free, low fat, semi-synthetic diet and a cholesterol-supplemented chow diet. Rabbits fed the semi-synthetic cholesterol-free diet developed endogenous hypercholesterolemia with cholesterol concentrations of 240-650 mg/dl plasma during a 182-250 day study. When equal plasma cholesterol concentrations were maintained in pairs of rabbits with either cholesterol-induced hypercholesterolemia or endogenous hypercholesterolemia, no differences in atherosclerotic disease, as judged by visual grading or by aortic cholesterol concentrations were found.

DETERMINANTS OF FATTY ACID AND ALCOHOL MONOMER ACTIVITIES IN MIXED MICELLAR SOLUTIONS. V.L. Sallee, *J. Lipid Res.* 19, 207-14 (1978). The determinants of monomer activities of lipids dissolved in micellar bile salt solutions have been studied using polyethylene discs as the organic phase of a partitioning system. The studies show that fatty acids and alcohols interact with micelles as a partitioning system so that the monomer activity is determined by micelle volume and the lipid's partition coefficient as well as mass of lipid in the solution. Influence of the partition coefficient is seen in the dependence of monomer activity on chain length, unsaturation and carboxyl or alcohol polar groups. Data provided allow calculation of monomer activities of fatty acids and alcohols in many complex micellar solutions. Such data are important for evaluating such processes as intestinal absorption and gallstone formation and dissolution.

A SIMPLE AND NOVEL METHOD FOR TRITIUM LABELING OF GANGLIOSIDES AND OTHER SPHINGOLIPIDS. G. Schwarzmann, *Biochim. Biophys. Acta* 529, 106-14 (1978). A very simple method for introducing tritium specifically into the ceramide portion of gangliosides, neutral glycosphingolipids and sphingomyelin has been developed using potassium boro [³H] hydride and palladium as catalyst. In this way six different gangliosides, five different neutral glycosphingolipids and sphingomyelin with high specific radioactivity were prepared for the first time. This simple procedure which does not require sophisticated apparatuses is suitable for large scale preparation of tritium-labeled sphingolipids as well as for nanogram quantities of individual sphingolipids so as to serve for analytical purposes. During the course of the labeling procedure no degradation of even the most labile trisialosyl-gangliotetraosyl:ceramide has been observed. The yield of tritiated compounds is almost quantitative. The specific radioactivity depends on the unsaturation of the ceramide moiety and the specific activity of the boro [³H] hydride employed.

MODULATION OF THE ORGANIZATION OF ERYTHROCYTE MEMBRANE PHOSPHOLIPIDS BY CYTOPLASMIC ATP. THE SUSCEPTIBILITY OF ISOIONIC HUMAN ERYTHROCYTE GHOSTS TO ATTACK BY DETERGENTS AND PHOSPHOLIPASE C. S.D. Shukla *et al.*, *Biochim. Biophys. Acta* 509, 48-57 (1978). Human erythrocyte ghosts were prepared in media of physiological ionic composition, and these "isoionic" ghosts were then lysed and resealed in media of varying Ca²⁺, Mg²⁺ and ATP concentrations. The susceptibilities of these ghosts to limited attack by various detergents and by phospholipases C were then compared with the susceptibilities of intact cells to similar attack: attack was assessed by measurements of lysis and of phospholipid hydrolysis. It therefore seems that interaction of ATP with sites on the cytoplasmic surface of the erythrocyte membrane can, without ATP hydrolysis, cause changes in the organization of the outer surface of the membrane that specifically render phosphatidylethanolamine and sphingomyelin less accessible to attack by extracellular phospholipases.

A SURVEY OF THE MALONALDEHYDE CONTENT OF RETAIL MEATS AND FISH. G.M. Siu and H.H. Draper, *J. Food Sci.* 43, 1147-9 (1978). A survey was made of the malonaldehyde (MA) content of 96 fresh and processed meat and fish samples obtained from supermarkets. MA content ranged from 0.14 µg/g in a cooked ham sample to 10.05 µg/g in a cooked

chicken sample. Ninety-two percent of the processed or cured meats and 38% of the fresh meats contained less than 1 µg/g. Sixty percent of the fresh meat samples ranged between 1 µg/g and 6 µg/g. Cooking led to only slight increases in MA in most samples, but up to 10-fold increases in roasts cooked for 3 hr.

