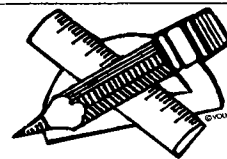


SD&C Abstracts



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

• Detergents

FOAM INHIBITION IN DETERGENTS AND CLEANERS. J. Perner, G. Frey and K. Stork. *Tenside Deterg.* 14(4), 180-5 (1977). Spiroacetates as well as hexamethylol melamine esters obtained from aliphatic aldehydes and pentaerythritol are effective foam inhibitors for detergents and cleaners based on non-ionic, anionic or cationic surfactants. All the important demands made on foam suppressors for anionic surfactants could therefore be met by these products. Additional effects can be achieved through combination of the named compounds, so there is a possibility of made-to-measure foam suppressors suitable for almost any kind of foam problem.

ETHOXYLATED ZIEGLER-ALCOHOLS FOR DETERGENTS. E. Scherf and W. Ussat (Candea Chem., Brunsbüttel). *Tenside Deterg.* 14(4), 177-80 (1977). Ziegler alcohol mixtures were used to prepare ethoxylates. The detergent power and foaming capacity were examined and it was found that ethoxylates based on C_{16} - C_{22} alcohol blends appear particularly suited for the formulation of foam controlled full-strength detergents for laundering temperatures between 40 and 90 °C.

BIODEGRADABILITY TESTING AND ITS RELEVANCE TO ENVIRONMENTAL ACCEPTABILITY. P.A. Gilbert and G.K. Watson (Unilever Res., Port Sunlight Lab.). *Tenside Deterg.* 14(4), 171-77 (1977). Care must be taken to ensure that the method used to determine biodegradability and the performance standard required to demonstrate environmental acceptability, are relevant to the real world. Hence it is important to understand the type of information provided by the various biodegradability test methods and methods of analysis, their relevance to practical situations and the influence of various factors on the results obtained.

BIODEGRADABLE SOIL CARRIERS. P.P. Haberer and F. Bayerlein (Diamalt A.-G., München-Allach). *Tenside Deterg.* 14(4), 185-7 (1977). Carboxymethylcellulose (CMC) has for many decades been the universally used soil carrier in detergent formulations. Numerous papers have demonstrated that CMC is not easily biodegradable. In the search for a more readily biodegradable substitute, starch seemed a good one. However starch derivatives are said not to have any effect in detergents. The chemical reasoning which led to this view are explained, from which a working hypothesis which leads to synthetic improved starch glycolates (carboxymethyl starch, CMS), which could be expected to be soil carriers. Reported is the synthesis of CMS, expected to exhibit soil carrying properties with synthetic fibers and blends, as well as cotton. The ecological data on CMS during biological sewage purification, i.e., depolymerization, the biological elimination from the sewage and the effect upon the biological population are described and compared with CMC.

TESTING OF SOIL CARRIERS IN DETERGENTS. H. Milster and U. Sommer. *Tenside Deterg.* 14(4), 187-8 (1977). Experimental conditions were determined for testing the soil carrying capacity of carboxymethylcellulose (CMC) and carboxymethyl starch (CMS), which lead to a definite though still not excessive graying of white fabrics. The soil content of the detergent bath was produced partly through using defined, much soiled, normal washing. The tests were carried out under practical conditions in drum type washing machines, the above mentioned soil carriers having been added to a basic detergent, either alone or in combination. The resultant graying of various kinds of textiles made of cotton and cotton/polyester blends was then determined. Different soil carriers produced different effects in cotton and mixed fabrics.

ENVIRONMENTAL BEHAVIOR OF ANIONIC AND NONIONIC SURFACTANTS. N.T. de Oude (Procter and Gamble European Tech. Center, Belgium). *Tenside Deterg.* 14(4), 189-94 (1977). During the first half of 1976 a test was conducted

in a community of approximately 100 homes without sewage treatment facilities. The families were supplied with laundering and dishwashing detergents. A sampling team frequently collected sewage and water of the creek receiving the sewage; the creek was sampled above, at and 1 km after the sewage outfall. Physical and chemical data were collected to determine concentrations and total amounts of several product ingredients. An acute aquatic toxicity test was modified to provide a biological response to the surfactants. With a participation of more than 85% of the eligible families and sampling covering more than 55% of the detergent consumption, the results are judged to be highly representative. The sensitivity of the program and the realistic value of the results will be demonstrated. The aquatic toxicity results were surprising and confirmed that field experiments are essential to assess the relevance of new laboratory tests and to review existing tests which are applied to new chemicals.

THE EFFECT OF DETERGENTS ON SWELLING OF STRATUM CORNEUM. G.J. Putterman, N.F. Wolejsza, M.A. Wolfram and K. Laden. *J. Soc. Cosmet. Chem.* 28(9), 521-32 (1977). Several surfactants were tested for their ability to produce in-plane swelling (increase in surface area) of squares of guinea pig stratum corneum. Highest levels of swelling were observed with the anionic surfactants sodium laurate and sodium lauryl sulfate, while little or no swelling was observed with the few cationic and nonionic surfactants examined. Though swelling in laurate was shown to be reversible, work index measurements revealed an irreversible weakening of the tissues. To gain insight into the mechanism of swelling the effects of protein denaturants and delipidizing agents were also evaluated. Concluded that protein denaturants, per se do not cause stratum corneum swelling, but that swelling is due to a reversible conformation change resulting from cooperative binding of the detergent. Stratum corneum swelling could be of value for studying detergent-skin interactions and for predicting detergent penetration of skin and possible subsequent skin irritation.

COMPOSITIONAL ANALYSIS OF SODIUM α -SULFO FATTY ACID METHYL ESTER BY NMR SPECTROMETRY. S. Hashimoto and T. Nagai (Lion Fat & Oil Co., Ltd. Tokyo). *Tenside Deterg.* 14(5), 271-2 (1977). The determination of sodium α -sulfo fatty acid methyl ester, disodium α -sulfo fatty acid and sodium methyl sulfate were studied by means of NMR spectrometry.

INTERACTIONS OF NONIONIC SURFACE ACTIVE AGENTS WITH TYROTHRIN. 1. INVESTIGATIONS ON THE INFLUENCE OF THE ANTIBIOTIC EFFECT. K. Thoma, E. Ullmann and L. Patt (Inst. Pharmacy and Food Chem. Univ. München). *Tenside Deterg.* 14(5), 266-70 (1977). Nonionic surfactants lower the antibiotic effect of tyrothricin in a different degree. Polyoxyethylene stearates and polyoxyethylene-900-sorbitan fatty acid esters cause a high decrease of action. The low molecular surface polyoxyethylene-400-laurate and -400-lauryl ether have less influence. The lowering of the antibiotic effect by adding homologous polyoxyethylene stearates increases with increasing polyoxyethylene component. Increasing fatty acid component of the homologous polyoxyethylene-900-sorbitan fatty acid esters has the same effect. Of all researched compounds polyoxyethylene-400-lauryl ether was found to have the smallest influence on the antibiotic effect of tyrothricin.

MICELLE-ADSORPTION OF HOMOLOGOUS SODIUM-N-ALKYLSULFATES. H.-D. Dorfer and E. Müller (Martin-Luther-Univ. Halle-Wittenberg). *Tenside Deterg.* 14(5), 262-5 (1977). The electroadsorption behavior of homologous Na-alkyl sulfates from $C_{10}H_{21}SO_3Na$ to $C_{17}H_{35}SO_3Na$ was studied by the a.c. polarography according to Breyer in the concentration range below and above the critical concentration. The analysis of the capacity-potential curves gives references that before reaching the critical micelle concentration from $E = 0V$ up to the first capacity maximum the existence of a bilayer structure is possible. In the potential branch from $E = -0.8V$ up to

$E = -1.4V$ two capacity maxima appear. The investigation of the temperature dependence of these maxima gives references that the first capacity maximum at less negative electrode potentials is related to the ad/desorption of micellar structures and the second capacity maximum with the ad/desorption of single molecules. The analysis of the time dependence of the electrode capacity lowering at different constant electrode potentials using the Koryta-equation gives that in the concentration range of the critical micelle formation diffusion and structural changing processes occur.

PREPARATION OF CARBOXYLIC ACID DIMETHYLAMIDE BY RADIATION INITIATED TELOMERIZATION OF ETHYLENE WITH DIMETHYL FORMAMIDE. B. Dederichs and S. Saus. *Tenside Deterg.* 14(5), 240-5 (1977). The telomerization of ethylene with dimethyl formamide can be initiated by gamma rays. Under pressure, the reaction results in a mixture of homologous N,N-dimethylalkane carbonamides and N-methyl-N-alkyl formide. Both isomeric series are produced in a ratio of approximately 1:1. The distribution of the homologous amides corresponds to that of a geometric series. The yield of primary amides is proportional to the absorbed dosage. For the effect of the dosage the equation $G = K \times 1^d$ applies, a having been found to be around 0.6. This means that the breaking-off of the chain is second order reaction. The reaction is dependent on pressure and temperature. As the pressure increases, the distribution of telomers is shifted toward longer-chain amides. High temperatures lead to increased energy yields.

PREPARATION OF POLYCARBOXYLATES FROM POLYSACCHARIDES, WOOD AND WOOD-LIKE MATERIALS AS NOVEL SEQUESTERING AGENTS. M. Diamantoglou, H. Magerlein and R. Zielke (Akzo Res. and Eng. Res. Inst. Obernburg). *Tenside Deterg.* 14(5), 250-6 (1977). The dicarboxymethylation of polysaccharides, especially cellulose and starch, with sodium halogen malonates, as well as the exhaustive oxidation of wood and wood-like substances with sodium hypochlorite has been found to produce two new groups of polycarboxylates. These represent effective sequestering agents which almost attain the reactivity of pentasodium triphosphate. Their biodegradability is moderate to very good, depending on the conditions under which they have been prepared and their carboxyl group content.

EFFECT OF THE STRUCTURE OF FATTY ACIDS ON THEIR WETTABILITY BY AQUEOUS SURFACTANT SOLUTION AND THE FRACTIONATION OF FATTY ACIDS. W. Zwierzykowski and E. Ledochowska (Technol. Inst. Organic and Food Chem. and Technol. Gdansk Tech. Univ, Poland). *Tenside Deterg.* 14(5), 257-61 (1977). The wettability of selected solid fatty acids by different surfactants was investigated. On the basis of the measure wetting angles the optimal composition of the wetting solution was established and then separations of rape seed oil fatty acids were carried out.

THE BEHAVIOR OF DYES AT OIL/WATER INTERFACES. H. Tamai, K. Hayashi and A. Watanabe (Kyoto Univ. Ind. Arts and Textile Fibers, Kyoto, Japan). *Colloid Polym. Sci.* 255(8), 773-81 (1977). The adsorption of ionic dyes, the builder effect, and the interaction between ionic dyes and surface active agents were investigated by using the electrocapillarity at oil/water interfaces. The oil phase was the solution of tetra-butylammonium chloride, sodium cetylsulfate, cetylpyridinium chloride or stearylamine in methylisobutylketone, and the water phase contained various dyes in addition to the inorganic electrolyte. The interfacial tension decreased over the anodic (or cathodic) polarization range, when anionic (or cationic) dyes were added to the water phase, thus indicating the dye adsorption at the interface. The interfacial excess of dye ions was found to increase linearly with the cube roots of dye concentration and of ionic strength of the water phase. The counterion binding took place at the oil/water interface between anionic (or cationic) dyes and positive (or negative) head groups of surface active agent ions adsorbed at the interface. It was found that the equilibrium constants of binding between anionic dyes and cationic surface active agents at the oil/water interface were of the same order of magnitude as, and a little larger than, those obtained at water bulk phase.

CARBOXYMETHYLATED ETHOXYLATES AS SURFACTANTS FOR THE PRODUCTION OF TERTIARY PETROLEUM. H. Stache, K. Kosswig, H. Grossmann and G. Schreier (Marl). *Tenside Deterg.* 14(5), 237-9 (1977). The sodium salts of carboxymethylated ethoxylates are promising surfactants for flooding, on account

of their good solubility, their stability in hard water and their chemical stability. By varying the hydrophobic radical, the degree of ethoxylation and that of carboxymethylation, a wide range of possibilities of adapting them to the demands of a specific petroleum deposit present themselves. Experience so far indicates that measurements of their interfacial tension by the ring method already give valuable information on the suitability of a surfactant for flooding of a specific formation.

ON THE THICKENING EFFECT OF WATER-SOLUBLE CELLULOSE ETHERS IN LIQUID DETERGENTS. P. Hüpfner. *Seifen, Ole, Fette, Wachse* 103(15), 429-32 (1977). Attempt to show specialists how, in formulating and adjusting liquid to pasty detergents, the viscosity setting can be correctly observed and critically checked. Among the technical arguments put forward in favor of cellulose ether, the setting of the rheological properties of the detergent, their stabilization and homogenization as well as prevention of the greying effect of textile detergents are the most important ones.

PERCARBONATE—PERBORATE AS BLEACH COMPONENTS OF DETERGENTS—A COMPARISON. H. Milster and U. Sommer (Federal Institution for Material Evaluation (BAM), Berlin). *Seifen, Ole, Fette, Wachse* 103(15), 415-17 (1977). Washing tests with perborate and percarbonate were performed under practical, comparable conditions, with the bleach being mixed with a stabilized basic powder suitable for processing with perborate.

PRINCIPAL SOURCES OF MICROBIOLOGICAL DETERIORATION OF TOILET SOAP AND THEIR ELIMINATION. V.A. Kopysev et al. *Maslo-zhir. Promst.* 1977(6), 26-8. On the basis of work done, recommendations for the prevention of microbiological deterioration of toilet soap and of its packing are given in the paper. Among these recommendations are the following: the soap must be stored at 15-18°C minimum and at a relative humidity of 75% maximum; the storage must be well ventilated. It is also recommended to add one of the antiseptics which are enumerated in the article. (Rev. Fr. Corps Gras)

PHYSICO-CHEMICAL PROPERTIES OF THE AQUEOUS SOLUTION OF CARBOXYLATE BUILDER. Y. Abe and S. Matsumura (Faculty of Engineering, Keio University, 832 Hiyoshimachi, Kohoku-ku, Yokohama, Japan). *Yukagaku* 26(7), 416-25 (1977). The effects of the physico-chemical properties of the aqueous solution of 38 carboxylate builders on detergents have been studied. The correlation between the building activity and molecular structure has been discussed. The detergency tests were carried out on naturally soiled cotton fabrics and the detergency powers were evaluated by Scheffe's method. Measurements were made on the surface tension, the critical micelle concentration, the emulsifying and solubilization capacities of the builder solution with DBS. The buffering and dispersing capacities for carbon black and manganese dioxide of the aqueous builder solution and the chelate stability constants of the builders with alkaline earth metals were determined. These results indicate that the washing efficiencies of formulations containing the carboxylate builder correlate well with their dispersing capacities for manganese dioxide and chelate stability constants with calcium ions. Other physico-chemical properties of the builder solutions have no relation to their washing efficiencies. ●

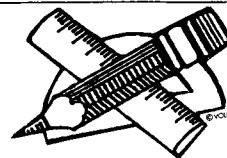
The Food and Drug Administration has retroactively approved use of D&C Red No. 34 in externally applied drugs and cosmetics. FDA had held up approval last March but now says such action was inappropriate. Details: *Federal Register*, Tuesday, Feb. 7, 1978, p. 4975. ●

AOAC annual meeting in October

The Association of Official Analytical Chemists will hold its 92nd annual meeting Oct. 16-19, 1978, at the Marriott Hotel in Washington, DC.

Approximately 200 papers will review current developments in analytical methodology applicable to agricultural, environmental, and public health areas during scientific sessions Monday afternoon through Thursday morning. One feature of the meeting will be a symposium on toxicological testing. ●

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

• Fats and Oils

AMELIORATING AGENTS FOR THE BREAD. A.P. Netchaev et al. *Pishch. Technol.* 1977(2), 34-6. The authors elaborated a technique for the synthesis of a product from interaction of stearic and lactic acids in the presence of sodium carbonate. The product was called sodium stelate and its composition can be expressed by the formula $C_{17}H_{35}CO(OCHCH_2CO)_nO Na$, where n is the degree of the lactic acid condensation. A molar ratio between the lactic acid and the stearic acid, of 1:1.6, allows the obtaining of an effective emulsifier which improves the bread quality. (Rev. Fr. Corps Gras)

VARIATION OF THE VITAMIN COMPOSITION AND OF THE PROPERTIES OF MILK FAT DURING STORAGE. M.M. Merzametov. *Pishch. Technol.* 1977(1), 70-2. During prolonged storage of milk fat, independently of the conditions, different chemical processes occur, leading to a decrease of the unsaturated acids, an accumulation of peroxides, and a modification of the vitamin composition. (Rev. Fr. Corps Gras)

ANTIOXIDANT ACTIVITY OF ALPHA, GAMMA, AND DELTA TOCOPHEROL ISOMERS IN THE MILK FAT OXIDATION. N.K. Nadirov et al. *Pishch. Technol.* 1977(1), 25-7. In the oxidation conditions accelerated by atmospheric oxygen in milk fat, the tocopherols, in concentration of 0.001-0.1%, show a good antioxidant property. The best oxidative stability in these conditions have the samples which contain 0.05% of α -tocopherol, 0.05% of γ -tocopherol, and 0.07% of δ -tocopherol. The antioxidant activity of the tocopherol isomers increases in the order $\alpha < \gamma < \delta$ and in the ratio 1:1.6:2.1 regarding the time of the induction period. (Rev. Fr. Corps Gras)

STUDY OF THE WETTING POWER OF WATER SOLUTIONS OF SOME SURFACE ACTIVE AGENTS FOR FRACTIONATION OF FATTY ACIDS. A.P. Lebedev et al. *Maslo-zhir. Promst.* 1977(5), 16-9. Among the studied surface active agents, the best wetting power belongs to the anionic ones which contain sulfuric groups. For laurylsulfate solutions, a complete wetting was observed with a concentration of 0.3%, compared with 3% for the sulfonol and 1.5% for the dodecylbenzenesulfonate. The introduction of an electrolyte decreases the wetting power of the solutions of surface active agents. (Rev. Fr. Corps Gras)

DIELECTRIC CHARACTERISTICS OF DIFFERENT EDIBLE FATS. M.I. Beliaev et al. *Maslo-zhir. Promst.* 1977(4), 25. At the present time, there exists a wide use of "Belorousski" and "Ukrainski" fats and of sunflower oil as frying fats, whose dielectric characteristics (dielectric permeability, coefficient of energy absorption, tangent of the angle of dielectric losses) are given in this paper. (Rev. Fr. Corps Gras)

MICROBIOLOGICAL REQUIREMENTS IN SUNFLOWER MEAL USED FOR EDIBLE PROTEINS. L.A. Zelenina et al. *Maslo-zhir. Promst.* 1977(4), 22. The microbiological requirement for sunflower meal destined for the production of edible proteins, on the experimental installation of the VNIIZH branch in Kharkov, are given in the paper. One of these is that the total number of microorganisms in 1 g of extraction meal can be max. 120,000. (Rev. Fr. Corps Gras)

SOME PROPERTIES OF THE SOLID PHASE OF NON-FILTRATED MISCELLAS OF CASTOR OIL. G.Ya. Stam et al. *Maslo-zhir. Promst.* 1977(4), 19-21. The chemical composition and the dimensions of the particles constituting the deposit of the miscella were established. The deposit contains a high quantity of protein and of non-lipidic phosphorus. The obtained data can be used in perfecting the technology of elimination of the solid phase from the miscella of castor oil. (Rev. Fr. Corps Gras)

THE OXIDO-REDUCTIVE FERMENTS OF THE SEEDS AND THE MICROORGANISMS IN THE PRODUCTION OF THE VEGETABLE OILS.