STIMULATION OF LEAD ABSORPTION BY VITAMIN D ADMINISTRATION. C.M. Smith *et al.*, *J. Nutr.* 108, 843-7 (1978). Two methods for the determination of lead absorption have been developed using the rat as the test animal. One is an everted intestinal sac method in which the time course of ²¹⁰Pb transport across intestinal wall can be followed in vitro; and the other, ²¹⁰Pb absorption from the intestine following gastric intubation can be followed in vivo. By using these techniques it can be clearly demonstrated that vitamin D markedly enhances lead absorption. Both techniques provide evidence that the distal small intestine is the major site of lead absorption and the site of greatest vitamin D stimulation. Lead acetate is apparently absorbed to the extent of 45% as it passes through the small intestine at a concentration of 0.01 mM.

TREATMENT OF HYPERTRIGLYCERIDEMIA WITH TRIBIC ACID AND CLOFIBRATE. CROSS-OVER STUDIES, EFFECTS ON LIPOPROTEINS AND ABSENCE OF POST-DRUG REBOUND. F.R. Smith, R.P. Noble and D.S. Goodman, *Atherosclerosis* 29, 345-54 (1978). In 34 patients with primary hypertriglyceridemia, the effectiveness of tribic acid and clofibrate have been compared using a cross-over design after weight and diet stabilization. In 26 patients, cholesterol and triglyceride concentrations in very low density (VLDL), low density (LDL), and high density (HDL) lipoproteins were measured while on drugs, then 6 weeks after the drugs were discontinued. The major effect of both drugs was on VLDL levels with only quantitatively very small effects seen on LDL and HDL lipid levels.

HYPERLIPIDEMIA AND PREMATURE ARTERIOSCLEROSIS. F.R. Smith, *Lipids* 13, 375-7 (1978). In the last decade, understanding of the relationship between plasma lipoprotein concentrations and arteriosclerosis has advanced considerably. Prospective and case-control epidemiologic studies in the general population have established a direct correlation between low density lipoprotein and an inverse correlation between high density lipoprotein concentrations and the risk of coronary disease. Detailed studies of patients and families with genetic hypercholesterolemia, hypertriglyceridemia, and combined hypercholesterolemia hypertriglyceridemia have identified subpopulations at particular risk. Skin fibroblast lines from patients with genetic hyperlipidemias have been used to provide important new information on the regulation by plasma lipoproteins of cellular cholesterol metabolism. We are entering a phase of investigation where epidemiological and biochemical data supplement each other in such a way that the old hypothesis linking plasma lipids to atherosclerosis has new life.

THE DISTRIBUTION OF DIETARY PLANT STEROLS IN SERUM LIPOPROTEINS AND LIVER SUBCELLULAR FRACTIONS OF RATS. M. Sugano *et al.*, *Lipids* 13, 427-32 (1978). Rats were fed plant sterols containing campesterol and β-sitosterol in the different proportions, and their distribution in serum lipoproteins and in liver subcellular fractions was determined. In serum lipoproteins, the percentage as well as the concentration of plant sterols increased with the increase in the density of lipoproteins. Thus, high density lipoprotein (HDL) contained the highest and very low density lipoprotein (VLDL) the lowest. Also, there were distinct differences in the ratio of campesterol to sitosterol among lipoproteins, it was the highest in VLDL and lowest in HDL. Quantitatively, more than 75% of campesterol and 80% of sitosterol were carried in HDL; the values were significantly different from those of cholesterol (ca. 70%) in relation to total cholesterol. The distribution of plant sterols in liver subcellular fractions was virtually the same with that of cholesterol. Both nuclei and microsomes contained approximately 40% of total plant sterols.

CONNECTIVE TISSUE COMPONENTS IN NORMAL AND ATHEROSCLEROTIC HUMAN CORONARY ARTERIES. M. Tammi *et al.*, *Atherosclerosis* 29, 191-4 (1978). Human coronary arteries with various degrees of atherosclerosis were analyzed for the concentration of different types of glycosaminoglycans (GAGs). The changes in GAGs were considered against the

background of macroscopic atherosclerosis, and the concentration of glycoprotein-bound hexosamines, collagen, calcium and cholesterol. The concentration of calcium was increased and that of hyaluronic acid decreased even in mildly atherosclerotic coronary arteries. The additional changes in advanced atherosclerosis included the increase of collagen and dermatan sulphate and the decrease of heparan sulphate. Cholesterol was increased in mild, and even further in advanced, atherosclerosis. The concentrations of chondroitin sulphates and glycoprotein-bound hexosamines were not significantly affected by atherosclerosis.

COMPARATIVE EFFECTS OF SATURATED AND UNSATURATED LIPIDS ON HEPATIC LIPOGENESIS AND CHOLESTEROGENESIS IN VIVO IN THE MEAL-FED RAT. J. Triscari, J.G. Hamilton and A.C. Sullivan, *J. Nutr.* 108, 815-25 (1978). The effects of saturated and unsaturated lipids on in vivo rates of hepatic lipogenesis and cholesterogenesis were compared. Lipogenic and cholesterogenic rates were determined in meal-fed rats either after feeding 1%, 5%, 10%, or 20% dietary corn oil or hydrogenated soybean oil for 14 days, or after intragastric administration of fatty acyl ethyl esters (18:0, 18:1, or 18:2) for 1 and 3 days. Dietary hydrogenated soybean oil was not absorbed, whereas dietary corn oil and the intragastrically administered fatty acyl ethyl esters were well absorbed. Fatty acid synthesis measured from $^3\text{H}_2\text{O}$ and (^{14}C)alanine was inversely correlated with unsaturated dietary fat content, but was unchanged by saturated dietary fat.

EFFECT OF EXOGENOUS FATTY ACIDS ON THE RETENTION OF PHOSPHOLIPID ACYL GROUPS BY MOUSE L FIBROBLASTS. P. Tsai and R.P. Geyer, *Biochim. Biophys. Acta* 528, 344-54 (1978). Exogenous oleic or linoleic acid, given at a high but non-toxic level (1 mg fatty acid/day for 20×10^6 cells in 50 ml medium), caused substantial redistribution of the otherwise permanently retained phospholipid acyl in mouse L fibroblasts. 18-40% of the preformed phospholipid acyls were shifted to triglycerides but most returned to phospholipids when the supply of exogenous fatty acid was removed. The phospholipid acyls could be reshuffled back to triglycerides again whenever an adequate amount of exogenous fatty acid was provided. Daily changes of medium containing oleic acid bound to bovine serum albumin caused a still greater total loss of phospholipid acyls into the medium. The removal of the prelabeled phospholipid acyls also occurred with phospholipid acyls which had been synthesized from (^{14}C)acetate 3 days earlier. The results demonstrate the fact that the apparent permanently retained phospholipid acyl groups found in L-cells could in fact be displaced through experimental manipulations.

FATTY ACID SYNTHESIS AND METABOLISM OF PHOSPHOLIPID ACYL GROUPS IN STRAIN L MOUSE FIBROBLASTS. P. Tsai and R.P. Geyer, *Biochim. Biophys. Acta* 489, 381-9 (1977). Strain L mouse fibroblasts grown in medium supplemented with 2.5% delipidized horse serum were found capable of desaturating oleic and linoleic acid to dienoic and trienoic acid(s), respectively. Although 40-60% of de novo fatty acid synthesis from (^2H)acetate was inhibited by the administration of exogenous oleic or linoleic acid, sterol synthesis was only slightly affected. Within 24-48 h after incorporation, phospholipid fatty acyl groups could undergo active exchange between phospholipids. After this dynamic transition period was over, not only were the phospholipid acyls retained but some vicinal fatty acyl pairs of phospholipid also appeared to be stable and remained together throughout the depletion period. At any time in the experiment, however, introduction of exogenous fatty acid perturbed this phospholipid acyl retention, delayed the time at which the phospholipid acyl groups no longer moved between phospholipids and also decreased the ultimate number of phospholipid acyl groups retained by strain L mouse fibroblasts.