A.M. Goldovski et al. *Maslo-zhir. Promst.* 1977(4), 13-7. The oxido-reductive ferments are localized in the gelatinous part of the cells of the kernel seeds; they are not present in the lipidic part of the cells. The gas exchange (absorption of oxygen and release of carbonic acid) revealed in the gelatinous part of the treated material is connected to the complex action of the oxido-reductive ferments and of the microorganisms contained in it. During the crushing of seed kernels, the action of ferments becomes stronger. During further operations, the inactivation of ferments occurs, a certain quantity of these still remaining non-inactivated and being able to participate in the oxidative processes. During the treatment of the sunflower seeds and soybeans following the scheme prepressing-extraction, the lipoxylase is inactivated most intensively during the cooking preceeding prepressing, while following the scheme of direct extraction, this occurs during the elimination of the solvent from the meal. The activity of lipoxylases for the sunflower seeds and soybeans are compared. (Rev. Fr. Corps Gras)

OXIDATION OF SUNFLOWER OIL UNDER FOAMY CONDITIONS. K.A. Melnikov et al. *Maslo-zhir. Promst.* 1977(3), 37-41. The formation of peroxide compounds during the oxidation of vegetable oil depends on the temperature of reaction. With a temperature going up to 120°C, the peroxide compounds are formed as much on the carbon atom adjacent to the double bond as on this one. The oxidation process is preceded by an isomerization of the double bonds with formation of conjugated systems. Increasing the temperature up to 150°C, the oxidation occurs preferentially on the double bond and it is considerably intensified. However, the mechanical properties of the obtained sheets are deteriorated a little due to the decrease of the molecular weight of the polymers. From the economic point of view, it is better to carry out the oxidation of the oil at a temperature of 110-120°C. (Rev. Fr. Corps Gras)

COMPOSITION AND PARTICULARITIES OF COPPER CATALYSTS DURING HYDROGENATION OF SUNFLOWER AND SOYBEAN OILS. B.N. Tiutiunnikov et al. *Maslo-zhir. Promst.* 1977(1), 21-3. The hydrogenation of fats with copper catalysts is accompanied by a smaller deviation of the radical selectivity in comparison with the hydrogenation with nickel catalyst. The copper catalysts, in the studied conditions, accelerate the reaction of the acyl groups of linolenic and linoleic acids with molecular hydrogen, not exercising practically any influence on the saturation of oleic acid groups. The copper catalysts do not manifest activity in the hydrogenation reaction if they do not contain silicon, its salts, or oxides of certain metals (Al_2O_3 , Cr_2O_3 , MgO). (Rev. Fr. Corps Gras)

STUDIES ON THE METAL-PROTEIN COMPLEX. XI. EFFECT OF IONIC PROPERTIES OF POLYPEPTIDES ON METAL-CATALYZED FATTY ACID OXIDATION. S. Yamashoji, H. Yoshida, and G. Kajimoto (Faculty of Nutrition, Kobe Gakuin University, Arise, Ikawadani, Tarumi-ku, Kobe, Japan). *Yukagaku* 26(7), 433-5 (1977). The effect of ionic properties of poly (L-Glu) [poly (L-Glutamic acid)] and poly L-Lys [poly (L-Lysine)] on metal-catalyzed fatty acid oxidation were studied as a model of metal-fatty acid-protein interaction in aqueous solution. In the poly (L-Glu) system, most of added Fe^{3+} combined with poly (L-Glu), and the resultant Fe^{3+} poly (L-Glu) complex caused the inhibition of the oxidant activity of added Fe^{3+} . On the other hand, about 70% of added Cu^{2+} remained in ionic state in the poly (L-Glu) system, and the oxidant activity of added Cu^{2+} was observed. In the poly (L-Lys) system, an insoluble fatty acid-poly (L-Lys) complex was formed, and most of added metal ion was contained in the complex. The rate of metal-catalyzed fatty acid oxidation increased with an increase in poly (L-Lys) concentration and with a rise in temperature under the formation of the insoluble fatty acid-poly (L-Lys) complex.

OXYGEN CONTENT IN FATS AND OILS AFFECTED BY THEIR AGING. K. Imaeda, T. Kuriki, and K. Ohsawa (Hoshi College of Pharmacy, 2-4-41, Ebara, Shinagawa-ku, Tokyo, Japan). *Yukagaku* 26(7), 436-9 (1977). Oxygen content in fats and oils was investigated by a modification of the Schutze-Unterzaucher method. Oxygen in soybean oil and colza oil heated at 180° C in air was determined periodically. The oxygen contents of soybean oil and colza oil were 9.9% and 9.2% initially and 8.2% and 9.1% after 30 hours, respectively; therefore the change in the oxygen contents was very little in this case. Oxygen was passed through linseed oil heated at 100°C and 200°C, and the oxygen content in linseed oil determined periodically. The oxygen content in linseed oil was initially 11.0%, that is gelatinized linseed oil heated at 100° C for 10 hours was 17.8%, and that in gelatinized one heated at 200° C for 5 hours was 15.0%. Then, oxygen content in perilla oil was similarly determined. The oxygen content in linseed oil was determined in the process of drying test by using cobalt naphthenate as a drier. The oxygen content in linseed oil was 8.5% initially and 21.6% after 6 hours. To linseed oil, butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA) or isopentyl gallate was added, each mixture heated at 100° C or 200° C under the passage of oxygen, and the oxygen content was determined. This determination of oxygen content in fats and oils affected by their aging seems to be effective for clarifying the process of their oxidation and degradation, in addition to other usual instrumental analyses.

PREPARATION OF METHYL ESTERS FROM FATS AND OILS CONTAINING SHORT-CHAIN FATTY ACIDS USING BORON TRIFLUORIDE-METHANOL REAGENT. H. Seino, S. Nakasato, T. Sangai, T. Murui, and H. Yoshida (Hygienic Sciences, Kitasato University, 1, Asamizodai, Sagami-hara-shi, Japan). *Yukagaku* 26(7), 405-10 (1977). Boron trifluoride (BF₃)-methanol complex is widely used for the preparation of methyl esters for gas chromatography. However, it is feared that short-chain fatty acids are lost when esters are prepared from fats and oils containing these acids by the conventional BF₃-methanol method. Soybean oils containing definite amounts of glycerol trihexanoate and glycerol trioctanoate were prepared and used as the samples for the collaborative studies. GC analysis of the esters prepared from these samples by the conventional method revealed an appreciable loss of hexanoic- and octanoic acids. Partial evaporation of the short-chain esters and partial passage of them into aqueous sodium chloride layer were supposed to be responsible for the low recovery of these esters. The collaborative studies suggested that the recovery of the esters of short-chain acids (C₆ and C₈) could be improved by the following modification of the conventional method. a) Shaking the mixture after the addition of aqueous sodium chloride solution. b) Reextraction of esters from the aqueous layer after the separation of hexane (or heptane) layer. c) Immediate GC analysis after the esterification. It was concluded that 7 ml of 7%-BF₃-methanol reagent was enough to esterify 300 mg of oil sample.

QUANTITATIVE DETERMINATION OF POLAR LIPIDS ON THIN LAYER-FID CHROMATOGRAPHY. M. Tanaka, T. Itoh, and H. Kaneko (Division of Chemistry, School of General Studies, Kitasato University, 1-Asamizodai, Sagami-hara, Kanagawa, Japan). *Yukagaku* 26(8), 454-7 (1977). In the analysis of phospholipid mixtures which contained phosphatidylcholine, cardiolipin, phosphatidylethanolamine, sphingomyelin and lysophosphatidylcholine, the relative responses for quantitative thin layer chromatography combined with a hydrogen flame ionization detector (thinchromography) represented a good coincidence with the theoretical responses based on weight per cent. It was also found that thinchromography is a useful tool for the estimation of the relative amounts of nonpolar lipid to polar lipid or neutral lipid to phospholipid and glycolipid in the total lipid extract.

STUDIES ON THE ISOMERIZATION OF 24-METHYLENECYCLOARTANOL TO CYCLOBRANOL. S. Asano, T. Shinagawa, T. Honda, N. Nashida, and T. Kuramoto (Technical Research Section of Tokyo Works, Riken Vitamin Oil Co., Ltd., 1-15-10, Wakagi, Itabashi-ku, Tokyo, Japan). *Yukagaku* 26(9), 545-9 (1977). Examination of crude rice bran oil and their foots obtained from different local manufacturers revealed the absence of cyclobranol, which is one of triterpene alcohols and occurs in some commercial oryzanols. On the other hand, cyclobranol was proved to be formed from 24-methylenecycloartanol, originally found in rice brans, by the translocation of a double bond in the side carbon chain in the presence of a catalytic

amount of hydrogen ions. The isomerization of 24-methylenecycloartanol to cyclobranol was observed to proceed most efficiently in the presence of sulfuric acid catalyst along with isopropyl alcohol solvent. The determination of isolated cyclobranol was carried out by the IR, NMR and mass spectra as well as elementary analysis, and showed the following properties: mp. 165° C and $[\alpha]_D^{26}$, +46.6°.

STUDY OF HEATED OILS. III-CHEMICAL CONSTITUTION OF THERMOXYDATIVE ALTERATION PRODUCTS. M. Naudet *Rev. Fr. Corps Gras* 24(10), 489-92, (1977). Operational conditions required for isolating the thermooxydative alteration products selectively, quantitatively, and without structural changes, are reviewed. A separation process for these compounds is proposed. This technique enables to distinguish between cyclic and acyclic dimers, estolides, ether bridge-link oligomers, oxymonomers and oxypolymers; the principal possible structures of these compounds are recalled. Examples of separation are given for different oils.

ANALYSIS OF FATS AND OILS BY TLC ON GLASS COATED ROD AND GLC ON GLASS CAPILLARY COLUMN. F. Mordret, A. Prevot, N. Le Barbanchon and C. Barbati *Rev. Fr. Corps Gras* 24(10), 467-75, (1977). In thin layer chromatography the use of an apparatus equipped with a FID detector permits the quantitative exploitation of results obtained with thin layer coating on fine refractory rods. In the case of industrial monoglycerides, the repeatability is good. The analysis is performed in a few minutes. Some examples of applications on AgNO₃-impregnated adsorbent are given. In GLC, the use of capillary columns for oils and fats analysis, already proposed by the authors, is shown in the following separations: fatty acids complex mixtures, positional isomers, hydroxy compounds, total sterols, triglycerides. The quantitative results and also the repeatability are discussed comparing with those obtained with packed columns. A simple rapid technique for sterols separation is proposed; its applications to pure oils mixtures is discussed.

STUDY OF HEATED OILS. II-TOXICOLOGICAL AND NUTRITIONAL STUDY OF PEANUT OIL, PALM-OIL, SOYBEAN-OIL AND SUNFLOWER OIL IN THE RAT. B. Coquet, D. Guyot, X. Fouillet and J.L. Rouaud *Rev. Fr. Corps Gras* 24(10), 483-8 (1977). Rats have been fed a balanced diet containing 15% heated or non-heated oil and 20% proteins; the heated oils have been prepared according to Guillaumin's technique (cf. the first part of the study). During the tolerance experiment after 3 months, blood, urine, anatomopathological and histological tests have shown no intolerance to one of heated oils. The reproduction test has shown no anomaly about fertility and growth in utero. The youngs, fed after weanling the same diet have been killed 5 weeks old. The autopsy indicates no significant anomaly, but only a relative weight of liver and kidneys lightly above those of controls.

STUDY OF HEATED FATS. I-PREPARATION AND CHEMICAL CHARACTERISTICS OF PEANUT-OIL, PALM-OIL, SOYBEAN-OIL AND SUNFLOWER OIL HEATED AT 220°C. R. Guillaumin, M. Gente-Jauniaux and C. Barbati *Rev. Fr. Corps Gras* 24(10), 477-81, (1977). The four refined oils have been heated until 220°C without foods, at the rate of one heating a day during 15 days, i.e. on the whole 10 hours at a temperature above 200°C. The thermooxydative changes in the oils have been studied during these experiments. A general increase of new chemical species (N.C.S.) depending on the polyunsaturation, oxidative past, metal traces content of the oils has been shown. Only very low and not greatly significant increases of the cyclic monomers have been observed, whatever the oils may be.

EFFECT OF FERTILIZERS ON THE COMPOSITION OF THE LIPIDS PRODUCED BY PERENNIAL TROPICAL OIL PLANTS AND ON THEIR YIELD. R. Ochs and M. Ollagnier, *Oléagineux* 32(10), 409-26, (1977). Experimental results from agricultural research are used in this survey to clarify the part which fertilizers play, or could play, in the production of lipids in the tropics. It is limited to two important crops: the oil palm and the coconut, for each of which fertilizer response is examined for response to the individual nutrients and to the rates applied. The potassic fertilizers play the foremost role in the fertilization of these crops, followed by nitrate, phosphatic and magnesium fertilizers. The choice of the salts used as fertilizers has also assumed great importance. There are still few experimental data on the effects of fertilizers on quality and the few results available do not permit the formation of any general hypothesis. However, in the majority of cases fertilizer greatly

increases the yield of primary products without noticeable effect on their oil content or on the quality of the oil, which is so controlled by genetics as to be almost insensitive to environmental conditions.

COMPARATIVE STUDY OF THE FRACTIONATION OF OILS FROM ELAEIS GUINEENSIS AND FROM ELAEIS GUINEENSIS \times ELAEIS MELANOCOCCA HYBRIDS. S. Musso, C. Bouvron, P. Archier and H. Yohou, *Oléagineux* 32(11), 489-91, (1977). In spite of a high iodine value, the oil of *Elaeis guineensis* \times *Elaeis melanococca* hybrid is still too rich in solid glycerides to be used as a table oil even in tropical countries. The fractionation of this oil makes it possible to obtain a large out put of fluid fraction with a better cold stability than that of peanut oil and therefore very much superior to that of the fluids obtained with *Elaeis guineensis* oil by the different systems used industrially for fractionation.

CONTROL OF FLOWS IN OIL-MILLS BY PROCESSES USING THE MICRO-PROCESSORS. J.P. Helme, J. Colin and F. Zwobada *Rev. Fr. Corps Gras* 24(11), 535-41 (1977). Refining has actually some control and information means which make possible the optimization of concerned parameters. The pick up of different datas, by one or several computers, might lead to a better adjusting of lines qualitatively and quantitatively. The sum of datas leads to new correlations and in the future, perhaps to an automatic control and processing. The principle of Loss Monitor is described. It is a device able to measure a difference of volume between an upper and lower flow during a given period of time. A differential volume indicator is concerned.

DETERMINATION OF TOTAL UNSAPONIFIABLE IN FATS AND OILS. A. Pelloquin, C. Dimitriades and M. Naudet, *Rev. Fr. Corps Gras* 24(11), 551-60 (1977). The various phases for determination of unsaponifiable have been reviewed; this study enabled the development of two methods for the selective and total separation of all unsaponifiable components in an oil, without changing their structure and without artefact.

ACTUAL KNOWLEDGE ON EDIBLE FATS: THEIR IMPORTANCE IN HUMAN NUTRITION. R.O. Vles and U.M.T. Houtsmuller, *Rev. Fr. Corps Gras* 24(11), 523-8 (1977). The hyperlipidemies, high risk factors for the occurrence of coronary heart disease, reveal metabolic disturbances which are highly dependent on quantity and quality of dietary carbohydrates and lipids. The regulatory role of linoleic acid has now been well documented. This fatty acid of dietary origin is a basic element in the construction of cells. Via its metabolic derivatives, it plays an exclusive functional role. In fact, it is the precursor of a series of substances known by the general name of prostaglandins. The prostaglandins, which are synthesized and are active in all tissues are modulators of hormonal activities. Their influence on blood platelets, blood pressure and heart function may account for the favourable effects observed after administration of linoleic high diets. Studies involving other dietary fatty acids such as the trans isomers of unsaturated fatty acids are enabled to disclose their metabolism and to confirm their innocuity.

UP TO DATE METHODS OF ANALYSIS AND CONTROL IN THE INDUSTRY OF FATS AND OILS: CONTROL OF LEVELS. J. Colin, *Rev. Fr. Corps Gras* 24(11), 543-9 (1977). The devices for control and determination of levels are used for several purposes:—safety devices in order to regulate a manufacture line;—evaluation of quantities in order to manage production unit;—determination of inventories (for liquids) in order to establish product balances and yields. The methods which are used are various and often selected for a given purpose, from the simplest device like the visual gauge to the most sophisticated apparatus using gamma rays or ultrasonics. It is important, in oil mills, to know precisely the inventories of oils, which needs reliable and highly performant devices. To this end, an apparatus based upon old principle of bliber has been tested; its accessory parts: pressure captors, flow regulator are up to date. It gives, in some conditions, precisions above 1%.

QUALITY PRESERVATION AND TESTING OF MALAYSIAN PALM OIL FROM FRESH FRUIT BUNCHES TO THE OIL REFINERY. B. Bek-Nielsen, *Oléagineux* 32(10), 437-41 (1977). Growth of palm oil production in Malaysia. Quality criteria on arrival at the refinery. Methods of purification on the spot to produce an oil fulfilling quality requirements, particularly as regards acidity and bleachability (Totox). Responsibility of shipping companies.

• Biochemistry and Nutrition

A LONG-TERM NUTRITIONAL STUDY WITH AUTOXIDIZED OIL. N. Shibata and T. Kinumaki (Tokai Regional Fisheries Research Laboratory, Kachidoki 5-5-1. Chuo-ku, Tokyo, Japan). *Yukagaku* 26(9), 529-33 (1977). Commercial stock diet, 10 g per mouse are fed as basal diet to one of the three groups each consisting of 50 mice. Mice in other two groups received 0.1 ml of fresh or autoxidized safflower oil per mouse by mixing each with 10 g of the basal diet, respectively. Feedings were continued for 9 months and observation was performed on growth rate and mortality during this period. Five mice of each group were killed at 2, 9, 14, 30 and 39 weeks after the start of feeding to determine blood glucose level, hepatic triglyceride and cholesterol contents and activities of various enzymes in liver. The following results were obtained. 1. The autoxidized oil obviously caused the lowering of average gain of the body weights of the group fed this oil as compared with the other two groups fed basal diet on fresh oil. 2. At the time when the lowering of body weight gain was observed, the mortalities of this group became higher than those of the other two groups. 3. The glucose levels in blood, triglyceride and cholesterol contents in livers did not show any difference among the three test groups fed on basal diet, with fresh oil and with oxidized oil.