FATTY ACID COMPOSITIONS OF 15 SPECIES OF FISH FROM TROPICAL WATERS. P.G. Viswanathan Nair and K. Gopakumar, *J. Food Sci.* 43, 1162-4 (1978). Fatty acid composition of five species of freshwater fish, three marine fish and seven brackish water fish were determined by GLC. Of the saturated fatty acids $\text{C}_{16:0}$ and $\text{C}_{18:0}$ are found to be the dominant ones with $\text{C}_{16:0}$ accounting for 50-55% of the total saturated acids. Among the monounsaturated fatty acids $\text{C}_{18:1}$ and $\text{C}_{18:1}$ and polyunsaturated fatty acids $\text{C}_{18:2}$, $\text{C}_{18:3}$, $\text{C}_{20:4}$, $\text{C}_{20:5}$ and $\text{C}_{22:6}$ are found to be the important ones. Stinging cat fish contained the highest amount of $\text{C}_{16:1}$ (16.52%). The level of

arachidonic acid was fairly high in most of the fish lipids analyzed. The ratio $\text{C}_{18:1}/\text{C}_{18:2}$ is higher for marine fish than for the freshwater fish and is fairly constant for each group. The fatty acid composition of brackish water fish do not show any definite pattern.

COMPARISON OF GUINEA-PIG SERUM LIPOPROTEINS AFTER IODINATION BY TWO DIFFERENT METHODS. P.K. Weech, F. McTaggart and G.L. Mills, *Biochem. J.* 169, 687-95 (1978). 1. Guinea-pig low-density lipoproteins were isolated by ultracentrifugation and iodinated either by the ICI method or by the chloramine-T procedure. 2. The efficiency of labelling by both methods was essentially the same. 3. When the two products were compared by ultracentrifugation, gel chromatography and immunodiffusion analysis, no significant difference in their properties was detected. 4. When they were compared by gradient-gel electrophoresis, aggregates were found in the product of the ICI method, but not in the lipoprotein iodinated by the chloramine-T process. 5. Both products were metabolized by the guinea pig with essentially the same fractional catabolic rate. 6. The fractional catabolic rate of lipoprotein iodinated by the chloramine-T method was not significantly different from that of lipoprotein logically labelled in the protein moiety with (^{75}Se)selenomethionine. 7. It is concluded that the products of both methods of iodination are almost equally acceptable, provided that the optimum conditions for the chloramine-T reaction are carefully established.

CEREBRAL PROSTAGLANDIN SYNTHESIS DURING THE DIETARY AND PATHOLOGICAL STRESSES OF ESSENTIAL FATTY ACID DEFICIENCY AND EXPERIMENTAL ALLERGIC ENCEPHALOMYELITIS. P.G. Weston and P.V. Johnston, *Lipids* 13, 408-14 (1978). Rats of the Lewis strain were fed diets adequate of deficient in essential fatty acids (EFA). At 70-80 days of age experimental allergic encephalomyelitis (EAE) was induced using adjuvants containing either *Mycobacterium butyricum* or *Mycobacterium tuberculosis* H37Ra. When the former *Mycobacterium* was used, the incidence of EAE was greater in the EFA-deficient than in EFA-adequate controls; but when the rats challenged with *M. tuberculosis*, the incidence of the disease was the same in both dietary groups. The results indicate a possible role for PGF synthesis in the degree of susceptibility of the rats to EAE under different dietary regimens.

EVIDENCE FOR A DUAL MECHANISM OF LIPOLYSIS ACTIVATION BY EPINEPHRINE IN RAT ADIPOSE TISSUE. L.S. Wise and R.L. Jungas, *J. Biol. Chem.* 253, 2624-7 (1978). Whole homogenates prepared from tissue previously exposed to epinephrine displayed a 3-fold increased rate of lipolysis of endogenous substrate. When the aqueous infranatant phase of such homogenates was collected by centrifugation and assayed against exogenous triolein emulsions, no hormone effect could be demonstrated. Treatment of such infranatants with cAMP-dependent protein kinase prepared from muscle increased their lipase activity against exogenous triolein by 80%. The data suggest that a second pathway of lipolysis activation occurs in response to epinephrine in addition to that involving a cAMP-mediated increase in the state of phosphorylation of the hormone-sensitive lipase.