EFFECT OF DIETARY FAT LEVEL ON GROWTH AND LIPOGENESIS IN THE COLOSTRUM DEPRIVED NEONATAL PIG. R.G. Wolfe, C.V. Maxwell, E.C. Nelson and R.R. Johnson (Dept. of Animal Sci. and Dept. of Biochem., Oklahoma State Univ., Stillwater, OK). *J. Nutr.* 107, 2100-8 (1977). Thirty male neonatal pigs were obtained by cesarean section and randomly allotted from littermate groups to three diets containing 2%, 17%, and 32% fat on a dry matter basis. Butterfat was used to replace glucose in the isoenergetic liquid, semipurified diets. Each pig was placed in a sterile isolator and fed ad libitum five times daily. After 14 days, pigs were weighed, killed, and samples of liver and backfat were obtained. The carcass of each pig was ground and samples obtained for determination of total body fat and protein. An increase in the level of dietary fat resulted in a significant increase in 14 day weight gain and a tendency for improved feed efficiency. These results demonstrate not only that the neonatal pig can utilize semipurified liquid diets high in butterfat content, but also that energy from butterfat appears to be used as efficiently as energy from glucose for growth purposes. Increasing dietary fat level decreased the activity of fatty acid synthetase and citrate cleavage enzyme in adipose tissue and liver, and decreased the activity of malic enzyme in adipose tissue. The specific activities of these three enzymes were higher in adipose tissue than in liver.

HYDROCARBON CHAIN DISORDER IN LIPID BILAYERS. TEMPERATURE DEPENDENT RAMAN SPECTRA OF 1,2-DIACYL PHOSPHATIDYLCHOLINE-WATER GELS. N. Yellin and I.W. Levin (Lab. of Chem. Phys., Nat. Inst. of Arthritis, Metabolism and Digestive Diseases, Nat. Inst. of Health, Bethesda, MD). *Biochim. Biophys. Acta* 489, 177-90 (1977). Vibrational Raman spectra of multilayers of 1,2-dimyristoyl, 1,2-dipalmitoyl and 1,2-distearoyl phosphatidylcholine were recorded as a function of temperature for the gel phase from -180°C to values slightly below the pretransition temperature. Temperature profiles for band intensity ratios involving the acyl chain C-C stretching modes define a characteristic temperature T_g which denotes the onset of hydrocarbon chain trans-gauche isomerization in the gel. T_g for the dimyristoyl (C_{14} chain lengths), dipalmitoyl (C_{16} chain lengths) and distearoyl (C_{18} chain lengths) systems are approximately -40 , -40 and 5°C , respectively. The higher T_g value for distearoyl phosphatidylcholine is associated with increasing interactions between the terminal chain areas of the individual monolayers forming the bilayer unit. This increased interaction between bilayer halves is presumably a consequence of the larger angle through which the hydrocarbon chains are tilted in the C_{18} phospholipid gel.

BASE STIMULATION OF PHOSPHOLIPID METABOLISM IN NEUROBLASTOMA CELLS. II. ESTIMATES OF RATES OF SYNTHESIS AND DEGRADATION OF PHOSPHOGLYCERIDES BY BASE MANIPULATION. E. Yavin (Dept. of Neurobiol., Weizmann Inst. of Sci., Rehovot, Israel) *Biochim. Biophys. Acta* 489, 290-7 (1977). Choline-stimulated phosphatidylcholine accumulation in phosphatidylcholine-depleted neuroblastoma cell cultures has been investigated. The estimated doubling time for phosphatidylcholine synthesis is about 11 h. A 2-fold increase in the total

cellular phospholipids is observed after 24 h following choline addition. This is attributed to the inability of cells to remove phosphatidyl dimethylethanolamine most likely due to the presence of an endogenous pool of phosphodimethylethanolamine precursor. Upon depleting this pool a 7-fold higher rate of phosphatidyl dimethylethanolamine degradation is observable in the presence of choline than in the presence of ethanolamine. These observations, viewed in the context of regulation of phospholipid biosynthesis, suggest that internal recycling of the polar head group may be a vital process of maintaining cellular phospholipids under steady-state conditions.

BASE STIMULATION OF PHOSPHOLIPID METABOLISM IN NEUROBLASTOMA CELLS. I. KINETICS OF INCORPORATION OF N-METHYLATED ETHANOLAMINE BASES. E. Yavin (Dept. of Neurobiol., Weizmann Inst. of Sci., Rehovot, Israel) *Biochim. Biophys. Acta* 489, 278-89 (1977). The effects of nitrogen bases on the regulation of phospholipid metabolism in neuroblastoma cell cultures were investigated. An increase in the total cellular phospholipids was observed up to 24 h following plating. Addition of monomethyl- and dimethylethanolamine bases resulted in a stimulation of the synthesis of their corresponding phospholipids. The average rates of synthesis of phosphatidylmono- methyl- and phosphatidyl dimethylethanolamine were 0.09 and 0.12 nmol/ μ g DNA per h, respectively. The labeling patterns of the various phospholipid species from ortho- 32 P]phosphate have been determined. They suggest that the synthesis of the analogs proceeded entirely via a phosphate-mediated pathway rather than through a base exchange mechanism. A number of distinct patterns for the incorporation of bases into acyl-, alkyl- and alkenyl-containing phosphoglyceride species were indicated. The polar head group composition appeared to be intimately related to the type of bond of the hydrocarbon residue.

ELASTIN SUB-FRACTION AS BINDING SITE FOR LIPIDS. K. Tokita, K. Kanno and K. Ikeda (Dept. of Clinical Lab., Yamagata Univ. Med. School, Iida, Zaoh, Yamagata 990-23, Japan) *Atherosclerosis* 28, 111-9 (1977). Elastin preparations were isolated from human thoracic aorta, from atherosclerotic and from grossly normal regions. A relatively mild procedure was used to avoid hot alkaline extraction and autoclaving. The elastase digest of the aortic elastin was chromatographed on a Sephadex G-100 column and separated into two fractions: A (larger molecular weight) and B (smaller molecular weight). The ratio of fraction A to total aortic elastin increased with age and the development of the atherosclerosis. Amino acid and sugar analyses showed that fraction A consistently contained more polar amino acids, hexose, hexosamine and L-fucose, and less sialic acid, in comparison with fraction B. Part of the elastin preparation was incubated with human low-density lipoprotein; a considerable amount of lipid, especially cholesterol, was transferred from the lipoprotein to the elastin. Estimation of protein and cholesterol in fractions A and B of the elastase hydrolyzate of incubated elastin showed that most of the cholesterol taken up by elastin had been in fraction A. The increased proportion of fraction A in aortic elastin derived from plaque areas appeared responsible for the marked lipid-binding capacity of plaque elastin.

LIPID BINDING BY FRAGMENTS OF APOLIPOPROTEIN C-III-1 OBTAINED BY THROMBIN CLEAVAGE. J.T. Sparrow, H.J. Pownall, F.-J. Hsu, L.D. Blumenthal, A.R. Culwell and A.M. Gotto (Dept. of Med., Baylor College of Med. and The Methodist Hosp., Houston, TX) *Biochemistry* 16, 5427-31 (1977). We have used thrombin to cleave apolipoprotein C-III-1 into two fragments constituting residues 1-40 (apoLP-C-III-A) and 41-79 (apoLP-C-III-B). The lipid binding properties of these fragments with dimyristoyl- and 1-palmitoyl-2-oleoyl-phosphatidylcholines have been determined using circular dichroic and intrinsic tryptophan fluorescence spectroscopy. The results of these studies and the examination of space filling models of apoLP-C-III provide evidence that an amphipathic α helix which contains a nonpolar face and a polar face is the basic structural unit for binding of phospholipid by the plasma apolipoproteins. These results also provide direct evidence that the hydrophobicity of the nonpolar face is important in lipid binding since the nonpolar face of residues 1-40 is considerably less hydrophobic than the nonpolar face of residues 41-79.

ANTIBODIES TO LIPOPROTEIN LIPASE. APPLICATION TO PERFUSED HEART. M.C. Schotz, J.S. Twu, M.E. Pedersen, C.H. Chen,

A.S. Garfinkel and J. Borensztajn (Res. Veterans Admin., Wadsworth Hosp. Ctr., Los Angeles, CA) *Biochim. Biophys. Acta* 489, 214-24 (1977). An antibody was prepared against purified rat heart lipoprotein lipase. This antibody showed marked species specificity. It inhibited almost totally the lipoprotein lipase activity from all rat tissues examined (i.e., heart, adipose, postheparin plasma, and mammary gland), while having no effect on the activity of lipoprotein lipase partially purified from rabbit, guinea pig and bovine heart and from bovine milk. The antibody also had no effect on the hepatic lipase activity of rat postheparin plasma. The data give compelling evidence that the functional fraction of lipoprotein lipase in hearts is at the endothelial cell surface accessible to lipoprotein lipase antibody.

APOLIPOPROTEIN A-II CONTENT OF HUMAN PLASMA HIGH DENSITY LIPOPROTEINS MEASURED BY RADIOIMMUNOASSAY. G. Schonfeld, J.-s. Chen, W.F. McDonnell and I. Jeng (Lipid Res. Center, Dept. of Preventive Med. and Med., Washington Univ. Schl. of Med., St. Louis, MO) *J. Lipid Res.* 18, 645-55 (1977). A double antibody radioimmunoassay for human ApoA-II is reported. ApoA-II isolated from human plasma high density lipoprotein (HDL) by column chromatography migrated as a single band on polyacrylamide disc gel electrophoresis, had the appropriate amino acid composition, and provoked the production of monospecific antisera. Similar results were obtained whether assays were carried out on intact or delipidated HDL samples. Thus, in contrast with ApoA-I (only 10% of which is detectable), all of the ApoA-II contents of intact HDL are detected with accuracy by this assay. Plasma levels of ApoA-II in young normolipemic subjects were approximately 40 mg/dl ($n=29$). In these subjects, over 98% of ApoA-II was found in the d 1.063-1.21 density fractions.