THE IN VITRO INHIBITION OF BOVINE MILK LIPOPROTEIN LIPASE BY A GLYCOPROTEIN PREPARATION FROM HUMAN ATHEROSCLEROTIC INTIMA. P.V. Wagh and T. Olivecrona, *Atherosclerosis* 29, 195-204 (1978). Intimal tissue from human atherosclerotic aortae was collected by the Dermatome procedure. The tissue was extracted with 5 mM Tris HCl buffer containing 0.3 M NaCl and 1 mM EDTA, pH 7.4. The ammonium sulfate precipitate between 0.4-0.8 saturation obtained from the extract was fractionated on a DEAE-cellulose column and the effluent was monitored for lipoprotein lipase inhibition employing purified bovine milk enzyme. The substrate used was an emulsion of purified olive oil and tritiated triolein. Human serum was the source of activator of the substrate.

LIPID AUTOXIDATION AND AMINO ACID CHANGES IN PROTEIN-ENRICHED SWEET POTATO FLAKES. W.M. Walter Jr. et al., *J. Food Sci.* 43, 1242-7 (1978). Three sweet potato flake formulations, containing soy flour plus methionine, casein and no supplementary protein, were prepared and stored at room temperature (21-23°C) in air for 16 months. The formulations were analyzed periodically to ascertain changes in carotene content, amino acid levels and water-binding

capacity. On the basis of carotene degradation as a measure of lipid autoxidation, it was found that after an induction period of 19 days required by the flakes supplemented with soy-methionine, all formulations were oxidized in an identical manner. Among the amino acids, only glutamic acid was lost from all three formulations, and isoleucine levels decreased in the control formulation only. Lysine concentration in the fortified flakes decreased while histidine decreased in the soy-methionine formulation. Storage had no effect on the water-binding capacity of any of the three formulations.

THE INDISPENSABILITY OF PHOSPHOLIPID AND UBIQUINONE IN MITOCHONDRIAL ELECTRON TRANSFER FROM SUCCINATE TO CYTOCHROME *c*. L. Yu, C. Yu, and T.E. King, *J. Biol. Chem.* 253, 2657-63 (1978). The indispensability of phospholipid and ubiquinone (Q) in mitochondrial electron transfer was studied by depleting phospholipid and Q in succinate-cytochrome *c* reductase and then replenishing the depleted enzyme. More than 90% of phospholipid and Q was removed by repeated ammonium sulfate-cholate fractionation. The depleted succinate-cytochrome *c* reductase showed no enzymatic activity for succinate \rightarrow *c* or $\text{QH}_2 \rightarrow$ *c* and yet retained most of the succinate \rightarrow Q activity. All enzymatic activity was restored upon the addition of Q and phospholipid. Restoration required the addition of Q prior to the addition of phospholipid. Replenishing the preparation with phospholipid brought about the reoxidation of cytochrome *c* in the absence of electron acceptor or oxygen.

HEAD-GROUP CONFORMATION IN PHOSPHOLIPIDS: A PHOSPHORUS-31 NUCLEAR MAGNETIC RESONANCE STUDY OF ORIENTED MONODOMAIN DIPALMITOYLPHOSPHATIDYLCHOLINE BILAYERS. R.G. Griffin, L. Powers, and P.S. Pershan, *Biochemistry* 17, 2718-22 (1978). Angular-dependent ^{31}P NMR spectra of oriented biaxial monodomain DPPC \cdot H_2O multilayers are employed to study head-group conformation in this phospholipid. The results indicate that the O-P-O plane of the phosphate, where the O's are the nonesterified oxygens of the phosphodiester, is tilted at $47 \pm 5^\circ$ with respect to the bilayer normal. This PO₂ orientation could result in the choline moiety being extended parallel to the bilayer plane, and it will explain the breadth of the axially symmetric ^{31}P powder spectrum observed for DPPC in excess water.

LOCATION AND INTERACTIONS OF PHOSPHOLIPID AND CHOLESTEROL IN HUMAN LOW DENSITY LIPOPROTEIN FROM ^{31}P NUCLEAR MAGNETIC RESONANCE. P.L. Yeagle *et al.*, *Biochemistry* 17, 2707-10 (1978). The major phospholipids, phosphatidylcholine and sphingomyelin, of low density lipoprotein (LDL) are accessible to small amounts of Pr^{3+} , suggesting that the head groups of all mobile phospholipids are on the surface of the particle in contact with the aqueous medium. The major source of the nuclear Overhauser effect enhancement of ^{31}P resonances is the *N*-methyl proton of the choline moiety, indicating close *N*-methyl phosphate group interactions, probably similar to those found previously in phospholipid vesicles.

STUDY OF CULTURED SKIN FIBROBLASTS FROM PATIENTS WITH AND WITHOUT ISCHEMIC HEART DISEASE. G. Friedman *et al.*, *Atherosclerosis* 30, 185-98 (1978). The aim of the present study was to determine whether skin fibroblasts derived from patients with ischemic heart disease (IHD), which could not be related to accepted risk factors, would show a metabolic abnormality with respect to lipid or lipoprotein metabolism. Thus, whereas no significant difference was encountered in the lipid and lipoprotein metabolism in cells of patients with IHD without risk factors and controls, some increase in LDL metabolism was seen in cells from patients with IHD and with a history of smoking. It remains to be determined whether this increase was causally related to smoking.

CHOLESTEROL CONTENT OF THE HUMAN ATRIUM IS RELATED TO PLASMA LIPOPROTEIN LEVELS. P.J. Nestel and A. Poyser, *Atherosclerosis* 30, 177-83 (1978). The cholesterol content of cells is thought to be strongly influenced by the plasma lipoproteins. We have examined this by measuring the concentration of cholesterol in the atrial wall, a tissue that is directly exposed to the lipoproteins in plasma. Atrial biopsies were obtained during coronary artery surgery from 38 subjects whose plasma lipoproteins had been measured previously. Significant, positive correlations were found in the whole group between atrial cholesterol concentration and VLDL cholesterol levels and, in the 10 subjects with the highest

atrial cholesterol values, a correlation was found between age and atrial cholesterol concentration which was independent of lipoprotein lipids.

EFFECT OF METFORMIN ON LIPID METABOLISM IN THE RABBIT AORTIC WALL. G. Marquie, *Atherosclerosis* 30, 165-75 (1978). The aim of the present study was to investigate whether metformin was capable of altering aortic lipid metabolism. Pretreatment of rabbits for 8 days with 120 mg/kg per os metformin reduced by 50-70% the incorporation of a 20 μCi tracer dose of ($4\text{-}^{14}\text{C}$)cholesterol (given orally 24 h before) into various segments of aorta, plasma, liver, intestine and lung, as compared with control animals. However, as intestinal absorption of cholesterol was also diminished in the same proportion, it was then decided to inject the labelled cholesterol directly into the blood. Under these conditions, metformin induced the same reduction in ($4\text{-}^{14}\text{C}$)cholesterol specific activity in the aorta, but not in other tissues.

MONTE CARLO STUDIES OF PHOSPHOLIPID LAMELLAE. EFFECTS OF PROTEINS, CHOLESTEROL, BILAYER CURVATURE, AND LATERAL MOBILITY ON ORDER PARAMETERS. H.L. Scott and S.L. Cherng, *Biochim. Biophys. Acta* 510, 209-15 (1978). In this paper we present the results of a Monte Carlo study of the effects of protein, cholesterol, bilayer curvature, and mobility on the chain order parameters of a lipid layer. The Monte Carlo method used is identical to the version developed earlier. The effect of cholesterol is dependent upon the length of the lipid hydrocarbon chains relative to the cholesterol depth of penetration. Our computer studies of bilayer curvature show the manner in which this curvature disrupts chain packing and are consistent with experimental results.

ASYMMETRIC DISTRIBUTION OF PHOSPHATIDYLETHANOLAMINE FATTY ACYL CHAINS IN THE MEMBRANE OF VESICULAR STOMATITIS VIRUS. B.S. Fong and J.C. Brown, *Biochim. Biophys. Acta* 510, 230-41 (1978). The membrane of vesicular stomatitis virus (VSV) contains two distinct pools of phosphatidylethanolamine molecules which reside in the inner and outer phospholipid monolayers, respectively. 36% of the total membrane phosphatidylethanolamine is found in the outer monolayer while 64% is found in the inner. The two pools of VSV phosphatidylethanolamine can be distinguished operationally by the fact that only outer phosphatidylethanolamine is reactive in intact virions with the membrane-impermeable reagent trinitrobenzenesulfonate (TNBS). Although fatty acyl chain asymmetry and phosphatidylethanolamine asymmetry are correlated in VSV, no simple rules can be discerned which uniquely relate the two parameters.