EFFECT OF SELECTIVE DEPLETION OF FIBRINOGEN ON THE EVOLUTION OF CHOLESTEROL-INDUCED ATHEROSCLEROSIS IN RABBITS. R.P. Sapru, R.N. Chakravarti, A.K. Moza, A. Kanta, and U. Kaur (Dept. of Cardiology and Experimental Med., Postgraduate Institute of Med. Education and Research, Chandigarh, India) *Atherosclerosis* 28, 171-9 (1977). Atherosclerosis was produced by induced alimentary hyperlipaemia in four groups of rabbits. Animals of groups II and III received cholesterol feeds daily for 2 months while in groups IV and V this was followed by another 3 months of intermittent feeding. Group I comprised normal control rabbits. Selective fibrinogen depletion was produced in groups III and V with Arvin so as to maintain the plasma fibrinogen around 100 mg/dl over the last 2 months of cholesterol feeding. Serum lipids, blood coagulation and euglobulin clot lysis as well as the post mortem histopathology of aorta, heart, kidneys, liver and lungs did not reveal any significant differences between corresponding groups of hyperlipaemic animals treated with (groups III and V) or without (groups II and IV) Arvin. It appears that fibrinogen or fibrin incorporation does not play a significant role in the pathogenesis of atherosclerotic lesions induced in rabbits by cholesterol feeding.

EFFECTS OF PERINATAL MALNUTRITION ON LIPID COMPOSITION OF NEURAL TISSUES FROM RHESUS MONKEYS. O.W. Portman, M. Alexander, M. Neutinger, M. Novy, R. Illingworth, and H. Uno (Dept. of Nutr. and Metabolic Diseases, Univ. of Oregon, OR) *J. Nutr.* 107, 2228-35 (1977). The effects of two forms of early deprivation on the composition of neural tissues were assessed. Female rhesus monkeys (*Macaca mulatta*) were fed a low protein diet prior to conception or from gestational day 50 until the infants were delivered by Caesarean section at gestational day 160; the infant monkeys were then fed a low protein formula until day 195, 5 weeks after birth. In another group of pregnant rhesus monkeys, the bridging vessels between the two discs of the bipartite placenta were ligated at gestational day 90, thereby reducing the functional placental mass; the infants were delivered at gestational day 155 and also fed nutritionally adequate diets throughout.

INFLUENCE OF DIETARY GLYCEROL ON THE SERUM LIPOPROTEINS OF RATS FED A FAT-FREE DIET. K.A. Narayan, J.J. McMullen, T. Wakefield and W.K. Calhoun (Nutr. Group, Food Sciences Lab., U.S. Army Natick Research and Development Command, Natick, MS) *J. Nutr.* 107, 2153-63 (1977). The effects of a high level of dietary glycerol on six density classes of serum lipoproteins were investigated in adult male Holtzman rats. A diet consisting by weight of glucose, 75.3%; vitamin-free casein, 17%; mineral mixture 5.5%; and all necessary vitamins

in glucose, 2.2%, was used as the control diet (group A). In two other groups, B and C respectively, either 30% glycerol or 20% corn oil was added by weight to diet A at the expense of glucose. The diets for groups A and B were approximately isocaloric (3.8 kcal/g); but the diet for group C had a higher density of energy (4.6 kcal/g). The present data suggested that a high level of dietary glycerol stimulated lipogenesis by the intestinal mucosal cells and thereby increased the output of chylomicra. It was previously reported that liver lipids were greatly elevated in rats in group C as compared with groups A and B.

EFFECT OF OXIDANTS, HYDRAZINES, AND AMINOQUINOLINES ON THE FILTERABILITY OF ERYTHROCYTES FROM VITAMIN E-DEFICIENT LEAD-POISONED RATS. O.A. Levander, V.C. Morris and R.J. Ferretti (Natr. Institute, Agricultural Research Service, United States Dept. of Agriculture, Beltsville, MD) *J. Nutr.* 107, 2135-43 (1977). Weanling male rats were fed, for 3 months, either a vitamin E-deficient Torula yeast diet or the same diet supplemented with 100 ppm vitamin E. Of rats fed each diet, one group received 250 ppm lead in the drinking water, whereas another group received no lead. Incubation in vitro with dialuric acid, hydrogen peroxide, or methylhydrazine had little effect on the filterability of suspensions of erythrocytes from vitamin E-supplemented rats, poisoned with lead or not. However, such chemical stress markedly reduced the filterability of red cells from vitamin E-deficient non-poisoned rats and the reduction was accentuated by lead poisoning. Under conditions which decreased filterability of erythrocytes from vitamin E-deficient lead-poisoned rats, hydrogen peroxide caused a great increase in red cell lipid peroxidation and smaller declines in glutathione and hemoglobin. These results show that a variety of mechanisms account for the decreased erythrocyte filterability caused by different chemical stresses and that the response to such stress can be greatly influenced by vitamin E status and/or lead exposure.

BIOLOGICAL ACTIVITY OF VITAMIN E COMPOUNDS AND NATURAL MATERIALS BY THE RESORPTION-GESTATION TEST, AND CHEMICAL DETERMINATION OF THE VITAMIN E ACTIVITY IN FOODS AND FEEDS. T. Leth and Helge S ndergaard (The Natl. Food Inst., Dept. for Determination of Nutr., M rkh j Bygade 19, 2860 S borg, Copenhagen, Denmark) *J. Nutr.* 107, 2236-43 (1977). The biological activity of the tocopherols and tocotrienols has been re-examined by the rat resorption-gestation test. The following values have been obtained (with *d,l*- α -tocopheryl acetate = 100%): *d*- α -tocopherol 80%; *d,l*- α -tocopherol 59%; *d*- α -tocopheryl acetate 136%; *d*- α -tocotrienol 13%; *d*- β -tocopherol 45%; *d*- β -tocotrienol 4%; *d*- γ -tocopherol 13%; *d*- γ -tocopherol less than 0.4%. The possibility of α - and γ -tocopherol being synergists has been tested, but no significant effect was found. The antioxidant BHT and ethoxyquin were without effect on the utilization of α -tocopherol by the rat. After chemical determination of the tocopherols and tocotrienols in foods and mixed feeds, these biological activities were used to calculate the vitamin E activity. For two samples of margarine and two samples of mixed feed, the calculated value of the vitamin E activity after chemical determination of the tocopherols and tocotrienols was compared with the value found by direct bioassay, and reasonably good agreement was found. The authors suggest that determination of vitamin E in foods and feeds as a rule should be carried out as a chemical determination of the individual tocopherols and tocotrienols followed by a calculation of the vitamin E activity from the biological activity of the tocopherols and tocotrienols.

STUDIES OF THE FORMATION AND RELEASE OF GLYCEROLIPIDS BY PRIMARY MONOLAYER CULTURES OF ADULT RAT HEPATOCYTES. R.G. Lamb, C.K. Wood, B.M. Landa, P.S. Guzelian and H.J. Fallon (Depts. of Pharmacol. and Med., Med. College of Virginia, Richmond, VA) *Biochim. Biophys. Acta* 489, 318-29 (1977). Primary monolayer culture of adult rat hepatocytes represents a relatively novel and potentially useful in vitro technique for studying various hepatic processes for extended periods of time. This study evaluates the potential of hepatocyte monolayers for studying hepatic glycerolipid biosynthesis. Hepatocyte monolayers synthesize glycerolipids from [14 C]glycerol and fatty acids and release them into the culture medium. Glycerolipid synthesis and release by monolayers declines 40 to 50% during the first 24 h of culture and these lower rates are maintained for at least 72 h. Triacylglycerol formation and release is dependent upon fatty acid concentration in the incubation medium although

phospholipid is not. Phospholipid and triacylglycerol release is reduced in monolayers exposed to colchicine for 24 h but only triacylglycerol release is lowered by the presence of cycloheximide. These results suggest release of triacylglycerol-containing lipoprotein by hepatocyte monolayers. However, we were unable to detect known apolipoprotein in the culture medium by immunologic techniques.

PLASMA CHOLESTEROL LEVELS IN RABBITS FED LOW FAT, CHOLESTEROL-FREE, SEMIPURIFIED DIETS: EFFECTS OF DIETARY PROTEINS, PROTEIN HYDROLYSATES AND AMINO ACID MIXTURES. M.W. Huff, R.M.G. Hamilton and K.K. Carroll (Dept. of Biochem., Univ. of Western Ontario, London, Ont. N6A 5C1, Canada) *Atherosclerosis* 28, 187-95 (1977). Rabbits become hypercholesterolemic when fed a low fat, cholesterol-free semisynthetic diet containing casein as the dietary protein. This did not occur when the casein was replaced by soy protein isolate or any one of seven other plant protein preparations. Doubling the amounts of either the casein or soy protein isolate from 25 to 50% by weight of the diet, made no significant difference to their effects on plasma cholesterol. Soy protein isolate was effective in counteracting the hypercholesterolemic response to casein when mixtures of the two proteins were fed. Better growth was obtained with mixtures of casein and soy protein isolate than with either protein alone. A moderate, but not significant, increase in plasma cholesterol was observed when a mixture of L-amino acids equivalent to soy protein isolate was fed. The results of these experiments indicate that the level of plasma cholesterol can be influenced by the amino acids supplied in the diet.

APOLIPOPROTEIN B RETENTION IN THE GROSSLY NORMAL AND ATHEROSCLEROTIC HUMAN AORTA. H.F. Hoff, C.L. Heideman, A.M. Gotto, Jr., and J.W. Gaubatz (Depts. of Neurol., Pathol. and Med., Baylor College of Med., Houston, TX) *Circ. Res.* 41, 684-90 (1977). Apolipoprotein B (apoB) was measured in buffer-extracted homogenates of grossly normal and atherosclerotic human aortic intima by means of an electroimmunoassay procedure. The apoB values which were expressed as μ g per mg tissue dry weight, varied widely, ranging from 0.34 to 18.45 in normal intima and from 0.8 to 12.5 in fatty fibrous plaques. No consistent differences in apoB content were found between normal intimas from thoracic and abdominal aortic regions. There was a statistically significant positive correlation between the quantity of buffer-extractable apoB in normal regions and the plasma cholesterol and triglyceride concentration. Buffer-extractable apoB values were significantly higher in fatty fibrous plaques than in ulcerated lesions from the same vessel. However, fatty fibrous plaque apoB values were significantly lower than those from grossly normal regions from the same aorta, although the topographical distribution of apoB was more widespread in plaques than in normal regions, as shown by immunofluorescence studies.

INFLUENCE OF α -DL-TOCOPHEROL ON FUNGAL LIPID COMPOSITION. N.J. Haley and R.C. Jack (Dept. of Biol. Sci., St. John's Univ., Jamaica, NY) *Biochim. Biophys. Acta* 489, 207-13 (1977). The addition of α -DL-tocopherol to growing cultures of the fungus *Glomerella cingulata* increased triacylglycerol content 50% or more but decreased the synthesis of triacylglycerols approximately 16-fold; moreover, α -tocopherol treated cultures had 10% to 85% less malonaldehyde than control cultures. These results suggest that α -tocopherol caused increased triacylglycerol content by decreasing triacylglycerol breakdown. In contrast, phosphoglyceride content and synthesis remained virtually unchanged by the addition of α -tocopherol. Our results suggest that α -tocopherol can be used to produce predictable shifts in the fatty acid composition of fungal phosphoglycerides. Such shifts can be useful tools in attempting to understand how changes in the fatty acid composition of phospholipids influence the physical properties and functions of cellular membranes.

BIOCHEMICAL AND IMMUNOLOGICAL EVIDENCE FOR THE PRESENCE OF AN APOLIPOPROTEIN B-LIKE COMPONENT IN THE SERUM LOW-DENSITY LIPOPROTEINS OF SEVERAL ANIMAL SPECIES. S. Goldstein, M.J. Chapman and G.L. Mills (Unit  35, Lab. de Recherche sur le M tabolisme des Lipides, I.N.S.E.R.M., H pital Henri Mondor, 94010 Creteil, France) *Atherosclerosis* 28, 93-100 (1977). The major component of the protein moiety of human LDL, i.e. apolipoprotein B, has been compared biochemically and immunologically with its counterpart in the LDL of several groups of animals (mammals, birds,

snakes and fish). A marked resemblance was found in the amino acid composition of the apo-B fractions from all the phylogenetic groups, although immunological cross-reactivity with human apolipoprotein B occurred only in the case of non-human primate (Old World monkey), non-primate mammalian (pig and guinea-pig) and bird (chicken) apo-B components (63%, 24% and about 8% respectively). The cross-reactivity of each animal apo-B component with its human counterpart was 7-14% lower than that observed between the parent LDL's. The resemblance in amino acid composition between the various apo-B preparations suggests that certain structural characteristics are required in this protein in order for it to bind and stabilize the liquid complement of serum LDL.

EFFECTS OF GROWTH TEMPERATURE AND SUPPLEMENTATION WITH EXOGENOUS FATTY ACIDS ON SOME PHYSICAL PROPERTIES OF CLOSTRIDIUM BUTYRICUM PHOSPHOLIPIDS. H. Goldfine, G.K. Khuller, R.P. Borie, B. Silverman, H. Selick II, N.C. Johnston, J.M. Vanderkooi and A.F. Horwitz (Dept. of Microbiol. and Dept. of Biochem. and Biophys., School of Med., Univ. of Pennsylvania, Philadelphia, PA) *Biochim. Biophys. Acta* **488**, 341-52 (1977). The effects of the compositional alterations induced in the plasmalogen-rich phospholipids of *Clostridium butyricum* by growth at different temperatures with biotin or at a given temperature on supplementation with exogenous fatty acids in the absence of biotin, have been studied in lipid dispersions with the spin probe 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO) and with the fluorescent probe diphenylhexatriene. Plots of TEMPO partitioning vs. temperature revealed deviations from linearity at 48° and 34.5°C for the phospholipids from cells grown on biotin at 37° and at 45° and 29°C for the phospholipids from cells grown on biotin at 25°C. Diphenylhexatriene fluorescence polarization showed a broad inflection beginning at 36°C for the lipids from 37°C-grown cells and at 32°C for the lipids from 25°C-grown cells. Maximum polarization was reached at -5°C in each sample.

HYPOCHOLESTEROLEMIC ACTION OF A NOVEL Δ^8 -DIHYDROABIETAMIDE DERIVATIVE, THD-341, IN RATS. H. Enomoto, Y. Yoshikuni, T. Ozaki, R. Zschecke and K. Ohata (Res. Lab., Nippon Shinyaku Co., Ltd., Kyoto, Japan) *Atherosclerosis* **28**, 205-15 (1977). The hypocholesterolemic properties of THD-341, N-(2,6-dimethylphenyl)- Δ^8 -dihydroabietamide, were studied in rats. THD-341 reduced serum cholesterol levels in cholesterol-fed rats at a concentration of less than 0.001% in the diet or an oral dose of less than 3 mg/kg, once a day. When compared in terms of the 50% inhibitory dose for serum cholesterol elevation (ID 50%, % in diet), THD-341 (0.0008%) was comparable to D-thyroxine (0.0005%), more potent than estradiol (0.003%), and far more potent than clofibrate (0.2%), β -sitosterol (0.8%), cholestyramine (2%), or nicotinic acid (3%). A daily intravenous injection of THD-341 was also effective (ID 50%: 7 mg/kg). THD-341 reduced serum and liver cholesterol in rats made hypercholesterolemic by 0.3% dietary thioracil or 0.25% dietary cholate. Liver cholesterol was more profoundly affected than the serum cholesterol. In normal rats, cholesterol was reduced in liver but not in serum. Its mechanism of action is unknown but the results suggest that THD-341 inhibits cholesterol absorption or re-absorption.

LOCALIZATION OF THE ENZYME SYSTEM FOR GLYCOSYLATION OF PROTEINS VIA THE LIPID-LINKED PATHWAY IN ROUGH ENDOPLASMIC RETICULUM. U. Czichi and W.J. Lennarz (Dept. of Physiol. Chem., The Johns Hopkins Univ. School of Med., Baltimore, MD) *J. Biol. Chem.* **252**, 7901-4 (1977). A crude preparation of microsomal membranes (postmitochondrial supernatant fraction) from the magnum portion of the hen oviduct was further subfractionated using a discontinuous sucrose gradient. Preparations of purified smooth surfaced membranes and rough endoplasmic reticulum, characterized by electron microscopy and nucleic acid content, were isolated. The enzymes involved in formation of mannose-containing glycoproteins via the lipid-linked pathway were shown to be localized in the rough endoplasmic reticulum. In contrast, a galactosyltransferase that catalyzed transfer of galactose to asialo-agalactosomucoid was localized in the smooth membrane fraction. There was no evidence for the involvement of lipid intermediates in the galactosyl transfer observed in this fraction.

SERUM CHOLESTEROL AND TRIGLYCERIDES IN PATIENTS SUFFERING FROM ISCHEMIC HEART DISEASE AND IN HEALTHY SUBJECTS. D.

Brunner, S. Altman, K. Loeb, S. Schwartz and S. Levin (Med. Dept. A, Government Hospital Jaffa, and Donolo Ins. of Physiological Hygiene, Tel Aviv Univ., Israel) *Atherosclerosis* **28**, 197-204 (1977). Serum cholesterol (CH) and triglyceride (TG) values were determined in 142 male and 58 female patients 35-74 years old, who suffered from angina pectoris (AP) or had a myocardial infarction (MI) (in the following referred to as ischemic heart disease (IHD) patients), as well as in 2219 male and 1469 female healthy normotensive subjects. Blood samples were taken in the fasting state. Blood from patients who had suffered from MI was examined three months after the acute event. The results suggest that in the population from which the two groups were recruited, elevated TG values were equal or superior to elevated CH values as indicators of coronary risk.

EFFECT OF ESSENTIAL OIL OF GARLIC ON SERUM FIBRINOLYTIC ACTIVITY IN PATIENTS WITH CORONARY ARTERY DISEASE. A.K. Bordia, H.K. Joshi, Y.K. Sanadhya and N. Bhu (Dept. of Med. and Cardiology, Ravindra Nath Tagore Med. College, Udaipur, India) *Atherosclerosis* **28**, 155-9 (1977). The effect of essential oil of garlic on serum fibrinolytic activity has been studied in 10 healthy individuals (group I); 10 patients with old myocardial infarction (group II) and in 20 patients with acute myocardial infarction (group III). Garlic was administered at the dosage equivalent to the essential oil extracted from 1 g of raw garlic per kg body weight. Groups I and II were administered garlic for a period of three months. Blood samples were collected initially, then monthly for the next 5 months. Group III was followed for 40 days and were allocated to two sub-groups, one receiving garlic and the other a placebo during the first 20 days only. Thus, garlic is of value in effectively increasing fibrinolytic activity, both during long terms use in chronic infarction cases as well as during the critical acute post-infarction period. The possible therapeutic role of essential oil of garlic in coronary artery disease has been discussed.