SPECTROSCOPIC STUDIES OF SPECIFICALLY DEUTERIUM LABELED MEMBRANE SYSTEMS. NUCLEAR MAGNETIC RESONANCE INVESTIGATION OF THE EFFECTS OF CHOLESTEROL IN MODEL SYSTEMS. E. Oldfield *et al.*, *Biochemistry* 17, 2727-40 (1978). Deuterium nuclear magnetic resonance spectra of dimyristoylphosphatidylethanolamines specifically labeled in positions 2', 3', 4', 6', 8', 10', 12', and 14', of the 2 chain, of an *N*-deuteriomethylphosphatidylcholine, and of cholesterol-3 α -d₃, have been obtained by the Fourier transform method at 5.46 and 3.52 T on two "home-built" widebore superconducting magnet spectrometers, as a function of temperature and composition. Results of calculations of chain length and membrane thickness of a dimyristoylphosphatidylcholine-30 mol % cholesterol membrane system at 23 $^\circ$ C give excellent agreement when compared with recent high-resolution diffraction data obtained on specifically deuterium labeled lecithin-cholesterol systems. These results are in agreement with similar effects reported recently for the dipalmitoylphosphatidylcholine-cholesterol system and may indicate a bent configuration for the 2 chain, in the lecithin-cholesterol system.

THE GROWTH-PROMOTING ACTIVITY OF SEVERAL LIPID-RELATED COMPOUNDS IN THE FREE-LIVING NEMATODE CAENORHABDITIS BRIGGSIAE. N.C. Lu *et al.*, *Proc. Soc. Exp. Biol. Med.* 158, 187-91 (1978). The growth-promoting activities of a number of lipid-related chemical compounds were studied in *C. briggsiae*. It was found that several such compounds, Tween 80 (20 mg/ml), Tween 85 (10 mg/ml), sodium oleate (1.0 mg/ml), sodium stearate (1.0 mg/ml), ethanol (4.0 mg/ml), *n*-propanol (4.0 mg/ml), and potassium acetate (5.0 mg/ml), greatly stimulated population growth in *C. briggsiae* and were much more potent than a casein hydrolysate (casamino acids). These findings have led to the recognition of a lipid-related factor for *C. briggsiae* and to the successful development of a

completely chemically defined medium for the cultivation of *C. briggsae* without the presence of a proteinaceous factor.

SUPPRESSION OF CALCIFIC FIBROUS-FATTY PLAQUE FORMATION IN RABBITS BY AGENTS NOT AFFECTING ELEVATED SERUM CHOLESTEROL LEVELS. THE EFFECT OF THIOPHENE COMPOUNDS. C.T. Chan, H. Wells and D.M. Kramsch, *Circ. Res.* 43, 115-25 (1978). We tested the suppressive effect of antihypercalcemic-hyperphosphatemic agents on atherogenesis. We studied five groups of rabbits for 8 weeks, one control group and four groups on a fibrogenic atherogenic diet. One group received the atherogenic diet alone, and the remaining three atherogenic groups were treated simultaneously with 2-thiophenecarboxylic acid (ThCA), 5-methyl-2-thiophenecarboxylic acid (5-CH₃-ThCA), and 5-bromo-2-thiophenecarboxaldehyde (5-Br-ThCA). Treatment with all three drugs normalized the elevated serum calcium but not the cholesterol levels, and effectively inhibited all aspects of the atherosclerotic process as determined morphologically and biochemically. The order of effectiveness was: 5-CH₃-ThCA > 5-Br-ThCA > ThCA. No bone resorption occurred in the treated groups. The normalizing effects of the thiophene compounds on serum phosphorus levels were not significant at the dosages used.

PHOSPHATIDYLCHOLINE MOBILITY IN LIVER MICROSOMAL MEMBRANES. A.M.H.P. Van den Bellelaar *et al.*, *Biochim. Biophys. Acta* 510, 242-55 (1978). Purified phosphatidylcholine exchange protein from bovine liver was used to exchange rat liver microsomal phosphatidylcholine for egg phosphatidylcholine. It was found at 25 and 37°C rat liver microsomal phosphatidylcholine was completely and rapidly available for replacement by egg phosphatidylcholine. In contrast, phosphatidylcholine in vesicles prepared from total microsomal lipids could only be exchanged for about 60%. These results are discussed with respect to the localization and trans-membrane movement of phosphatidylcholine in liver microsomes.