PHASE SEPARATION OF ACIDIC AND NEUTRAL PHOSPHOLIPIDS INDUCED BY HUMAN MYELIN BASIC PROTEIN. J.M. Boggs, M.A. Moscarello and D. Papahadjopoulos (Dept. of Biochem., Res. Inst., The Hosp. for Sick Children, Toronto, Ontario, Canada) *Biochemistry* **16**, 5420-6 (1977). Differential scanning calorimetry was used to detect lipid phase separation induced in mixtures of acidic and neutral phospholipids by myelin basic protein from human central nervous system myelin. Phosphatidic acid, phosphatidylglycerol, and phosphatidylserine mixtures with phosphatidylcholine (PC) were used and were shown to be nearly randomly mixed in the absence of the protein. Incorporation of basic protein into these mixtures caused a shift in the phase transition temperature toward the temperature of the PC component, indicating that it binds and separates out the acidic lipid leaving a PC-enriched phase. In some cases, a transition due to the acidic lipid-basic protein complex was also observed. The shift toward the transition temperature of the PC component occurred regardless of whether the PC was the lower melting or the higher melting component of the mixture. Thus, the protein does not just bind to the lipid which melts first, but binds to the acidic lipid even if it melts at a much higher temperature than the neutral lipid. If enough acidic lipid is available, the protein can bind to 27-34 molecules of acidic lipid per molecule of protein. At pH 7.4 basic protein has 38 basic residues; thus, nearly all of these can be involved in electrostatic binding to acidic lipid polar head groups resulting in lipid phase separation.

SYNTHESIS OF PHOSPHOLIPIDS IN MITOCHONDRIA AND OTHER MEMBRANE FRACTIONS OF RABBIT RETICULOCYTES. W. Augustin, J. Zborowski, J. Baranska, I. Wiswedel and L. Wojteczak (Inst. of Physiol. Chem., Med. School of Magdeburg, Leipziger Strasse 44, DDR-301 Magdeburg, G.D.R.) *Biochim. Biophys. Acta* **489**, 298-306 (1977). Reticulocytosis of 40-50% was obtained in rabbits by daily bleeding. Reticulocytes (plus erythrocytes) were subfractionated into plasma membrane fraction, mitochondria and the post-mitochondrial fraction. In all fractions, fatty acids were incorporated into phospholipids. This process was ATP dependent and represented acylation of lysophospholipids. Incorporation of fatty acids into lysophosphatidic and phosphatidic acids occurred only in the presence of sn-glycerol 3-phosphate and was observed in mitochondria and the post-mitochondrial fraction. It represents a two-step acylation of sn-glycerol 3-phosphate. Incorporation of phosphorylcholine from CDPcholine into phosphatidylcholine was observed in the mitochondrial and the post-mitochondrial fractions. This activity was correlated with

NADPH-cytochrome *c* reductase and was probably connected with the remnants of the endoplasmic reticulum.

RAMAN SPECTRA AND VIBRATIONAL ASSIGNMENTS FOR DEUTERATED MEMBRANE LIPIDS. 1,2-DIPALMITOYL PHOSPHATIDYLCHOLINE- D_6 AND $-D_{12}$. M.R. Bunow and I.W. Levin (Lab. of Chem. Phys., Nat. Inst. of Arthritis, Metabolism and Digestive Diseases, Bethesda, MD) *Biochim. Biophys. Acta* **489**, 191-206 (1977). Vibrational Raman spectra of polycrystalline 1,2-dipalmitoyl phosphatidylcholine- d_6 (fully deuterated choline methyl groups) and 1,2-dipalmitoyl phosphatidylcholine- d_{12} (fully deuterated acyl chains) were recorded in the 3050-2800, 2250-2050 and 1800-700 cm^{-1} regions. The fundamental vibrational modes were assigned primarily on the basis of isotopic frequency shift ratios, group frequency correlations and comparisons with specific model compounds. Since deuterium-substituted lipids provide well-isolated spectral probes, particularly in the carbon-deuterium stretching region, the dependence of the 2250-2050 cm^{-1} region on lipid phase was examined for the dipalmitoyl phosphatidylcholine- d_{12} species. The methylene CD_2 deformation and twisting modes at 984 and 919 cm^{-1} , respectively, also exhibit intense, isolated vibrational transitions which should prove useful for monitoring molecular order in mixed deuterated and undeuterated lipid systems.

PURIFICATION OF LYSOPHOSPHOLIPASES. APPLICATION OF A CONTINUOUS SPECTROPHOTOMETRIC ASSAY USING THIOESTER SUBSTRATE ANALOGS. A.J. Aarsman, J.D.R. Hille and H. Van Den Bosch (Lab. of Biochem., State Univ. of Utrecht, Padualaan 8, Utrecht, The Netherlands) *Biochim. Biophys. Acta* **489**, 242-6 (1977). Purification of lysophospholipases was monitored with four analogs of the natural lysophosphatidylcholine substrate, including two analogs with an acyl-thioester bond. In all chromatographic procedures employed, peaks of enzymatic activity towards each of the substrates were coincidental; moreover, the ratio of thioester to oxyester hydrolysis rates remained essentially constant over a more than 500-fold purification. These findings strongly support the conclusion that the hydrolysis of the thioester substrates truly reflects the specificity of lysophospholipases, thus allowing the use of a convenient spectrophotometric assay for these enzymes.

CARBON-13 NUCLEAR MAGNETIC RESONANCE STUDIES OF CHOLESTERYL ESTERS AND CHOLESTERYL ESTER/TRIGLYCERIDE MIXTURES. J.A. Hamilton, N. Oppenheimer and E.H. Cordes (Dept. of Chem., Indiana Univ., Bloomington, IN) *J. Biol. Chem.* **252**, 8071-80 (1977). Neat cholesteryl linoleate, neat cholesteryl oleate, and a mixture of these two esters containing 72% of the former have been examined by natural abundance ^{13}C NMR spectroscopy as a function of temperature. All three samples yield highly resolved NMR spectra including several narrow single carbon resonances well above the isotropic \rightarrow cholesteric phase transition temperature. In the isotropic phase, within 10° of the transition temperature, resonances for carbon atoms of the cholesterol ring system broaden significantly and differentially, indicating appreciable intermolecular pretransition ordering. In the cholesteric mesophase, resonances for the cholesterol ring system are broadened to the point of undetectability, although those for most carbons of the fatty acyl moiety remain narrow. In the smectic mesophase, resonances for carbon atoms of the fatty acyl moiety are significantly broadened. Comparison of the results obtained herein with previously obtained ^{13}C NMR spectra of human plasma low density lipoproteins at $35-36^\circ$ strongly suggests that cholesteryl esters in these particles are less motionally restricted than they are in neat liquid-crystalline phases.

THE STRUCTURE AND MORPHOLOGY OF THE ABNORMAL SERUM LIPOPROTEIN-X. H. Hauser, G. Kostner, M. Muller and P. Skrabal (Lab. fur Biochem., Eidgenossische Tech. Hochschule, Universitatstrasse 16, CH-8006 Zurich, Switzerland) *Biochim. Biophys. Acta* **489**, 247-61 (1977). The structure and morphology of an abnormal lipoprotein particle present in the serum of patients with obstructive jaundice has been investigated by gel filtration, electron microscopy and NMR spectroscopy. Lipoprotein-X is a spherical lipoprotein particle with an average Stokes diameter of ≈ 40 nm and a wide size distribution ranging from 20 to 70 nm. Different from all lipoprotein structures known so far lipoprotein-X is a hollow particle (= vesicle) with a water-filled internal cavity surrounded by a continuous, single bilayer which is impermeable to cations and $\text{K}_3\text{Fe}(\text{CN})_6$. The packing of the bilayer

is tighter and the segmental motion of both the polar group and the hydrocarbon chains are significantly reduced relative to typical phosphatidylcholine bilayers. In terms of segmental motion and anisotropy of packing the lipoprotein-X bilayer closely resembles a model bilayer system consisting of phosphatidylcholine, lysophosphatidylcholine, sphingomyelin and cholesterol mixed in the same molar ratio as in lipoprotein-X.

TRANSLOCATION OF PHOSPHOLIPIDS BETWEEN THE OUTER AND INNER MEMBRANES OF SALMONELLA TYPHIMURIUM. N.C. Jones and M.J. Osborn (Dept. of Microbiol., Univ. of Connecticut Health Ctr., Farmington, CT) *J. Biol. Chem.* **252**, 7405-12 (1977). The reversibility and specificity of phospholipid translocation between the inner and outer membrane of *Salmonella typhimurium* has been investigated by incorporating exogenous lipids from phospholipid vesicles into the outer membrane of intact cells. Translocation of newly incorporated phospholipids to the inner membrane was demonstrated by decarboxylation of vesicle-derived phosphatidylserine and by recovery of vesicle constituents in both inner and outer membrane fractions. All *Salmonella* phospholipids tested, as well as phosphatidylcholine and cholesteryl oleate were effectively translocated to the inner membrane. However, no translocation of vesicle-derived lipopolysaccharide or an incomplete biosynthetic precursor of lipid A could be detected. Translocation of phospholipids and cholesteryl ester was rapid and extensive, and appeared to lead to equilibration of the lipids between the two membranes. The mechanism of intermem-

When You Move

Attach old mailing label in space below for fastest service. If mailing label is not available, print your old company name and address in this box. Please allow six weeks for change to take effect.

Print your new business and home address here.

Business

Name _____

Title _____

Company _____

Address _____

City _____

State _____ Zip _____

Telephone _____

Home

Address _____

City _____

State _____ Zip _____

Telephone _____

Mail to: Joan Nelson, Circulation Manager, American Oil Chemists' Society, 508 South Sixth Street, Champaign, IL 61820