MOLECULAR WEIGHT DISTRIBUTIONS OF POLYDISPERSE SYSTEMS: APPLICATION TO VERY LOW DENSITY LIPOPROTEINS. S.T. Kunitake *et al.*, *Biochemistry* 17, 1936-42 (1978). A technique is described which directly yields a distribution of molecular weights. A density gradient is constructed in a centrifuge tube. Then, 0.5 mL of a dilute solution of very low density lipoproteins in a dense solvent is introduced beneath the gradient. The tube is then centrifuged until the largest lipoproteins have just floated to the top and the rest are located along the length of the tube according to their flotation coefficients. The tube is then carefully removed, mounted in a support, and scanned with an argon-ion laser. All the data are then available for the construction of the distribution of molecular weights, buoyant densities, and frictional coefficients for the lipoproteins in the polydisperse sample.

ISOLATION OF SUBFRACTIONS OF HUMAN VERY LOW DENSITY LIPOPROTEINS BY ZONAL ULTRACENTRIFUGATION. W. Patsch *et al.*, *J. Biol. Chem.* 253, 4911-5 (1978). Very low density lipoproteins (VLDL) have been isolated and subfractionated on the basis of their differing flotation rates. The procedure consists of a single 45-min zonal ultracentrifugation step using a linear density gradient of $d = 1.00$ to 1.15 g/ml. Appropriate fractions of the zonal rotor effluent containing the entire VLDL spectrum were characterized by analytical ultracentrifugation, gel filtration chromatography, and complete chemical analysis. This procedure provides a reliable methodology for a rapid isolation of VLDL subfractions and the accurate determination of their flotation rates.

THE ROLE OF PHOSPHATIDYLGLYCEROL IN THE ACTIVATION OF CTP:PHOSPHOCHOLINE CYTIDYLTRANSFERASE FROM RAT LUNG. D.A. Feldman *et al.*, *J. Biol. Chem.* 253, 4980-6 (1978). The reaction catalyzed by CTP:phosphocholine cytidyltransferase in the reverse direction, *i.e.* the formation of CTP and phosphocholine from CDP-choline and pyrophosphate, is slightly faster than the reaction in the forward direction. The reverse reaction is optimal at 2mM pyrophosphate and 6 mM Mg²⁺, in both fetal and adult preparations. The enzyme from adult lung can be dissociated into a form identical with the low molecular weight species found in fetal lung. The dissociated species can be converted back to a high molecular weight form in the presence of phosphatidylglycerol.

FUNCTION OF PHOSPHOLIPIDS IN ESCHERICHIA COLI. CHARACTERIZATION OF A MUTANT DEFICIENT IN CARDIOLIPIN SYN-

THESIS. G. Pluschke, Y. Hirota, and P. Overath, *J. Biol. Chem.* 253, 5048-55 (1978). Screening of a collection of temperature-sensitive mutants of *Escherichia coli* for defects in phospholipid metabolism led to the isolation of a mutant deficient in cardiolipin synthesis. The defective gene, named *cis*, is closely linked to the *trp* marker and maps at about Minute 27 on the *E. coli* chromosome. The *cis* mutation confers a 5-times reduction in the turnover of the phosphate moiety of phosphatidylglycerol.

LIPID METABOLISM IN THE VITAMIN-B₁₂-DEPRIVED RAT. C. Fehling *et al.*, *Nutr. Metab.* 22, 82-9 (1978). Rats were deprived of vitamin B₁₂ in order to study the effect of this deprivation on the metabolism of lipids in the liver and the nervous system. Serum vitamin B₁₂ concentrations of 102.7 and 78 pg/ml were found at sacrifice after 5 and 6 months, respectively. Neurological testing failed to reveal signs of neuropathy. The total liver lipids were decreased in the vitamin-B₁₂-deprived animals, but no changes were detected in the lipid concentration or in the phospholipid composition of the nervous system. Some animals were given propionate, and in these, contrary to expectations, pentadecanoic acid and heptadecanoic acid were found in smaller amounts in the liver triglycerides of the vitamin-B₁₂-deprived rats than in the control rats. This could be due to the inhibitory effect of methylmalonyl CoA on fatty-acid synthesis, demonstrated by others *in vitro*.

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